National Institute for Health and Care Excellence

Final

Rehabilitation for chronic neurological disorders including acquired brain injury

[G] Evidence review for rehabilitation for cognitive function

NICE guideline NG252

Evidence review underpinning recommendations 1.18.1 to 1.18.18, and a recommendation for research in the NICE guideline

October 2025

Final

This evidence review was developed by NICE

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Review question

What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

Introduction

Impairment in cognition can be a feature of many chronic neurological disorders. It can have a sudden onset, develop insidiously and progress gradually, or decline abruptly. Its impact can be focal to one specific cognitive skill, or widespread across cognitive domains. Examples include the abilities to concentrate, learn, remember, make decisions, read social cues, interact appropriately and organise one's life.

The damage is invisible and may be missed or misunderstood by the people with the neurological condition, their families, work colleagues, and health care professionals. However, the impact can be devastating.

The aim of this evidence review is to identify evidence on the effectiveness and cost-effectiveness of interventions designed to improve or maintain cognitive functioning in people with chronic neurological disorders.

Summary of the protocol

See Table 1 for a summary of the Population, Intervention, Comparison and Outcome (PICO) characteristics of this review.

Table 1: Summary of the protocol (PICO table)

Population	Adults and children with rehabilitation needs due to the following chronic neurological disorders: • Acquired brain injury • Acquired spinal cord injury • Acquired peripheral nerve disorders • Progressive neurological diseases • Functional neurological disorders
Intervention	• Intervention group 1: Interventions to improve and maintain executive function • Intervention group 2: Interventions to improve processing speed • Intervention group 3: Interventions to improve memory and learning • Intervention group 4: Interventions to improve social cognition • Interventions 5: Interventions to improve visual, spatial and perceptual functions. • Intervention group 6: Interventions to support orientation. • Intervention group 7: Interventions to improve attention

Comparison	Interventions compared with others in the same group or:
	• Placebo (placebo or sham)
	• Control (no intervention, waitlist, standard rehabilitation care alone, or 'usual care')
	• The same intervention (as listed under 'intervention') but varied in terms of:
	  ○ Frequency
	  ○ Intensity
	  ○ Timing
	  ○ Setting

Outcome	Critical • Physical and mental health related quality of life and social care related quality of life (assessed using standardised, validated, global scales such as EQ 5D, SF-12, SFMA, ASCOT and ICECAP-A). • Independence in ADLs (assessed using a standardised, validated, global measure such as COPM, Barthel ADL index, Katz, PSMS, OARS, PAT, EADL-Test, GAS) • Executive function (measured using a standardised, validated measure of global executive such as the Global Executive Composite, DEX, FrSBe [executive subscale only] and BRIEF-A) • Processing speed (assessed using a standardised, validated measure such as the Symbol Digit Modalities Test Reaction times and the WAIS-IV Processing Speed Index [Coding/Symbol Search]). • Memory (measured using a standardised, validated tool such as the Rivermead Behavioural Memory Test, Wechsler Memory Scales and the Everyday Memory Checklist.) • Social cognition (measured using a standardised, validated, global measure such as the BIRT Social Cognition Questionnaire, the Edinburgh Social Cognition Test and the Awareness of Social Inferences Test) • Perceptual function (measured using a standardised, validated measure of global perceptual function such as the Rivermead Perceptual Assessment Battery and VOSP) • Orientation (measured using a standardised, validated, global measure of orientation such as the Test of Orientation for Rehabilitation Patients, O-Log and GOAT.) • Attention (measured using a standardised, validated, global measure of attentional outcome such as TEA and TEA-Ch) • Physical and mental health related quality of life and social care related quality of life **Important** • Functioning (assessed using a standardised, validated measure of global functioning such as FIMFAM for adults or PEDI-CAT for children and young people) • Return to work, education, training (assessed objectively by a count of return to work, education, training or 'meaningful activity')

ADL: activity of daily living; ASCOT: Adults social care outcomes toolkit; BIRT: Brain injury rehabilitation trust; BRIEF-A: Behaviour rating inventory of executive function for adults; COPM: Canadian occupational performance measure; DEX: Dysexecutive questionnaire; EADL: extended activities of daily living; EQ 5D: EuroQoL five dimensions; FIMFAM: UK functional assessment measure; FrSBe: Frontal systems behaviour scale; GAS: Goal attainment scale; GOAT: Galveston orientation and amnesia test; ICECAP-A: ICEpop capability measure for adults; OARS: Older Americans resources and services; O-Log: Orientation log; PAT: Performance ADL test; PEDI-CAT: Paediatric evaluation of disability inventory- computer adaptive test; PSMS: Physical self-maintenance scale; SF-12: 12-item short form survey; SFMA: Selective functional movement assessment; TEA: Test of everyday attention; TEA-ch: Test of everyday attention for children; VOSP: Visual object and space perception battery; WAIS-IV: Wechsler adult intelligence scale, fourth edition

For further details see the review protocol in appendix A.

Methods and process

This evidence review was developed using the methods and process described in Developing NICE guidelines: the manual. Methods specific to this review question are described in the review protocol in appendix A and the methods document (supplement 1).

Declarations of interest were recorded according to NICE's conflicts of interest policy.

Effectiveness evidence

Included studies

Forty-one studies were included in this review: 38 randomised controlled trials (RCTs) (Bernini 2019, Blair 2021, Carr 2014, Cisneros 2021a, Cisneros 2021b, Costa 2014, Cuberos-Urbano 2018, de Giglio 2016, de Luca 2019a. de Luca 2019b, de Luca 2022, de Ruiter 2016, Emmanouel 2020, Fleming 2022, Gich 2015, Hanssen 2016, Jones 2021, Leonardi 2021, Lesniak 2014, Lesniak 2018, Lincoln 2020, Maggio 2018, Maggio 2022, Mantynen 2014, Martin 2014, Mattioli 2016, Messinis 2017, Messinis 2020, Ophey 2020, Pedulla 2016, Perez- Martin 2017, Phillips 2016, Piovesana 2017, Rilo 2018, Stubberud 2013, Stubberud 2014, Svaerke 2022, Tramontano 2024); 1 cluster RCT (das Nair 2019); 1 crossover RCT (Siponkoski 2020); and 1 stepped-wedge design RCT (Corti 2020).

The included studies are summarised in Table 2.

Sixteen studies focused on acquired brain injury (Cisneros 2021a, Cisneros 2021b, Corti 2020, Cuberos-Urbano 2018, das Nair 2019, de Luca 2019b, de Luca 2022, de Ruiter 2016, Emmanouel 2020, Fleming 2022, Jones 2021, Lesniak 2014, Lesniak 2018, Phillips 2016, Piovesana 2017, Siponkoski 2020) and 25 studies were focused on progressive neurological diseases (Bernini 2019, Blair 2021, Carr 2014, Costa 2014, de Giglio 2016, de Luca 2019a, Gich 2015, Hanssen 2016, Leonardi 2021, Lincoln 2020, Maggio 2018, Maggio 2022, Mantynen 2014, Martin 2014, Mattioli 2016, Messinis 2017, Messinis 2020, Ophey 2020, Pedulla 2016, Perez- Martin 2017, Rilo 2018, Stubberud 2013, Stubberud 2014, Svaerke 2022, Tramontano 2024).

Thirteen studies were conducted in Italy (Bernini 2019, Corti 2020, Costa 2014, de Giglio 2016, de Luca 2019a, de Luca 2019b, de Luca 2022, Leonardi 2021, Maggio 2018, Maggio 2022, Mattioli 2016, Pedulla 2016, Tramontano 2024); 4 studies were conducted in UK (Carr 2014, das Nair 2019, Lincoln 2020, Martin 2014); 4 studies were conducted in Canada (Blair 2021, Cisneros 2021a, Cisneros 2021b, Jones 2021); 4 studies were conducted in Spain (Cuberos-Urbano 2018, Gich 2015, Perez-Martin 2017, Rilo 2018); 3 studies were conducted in Australia (Fleming 2022, Phillips 2016, Piovesana 2017); 3 studies were conducted in Norway (Hanssen 2016, Stubberud 2013, Stubberud 2014); 3 studies were conducted in Greece (Emmanouel 2020, Messinis 2017, Messinis 2020); 2 studies were conducted in Finland (Mantynen 2014, Siponkoski 2020); 2 studies were conducted in Poland (Lesniak 2014, Lesniak 2018); 1 study was conducted in The Netherlands (de Ruiter 2016); 1 study was conducted in Denmark (Svaerke 2022); and 1 study was conducted in Germany (Ophey 2020.

Two studies investigated interventions to improve and maintain executive function versus a different intervention to improve and maintain executive function (Cuberos -Urbano 2018, Emmanouel 2020), but these studies were not pooled due to each investigating different interventions; 2 studies investigated interventions to improve memory and learning versus a different intervention to improve memory and learning (Lesniak 2014, Martin 2014), but these studies were not pooled due to each investigating different interventions; 3 studies investigated interventions targeting combinations of cognitive domains (as per the intervention groups in the protocols) versus different interventions targeting the same combinations of cognitive domains (Jones 2021, Mattioli 2016, Tramontano 2024); 2 studies investigated interventions to improve and maintain executive function versus placebo or sham (Costa 2014, Phillips 2016); 2 studies investigated interventions targeting combinations of cognitive domains versus placebo or sham (de Ruiter 2016, Messinis 2020); 7 studies investigated interventions to improve and maintain executive function versus control (Blair 2021, Hanssen 2016, Ophey 2020, Piovesana 2017, Stubberud 2013, Stubberud 2014, Svaerke 2022); 2 studies investigated interventions to improve memory and learning versus control (das Nair 2019, Fleming 2022); 16 studies investigated interventions targeting combinations of cognitive domains versus control (Bernini 2019, Carr 2014, Cisneros 2021a,

Cisneros 2021b, Corti 2020, de Giglio 2016, Fleming 2022, Gich 2015, Lesniak 2018, Lincoln 2020, Mantynen 2014, Messinis 2017, Perez-Martin 2017, Rilo 2018, Siponkoski 2020, Svaerke 2022); 1 study investigated an intervention to improve and maintain executive function (adaptive working memory cognitive training) versus a lower intensity intervention to improve and maintain executive function (non-adaptive working memory training) (Pedulla 2016); 1 study investigated a virtual intervention to improve attention versus a face-to-face intervention to improve attention (de Luca 2022); 6 studies investigated interventions targeting combinations of cognitive domains versus the same intervention differing in terms of frequency, intensity, timing or setting (de Luca 2019a, de Luca 2019b, Leonardi 2021, Lesniak 2018, Maggio 2018, Maggio 2022).

Four studies included children only (Corti 2020, de Ruiter 2016, Phillips 2016, Piovesana 2017) and 37 studies included adults only (Bernini 2019, Blair 2021, Carr 2014, Cisneros 2021a, Cisneros 2021b, Costa 2014, Cuberos-Urbano 2018, das Nair 2019, de Giglio 2016, de Luca 2019a, de Luca 2019b, de Luca 2022, Emmanouel 2020, Fleming 2022, Gich 2015, Hanssen 2016, Jones 2021, Leonardi 2021, Lesniak 2014, Lesniak 2018, Lincoln 2020, Maggio 2018, Maggio 2022, Mantynen 2014, Martin 2014, Mattioli 2016, Messinis 2017, Messinis 2020, Ophey 2020, Pedulla 2016, Perez- Martin 2017, Rilo 2018, Siponkoski 2020, Stubberud 2013, Stubberud 2014, Svaerke 2022, Tramontano 2024).

Data for the following outcomes were identified through analysis of the included studies:

- Physical and mental health related quality of life & social care related quality of life
- Independence in ADLs
- Executive function
- Processing speed
- Memory
- Perceptual function
- Attention

See the literature search strategy in appendix B and study selection flow chart in appendix C.

Excluded studies

Studies not included in this review are listed, and reasons for their exclusion are provided in appendix K.

Summary of included studies

Summaries of the studies that were included in this review are presented in Table 2.

Table 2: Summary of included studies

Study	Population	Intervention	Comparison	Outcomes
Bernini 2019 RCT Italy	N=41 adults with Parkinson's disease • CoRe plus standard physical rehabilitation: n=23 • Standard physical rehabilitation only: n=18 Age in years [Mean (SD)]:	Computerised cognitive rehabilitation (CoRe) plus standard physical rehabilitation 3x45-minute sessions per week for 4 weeks in inpatient hospital setting. Ontology-based software tool which allowed personalised	Standard physical rehabilitation only Exercise or physical activity (same frequency, duration, and number of sessions as intervention arm). Cardiovascular warm-up activities	• Executive function • Processing speed • Memory (working memory) • Memory (long-term declarative memory)

Study	Population	Intervention	Comparison	Outcomes
	• CoRe plus standard physical rehabilitation: 71.18 (7.04) • Standard physical rehabilitation only: 69.33 (7.72) Sex (M/F): • CoRe plus standard physical rehabilitation: n=6/n=11 • Standard physical rehabilitation only: n=11/n=7 Chronic neurological disorder category: Progressive neurological disease.	cognitive (logical-executive) exercises. Participants also received the same standard physical rehabilitation care as the control arm. Protocol intervention group: Interventions to improve and maintain executive function, processing speed, visual, spatial and perceptual functions, and attention.	and exercises to improve range of motion, strength, balance and postural control.	• Perceptual function • Attention • Attention (working memory and attention composite)
Blair 2021 RCT Canada	N=30 adults with multiple sclerosis • Online working memory training (Cogmed): n=15 • Standard medical care: n=15 Age in years [Mean (SD)]: • Online working memory training (Cogmed): 51.07 (7.29) • Standard medical care: 52.13 (8.71) Sex (M/F): • Online working memory training (Cogmed): n=3/n=12 • Standard medical care: n=6/n=9 Chronic neurological disorder category: Progressive neurological diseases.	Online working memory training (Cogmed) 1x 30-45-minute session per day, 5 days a week for 5 weeks in patient's own home. Adaptive training with levels adjusted in real based on performance. Each participant was assigned a qualified coach in the use of Cogmed who provided structure, motivation and feedback on progress to optimise training gains. Each session involved various tasks focusing on different aspects of working memory. Protocol intervention group: Interventions to improve memory and learning.	Standard medical care No further details reported.	• Physical and mental health related quality of life and social care related quality of life • Executive function • Processing speed • Memory (working memory) • Functioning • Attention (working memory, processing speed and attention composite)
Carr 2014 RCT	N=48 adults with multiple sclerosis	Memory rehabilitation programme	Usual care Standard care and other rehabilitation	• Physical and mental health related quality of life and

Study	Population	Intervention	Comparison	Outcomes
UK	• Memory rehabilitation programme: n=24 • Usual care: n=24 Age in years [Mean (SD)]: • Memory rehabilitation programme: 55.8 (10.2) • Usual care: 52.9 (11.8) Sex (M/F): • Memory rehabilitation programme: n=7/n=17 • Usual care: n=8/n=16 Chronic neurological disorder category: Progressive neurological diseases.	10x 1.5-hour group sessions with homework per week and delivered by assistant psychologists in outpatient unit. The program incorporated restitution and compensation strategies, attention training, internal memory strategies, and external memory aids. Protocol intervention group: Interventions to improve memory and learning and attention.	services, such as physiotherapy and occupational therapy, proceeded as normal.	social care related quality of life • Memory (global memory)
Cisneros 2021a RCT Canada	N=37 adults with traumatic brain injury • Cognitive enrichment programme: n=23 • Usual care: n=14 Age in years [Mean (SD)]: • Cognitive enrichment programme: 64.9 (7.18) • Usual care: 63.75 (5.63) Sex (M/F): • Cognitive enrichment programme: n=14/n=6 • Usual care: n=5/n=7 Chronic neurological disorder category: Acquired brain injury.	Cognitive enrichment programme 2x 90-minute sessions per week for 12 weeks, delivered by neuropsychologists in inpatient hospital settings. Programme consisted of 3 modules: Introduction and self-awareness, Attention and memory, and executive function. Protocol intervention group: Interventions to improve and maintain executive function, memory and learning, and attention.	Usual care Usual care involved individual interventions focusing on resumption of daily activities and social roles. Interventions aimed at reducing the impact of cognitive difficulties in daily life used self-guided and environmental strategies.	• Executive function • Processing speed

Study	Population	Intervention	Comparison	Outcomes
Cisneros 2021b RCT Canada	N=37 adults with traumatic brain injury • Cognitive enrichment programme: n=23 • Usual care: n=14 Age in years [Mean (SD)]: See Cisneros 2021a. Sex (M/F): See Cisneros 2021a. Chronic neurological disorder category: Acquired brain injury.	Cognitive enrichment programme See Cisneros 2021a. Protocol intervention group: Interventions to improve and maintain executive function, memory and learning, and attention.	See Cisneros 2021a.	• Physical and mental health related quality of life and social care related quality of life • Processing speed • Attention (working memory and attention composite)
Corti 2020 Stepped-wedge design RCT Italy	N=48 children and young people with acquired brain injury • Computerised cognitive training (Lumosity Cognitive Training): n=24 • Waitlist control: n=24 Age in years [Mean (SD)]: • Computerised cognitive training (Lumosity Cognitive Training): 13.83 (1.65) • Waitlist control: 13.50 (1.99) Sex (M/F): • Computerised cognitive training (Lumosity Cognitive Training): n=12/n=6 • Waitlist control: n=11/n=3 Chronic neurological disorder category: Acquired brain injury.	Computerised cognitive training (Lumosity Cognitive Training) 2x 20-minute sessions per day, 5 times per week for 8 weeks in the community. All training was performed at home and included game-like exercises aimed at stimulating cognitive domains (memory, attention, cognitive flexibility, speed, and problem-solving). The programme was able to automatically adjust the training difficulty to the individual using it. Protocol intervention group: Interventions to improve and maintain executive function, processing speed, memory and learning, and attention.	Waitlist control	• Executive function • Memory (working memory)
Costa 2014 RCT Italy	N=17 adults with Parkinson's disease • Prospective memory exercises: n=9 • Simple cognition exercises: n=8	Prospective memory exercises 3x 45-minute sessions per week for 1 month delivered within the community.	Simple cognition exercises 3x 45-minute sessions per week for 1 month	• Attention

Study	Population	Intervention	Comparison	Outcomes
	Age in years [Mean (SD)]: • Prospective memory exercises: 66.1 (7.1) • Simple cognition exercises: 70.9 (4.8) Sex (M/F): Not reported Chronic neurological disorder category: Progressive neurological diseases.	Paper and pen exercises where participants had to alternately select between stimuli belonging to different semantic categories with exercises increasing in difficulty. Protocol intervention group: Interventions to improve and maintain executive function.	delivered within the community. Participants performed simple cognitive exercises for language abilities and respiratory exercises.	
Cuberos-Urbano 2018 RCT Spain	N=16 adults with acquired brain injury • GMT plus lifelog: n=8 • GMT only: n=8 Age in years [Mean (SD)]: • GMT plus lifelog: 34.13 (14.13) • GMT only: 37.25 (10.99) Sex (M/F): Not reported Chronic neurological disorder category: Acquired brain injury	Goal management training (GMT) plus lifelog 2x 1-hour sessions per week for 7 weeks delivered in outpatient setting by occupational therapists or neuropsychologists. GMT was delivered as per the control group with lifelog devices which recorded participants' everyday experiences between sessions. These recordings were used to identify situations where goal-neglect behaviours arose, to provide specific feedback about real-life problems, and to raise awareness and boost ongoing monitoring of slips. Protocol intervention group: Interventions to improve memory and learning.	Goal management training (GMT) only 2x 1-hour sessions per week for 7 weeks delivered in outpatient setting by occupational therapists or neuropsychologists. GMT was delivered in a group setting and used cognitive exercises and psychoeducation to enhance goal control.	• Executive function • Processing speed • Memory (working memory)
das Nair 2019 Cluster RCT	N=328 adults with traumatic brain injury • Manualised memory rehabilitation plus usual care: n=171	Manualised memory rehabilitation plus usual care 1x 1.5-hour session per week for 10 weeks	Usual care only No further details reported.	• Physical and mental health related quality of life and social care

Study	Population	Intervention	Comparison	Outcomes
UK	• Usual care only: n=157 Age in years [Mean (SD)]: • Manualised memory rehabilitation plus usual care: 45.8 (11.5) • Usual care only: 45.1 (12.5) Sex (M/F): • Manualised memory rehabilitation plus usual care: n=123/n=48 • Usual care only: n=116/n=41 Chronic neurological disorder category: Acquired brain injury.	delivered in the community by clinical psychologist. Sessions followed a treatment manual provided by a facilitator and included restitution, strategies to improve encoding and retrieval, and compensation strategies. Protocol intervention group: Interventions to improve memory and learning.		related quality of life • Memory (global memory)
de Giglio 2016 RCT Italy	N=24 adults with multiple sclerosis • Video-game based cognitive rehabilitation: n=12 • Waitlist control: n=12 Age in years [Mean (SD)]: • Video-game based cognitive rehabilitation: 43.7 (7.6) • Waitlist control: 40.2 (10.1) Sex (M/F): • Video-game based cognitive rehabilitation: n=4/n=8 • Waitlist control: n=6/n=6 Chronic neurological disorder category: Progressive neurological diseases.	Video-game based cognitive rehabilitation 1x 30-minutes per day, 5 days a week for 8 weeks delivered in outpatient setting and patients' home and patient directed. A psychologist gave instructions on how to use the console and perform the training. Video game training focusing on memory, attention, visual spatial processing, and calculation. Protocol intervention group: Interventions to improve memory and learning, visual, spatial and perceptual functions, and attention.	Waitlist control	• Processing speed • Attention (working memory, processing speed and attention composite)

Study	Population	Intervention	Comparison	Outcomes
de Luca 2019a RCT Italy	N=60 adults with Parkinson's disease • COCR: n=30 • Standard cognitive training: n=30 Age in years [Mean (SD)]: • COCR: 61.9 (11.5) • Standard cognitive training: 63.2 (7.3) Sex (M/F): • COCR: n=16/n=14 • Standard cognitive training: n=15/n=15 Chronic neurological disorder category: Progressive neurological diseases.	Computerised cognitive rehabilitation (COCR) 3x 60-minute sessions per week for 8 weeks delivered in inpatient setting (rehabilitation clinic) by therapist. Specific exercises to improve cognitive domains adapted to ability on a computerised cognitive tool. Tasks had playful interactions to promote patient's motivation while audio-video feedback encouraged awareness of performance. Protocol intervention group: Interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention.	Standard cognitive training 3x 60-minute sessions per week for 8 weeks delivered in inpatient setting (rehabilitation clinic) by therapist. Face-to-face interactions along with pen and paper representations of the same exercises performed in the COCR condition.	• Executive function • Memory (global memory) • Perceptual function • Attention (attention and orientation composite)
de Luca 2019b RCT Italy	N=100 adults with traumatic brain injury • VRT (BTS-Nirvana): n=50 • Traditional cognitive rehabilitation: n=50 Age in years [Mean (SD)]: • VRT (BTS-Nirvana): 38.7 (9.3) • Traditional cognitive rehabilitation: 41.1 (10.8) Sex (M/F): • VRT (BTS-Nirvana): n=29/21 • Traditional cognitive rehabilitation: n=26/24 Chronic neurological disorder category: Acquired brain injury.	Virtual reality training (VRT, BTS-Nirvana) 3x 1-hour sessions per week for 8 weeks delivered in inpatient (rehabilitation clinic) by a therapist. Semi-immersive program for motor and cognitive rehabilitation where participants interacted with virtual scenarios and audio-visual stimuli to rehabilitate attention, visual-spatial, and executive functions. Protocol intervention group: Interventions to improve and maintain executive function, visual, spatial and perceptual functions, and attention.	Traditional cognitive rehabilitation 3x 1-hour sessions per week for 8 weeks delivered in inpatient (rehabilitation clinic) by a therapist. Participants underwent similar training targeted at executive function, attention and visual-spatial cognition as the VRT group but using face-to-face interactions with pen and paper activities. Exercises included tasks of simple association (letter-	• Executive function • Attention

Study	Population	Intervention	Comparison	Outcomes
			colour), inhibitory control, arithmetic operations, estimating numerical quantity and categorisation, performed deductive logical reasoning, and exercises targeting attention processes and visual-spatial cognition.	
de Luca 2022 RCT Italy	N=30 adults with traumatic brain injury • VRB-APT: n=15 • CAP-T: n=15 Age in years [Mean (SD)]: • VRB-APT: 44.6 (14.44) • CAP-T: 42.53 (17.95) Sex (M/F): • VRB-APT: n=7/n=8 • CAP-T: n=7/n=8 Chronic neurological disorder category: Acquired brain injury.	Virtual reality based-attention processes training (VRB-APT) 3x 45-minute sessions per week for 8 weeks delivered in outpatient setting by a psychiatric therapist. Participants used a device with interactive activities for attention rehabilitation and oculo-motor coordination tasks. Cognitive training was based on a game interaction using augmented feedback. The therapist planned and organised all virtual exercises increasing the difficulty. Protocol intervention group: Interventions to improve attention.	Conventional attention processes training (CAP-T) 3x 45-minute sessions per week for 8 weeks delivered in outpatient setting by a cognitive therapist. Attention focussed programme consisting of pen and paper exercises, with a face-to-face approach. The programme was based on meta-cognitive strategy and psychoeducational interventions.	• Attention
de Ruiter 2016 RCT The Netherlands	N=80 children and young people who were survivors of brain tumour • Neurofeedback training: n=40 • Placebo: n=40 Age in years [Mean (SD)]: • Neurofeedback training: 14.45 (2.99)	Neurofeedback training 2x 30-minute sessions per week for 15 weeks delivered in the community by trained trainers. Each session consisted of 10x 3-minute mini-sessions with 1-minute rest breaks in between. All modules were set to provide 80% positive	Placebo No further details reported.	• Processing speed • Memory (short-term memory)

Study	Population	Intervention	Comparison	Outcomes
	• Placebo: 13.45 (3.28) Sex (M/F): • Neurofeedback training: n=16/n=18 • Placebo: n=19/n=18 Chronic neurological disorder category: Acquired brain injury.	reinforcement training and 20% negative reinforcement training. Reinforcement was based on individually determined thresholds which were adjusted automatically during sessions. Protocol intervention group: Interventions to improve processing speed, memory and learning, and Attention*. *No information was provided about how different cognitive domains were targeted; protocol group was inferred based on trial name.		
Emmanouel 2020 RCT Greece	N=18 adults with acquired brain injury • GMT plus WMT: n=9 • WMT only: n=9 Age in years [Mean (SD)]: • GMT plus WMT: 33.6 (7.9) • WMT: 36.0 (10.1) Sex (M/F): • GMT plus WMT: n=5/n=4 • WMT: n=7/n=2 Chronic neurological disorder category: Acquired brain injury.	Goal management training (GMT) plus working memory training (WMT) 3-4x 30-minute sessions per week (11 sessions in total) by a neuropsychologist in outpatient rehabilitation centres and participant's homes. Participants were introduced to goal management training by a trainer (which included orienting, defining goals, listing steps, learning steps, monitoring and checking, using catchphrases, verbal instructions, and visual cue cards). Participants were also introduced to a working memory strategy involving imagery and visual aids (for example, the steps of a ladder). Participants practiced internalising these tools, before visual	Working memory training (WMT) only 3-4x 30-minute sessions per week (11 sessions in total) by a neuropsychologist in outpatient rehabilitation centres and participant's homes. Participants improved their working memory skills using a 9-step training technique (1. Repeat the current information; 2. Keep it in mind; 3. Go 1 activity back; 4. Repeat together the previous and current information; 5. Hold them in mind and 6. Decide what to do; 7. Say the outcome and 8. Repeat it	• Executive function • Processing speed • Memory (working memory) • Attention

Study	Population	Intervention	Comparison	Outcomes
		cues were removed. This process was repeated when teaching further goals. At the end of each session, participants were asked to recall their learning in previous sessions. Protocol intervention group: Interventions to improve and maintain executive function.	internally; 9. Keep it until the next action). In later sessions, participants practiced internalising the technique.	
Fleming 2022 RCT Australia	N=52 adults with traumatic brain injury • COMP: n=17 • COMP-MST: n=17 • Waitlist control: n=18 Age in years [Mean (SD)]: • COMP: 40.24 (14.02) • COMP-MST: 37.35 (13.38) • Waitlist control: 39.44 (14.11) Sex (M/F): • COMP: n=13/n=4 • COMP-MST: n=16/n=1 • Waitlist control: n=11/n=7 Chronic neurological disorder category: Acquired brain injury.	Compensation strategy training (COMP) 0.5-hour active control plus 1.5-hour compensatory training delivered by a therapist in outpatient clinic. Education on prospective memory and the impact of traumatic brain injury on this, and appropriate assistive technologies to compensate for prospective memory impairment (for example, smart phone or electronic calendar). Protocol intervention group: Interventions to improve memory and learning Compensation strategy training plus metacognitive skills training (COMP-MST) 0.5-hour metacognitive skills training plus 1.5-hour compensatory training delivered by a therapist in outpatient clinic. Included COMP with an incorporation of metacognitive skills training within each	Waitlist control	• Independence in ADLs • Memory (prospective memory)

Study	Population	Intervention	Comparison	Outcomes
		prospective memory training session. Protocol intervention group: Interventions to improve and maintain executive function, and memory and learning.		
Gich 2015 RCT Spain	N=43 adults with multiple sclerosis • MS-Line! cognitive rehabilitation: n=22 • No intervention: n=21 Age in years [Mean (SD)]: • MS-Line! cognitive rehabilitation:45.5 (9.6) • No intervention: 44.0 (8.3) Sex (M/F): • MS-Line! cognitive rehabilitation: n=6/n=16 • No intervention: n=8/n=13 Chronic neurological disorder category: Progressive neurological diseases.	MS-Line! cognitive rehabilitation 2x 75-minute sessions per week for 6 months delivered in outpatient hospital setting. Each session combined 25-minutes of written, 25-minutes of manipulative and 25-minutes of computer-based materials or games (for example, crosswords, maths problems, spatial games, origami, computer-based logic and reasoning games). All materials had different levels of difficulty, and clues were provided. Patients and family members were also asked to do a short (5-minute) daily cognitive exercise together at home. Protocol intervention group: Interventions to improve and maintain executive function, processing speed, and memory and learning.	No intervention	• Executive function • Processing speed • Memory (working memory) • Memory (long-term declarative memory) • Attention • Attention (working memory and attention composite) • Attention (working memory, processing speed and attention composite)
Hanssen 2016 RCT Norway	N=120 people with multiple sclerosis • Cognitive rehabilitation plus standard rehabilitation: n=60 • Standard rehabilitation only: n=60 Age in years [Mean (SD)]: Not reported, Mean (range):	Cognitive rehabilitation plus standard rehabilitation Three 2-hour sessions as inpatients and 6 bi-weekly 10-minute telephone sessions delivered by a neuropsychologist and occupational therapist.	Standard rehabilitation only Participants received neuropsychological assessment and participated in the standard 4-week rehabilitation program of individual follow-up with a multidisciplinary	• Physical and mental health related quality of life and social care related quality of life • Executive function

Study	Population	Intervention	Comparison	Outcomes
	• Cognitive rehabilitation plus standard rehabilitation: 53.9 (33-70) • Standard rehabilitation only: 52.5 (32-71) Sex (M/F): • Cognitive rehabilitation plus standard rehabilitation: n=20/n=40 • Standard rehabilitation only: n=12/n=48 Chronic neurological disorder category: Progressive neurological diseases.	Sessions were performed in groups of 3-6 patients and included lectures, practical exercises and discussions during the first week and individual sessions during the 2nd and 3rd week. Techniques from both motivational interviewing and cognitive behavioural therapy were used to support the goal setting process. Protocol intervention group: Interventions to improve and maintain executive function.	team, with an opportunity to consult a clinical psychologist and attend lectures on cognitive and psychological aspects of multiple sclerosis.	
Jones 2021 RCT Canada	N=15 people with acquired brain injury • MACT: n=8 • APT: n=7 Age in years [Mean (SD)]: • MACT: 51.9 (11.02) • APT: 55.4 (10.54) Sex (M/F): • MACT: n=7/n=1 • APT: n=6/n=1 Chronic neurological disorder category: Acquired brain injury.	Music attention control training (MACT) 45-minute sessions per week for 3 weeks delivered by an onsite researcher in a community setting. Modelled according to the APT with exercises translated to live musical instruments. Eight exercises were included per session. Protocol intervention group: Interventions to improve and maintain executive function, and attention	Attention process training (APT) 45-minute sessions per week for 3 weeks delivered by an onsite researcher in a community setting. Computerised version of APT. Tasks included sustained and selective attention control, and cognitive control with increasing difficulty. Eight exercises were included per session.	• Attention
Leonardi 2021 RCT Italy	N=30 adults with multiple sclerosis • Virtual reality cognitive rehabilitation: n=15 • Conventional cognitive rehabilitation: n=15	Virtual reality cognitive rehabilitation Three 45-minute sessions per week for 8 weeks delivered in an outpatient (rehabilitation clinic) setting.	Conventional cognitive rehabilitation Three 45-minute sessions per week for 8 weeks delivered in an outpatient	• Executive function • Processing speed • Memory (long-term declarative memory) • Attention (working

Study	Population	Intervention	Comparison	Outcomes
	Age in years [Mean (SD)]: • Virtual reality cognitive rehabilitation: 57.4 (7.9) • Conventional cognitive rehabilitation: 51.8 (1.0) Sex (M/F): • Virtual reality cognitive rehabilitation: n=7/n=8 • Conventional cognitive rehabilitation: n=5/n=10 Chronic neurological disorder category: Progressive neurological diseases.	Each session involved stimulation of specific cognitive domains (attention, verbal and visuo-spatial memory and executive function training) and increasing difficulty. Participants used a VR medical device, with 2D exercises where participants used a touchscreen or magnetic tracking sensor, and 3D exercises where participants interacted with immersive scenarios and virtual objects. Protocol intervention group: Interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention.	(rehabilitation clinic) setting. Traditional cognitive rehabilitation with face-to-face approach. Sessions involved stimulation of specific cognitive domains (attention, verbal and visuo-spatial memory and executive function training) in increasing difficulty.	memory, processing speed and attention composite)
Lesniak 2014 RCT Poland	N=26 adults with traumatic brain injury • a-tDCS plus cognitive rehabilitation programme: n=14 • Sham a-tDCS plus cognitive rehabilitation programme: n=12 Age in years [Mean (SD)]: • a-tDCS plus cognitive rehabilitation programme: 28.3 (9) • Sham a-tDCS plus cognitive rehabilitation programme: 29.3 (7.7) Sex (M/F): Data only reported for whole study population, not by allocation group,	Anodal transcranial magnetic stimulation (a-tDCS) plus cognitive rehabilitation Five 10-minute simulations per week for 3 weeks delivered in an inpatient and outpatient neurorehabilitation unit. Cumulative anodal transcranial direct current stimulation of the left dorsolateral prefrontal cortex (1 mA for 10 minutes; current density =0.028 mA/cm^2) delivered prior to a cognitive rehabilitation session. The current intensity was gradually increased at the beginning of the session and gradually decreased at the end of the session to	Sham anodal transcranial magnetic stimulation (a-tDCS) plus cognitive rehabilitation Five 10-minute simulations per week for 3 weeks delivered in an inpatient and outpatient neurorehabilitation unit. Sham transcranial direct current stimulation (1 mA for the first 25 seconds of a 10-minute stimulation period) delivered prior to a cognitive rehabilitation session.	• Memory (working memory) • Memory (long-term declarative memory) • Attention • Attention (working memory, processing speed and attention composite)

Study	Population	Intervention	Comparison	Outcomes
	• n=17/n=6 Chronic neurological disorder category: Acquired brain injury.	diminish the perception of current. The rehabilitation programme was computer based and focused on internal memory strategies. Patients completed exercises in which they practiced these techniques and difficulty levels were adjusted according to participants capabilities. Protocol intervention group: Interventions to improve memory and learning.	The rehabilitation programme was computer based and focused on internal memory strategies. Patients completed exercises in which they practiced these techniques and difficulty levels were adjusted according to participants capabilities.	
Lesniak 2018 RCT Poland	N=65 adults with acquired brain injury • Individual memory rehabilitation: n=23 • Group memory rehabilitation: n=22 (n=18 analysed) • No intervention: n=20 Age in years [Mean (SD)]: • Individual memory rehabilitation: 39.6 (15) • Group memory rehabilitation: 41.3 (15) • No intervention: 42.2 (14) Sex (M/F): • Individual memory rehabilitation: n=17/n=6 • Group memory rehabilitation: n=11/n=7 • No intervention: n=13/n=7 Chronic neurological disorder category: Acquired brain injury.	Individual memory rehabilitation 15 60-minute sessions held over 3 weeks delivered by a psychologist. Same internal memory strategies were taught as those in the group sessions; however, memory exercises were taught using computer software. The therapy involved increasing awareness and teaching memory strategies such as mind mapping, active reading and imagination to improve everyday memory. Exercises ranged in difficulties adjusted to the individual and were supervised by a psychologist. Participants were encouraged to complete homework where they used newly learned strategies. Protocol intervention group: Interventions to improve and maintain	No intervention	• Memory (global memory) • Memory (working memory) • Memory (long-term declarative memory) • Attention

Study	Population	Intervention	Comparison	Outcomes
		executive function, memory and learning, and attention. Group memory rehabilitation 15 60-minute sessions held over 3 weeks delivered by a facilitator. Group therapy was structured covering various aspects of rehabilitation after traumatic brain injury. Groups consisted of 3-6 participants and run by a facilitator. The therapy involved increasing awareness and teaching memory strategies such as mind mapping, active reading and imagination to improve everyday memory, as well as grouping strategies and were taught using questionnaires and quizzes, interactive multimedia presentations, discussions and brainstorming. Patients were asked to share their memory problems and coping methods. Participants were encouraged to complete homework where they used newly learned strategies. Protocol intervention group: Interventions to improve and maintain executive function, memory and learning, and attention.		
Lincoln 2020 RCT UK	N=449 adults with multiple sclerosis • Cognitive rehabilitation plus usual care: n=245	Cognitive rehabilitation plus usual care Once per week for 10 sessions, delivered in	Usual care only Comprised of general advice from multiple sclerosis nurse	• Processing speed • Memory (global memory)

Study	Population	Intervention	Comparison	Outcomes
	• Usual care only: n=204 Age in years [Mean (SD)]: • Cognitive rehabilitation plus usual care: 49.9 (9.8) • Usual care only: 48.9 (10.0) Sex (M/F): • Cognitive rehabilitation plus usual care: n=67/n=178 • Usual care only: n=56/n=148 Chronic neurological disorder category: Progressive neurological diseases.	groups of 4-6 by an assistant psychologist. The intervention comprised of restitution strategies (internal and external) designed to retrain attention and memory functions and encoding and retrieval. 'Homework' was given to help generalise techniques to daily life. Protocol intervention group: Interventions to improve memory and learning, and attention.	specialists and occupational therapists on how to manage cognitive difficulties and signposting to online information. All other clinical services, and support from specialist charities, were available as part of usual care.	• Memory (working memory) • Memory (long-term declarative memory) • Attention • Attention (working memory, processing speed and attention composite)
Maggio 2018 RCT Italy	N=20 adults with Parkinson's disease • Virtual reality cognitive and motor rehabilitation (BTS-Nirvana): n=10 • Standard cognitive rehabilitation: n=10 Age in years [Mean (SD)]: • Virtual reality cognitive and motor rehabilitation (BTS-Nirvana): 69.9 (6.3) • Standard cognitive rehabilitation: 68.9 (10.05) Sex (M/F): • Virtual reality cognitive and motor rehabilitation (BTS-Nirvana): n=6/n=4 • Standard cognitive rehabilitation: n=4/n=6 Chronic neurological disorder category:	Virtual reality cognitive and motor rehabilitation (BTS-Nirvana) Three 60-minute sessions per week for 8 weeks delivered in an outpatient setting by a therapist. Recreated events were generally 3-dimensional reproducing real live events and objects. The virtual reality device uses infrared sensors, a projector, and large screen to recreate an interactive series of exercises, whereby participants use their movements to engage with virtual scenarios and audio-visual stimuli, leading to a sensory involvement that particularly aids rehabilitation of executive function, attention and	Standard cognitive rehabilitation Three 60-minute sessions per week for 8 weeks delivered in an outpatient setting by a therapist. Face-to-face cognitive rehabilitation targeting the same domains as the intervention group using pen and paper activities.	• Executive function • Memory (global memory) • Perceptual function • Attention (attention and orientation composite)

Study	Population	Intervention	Comparison	Outcomes
	Progressive neurological diseases.	visuospatial skills. Exercises were standardised with increasing difficulty tailored to individuals. Protocol intervention group: Interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention.		
Maggio 2022 RCT Italy	N=60 adults with multiple sclerosis • Semi-immersive virtual reality cognitive rehabilitation: n=30 • Traditional cognitive rehabilitation: n=30 Age in years [Mean (SD)]: • Semi-immersive virtual reality cognitive rehabilitation: 51.9 (9.9) • Traditional cognitive rehabilitation: 48.2 (12.2) Sex (M/F): • Semi-immersive virtual reality cognitive rehabilitation: n=18/n=12 • Traditional cognitive rehabilitation: n=13/n=17 Chronic neurological disorder category: Progressive neurological diseases.	Semi-immersive virtual reality cognitive rehabilitation Three 60-minute sessions per week for 8 weeks delivered in an outpatient setting by a therapist. Intervention used virtual reality to provide participants with cognitive rehabilitation training in real-life scenarios targeting cognitive and motor performance.* Protocol intervention group: Interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention. *No information was provided about how different cognitive domains were targeted; protocol group was inferred based on trial name.	Traditional cognitive rehabilitation 3 x 60-minute sessions per week for 8 weeks delivered in an outpatient setting by a therapist. All basic cognitive rehabilitation exercises followed a pre-determined protocol, which targeted cognitive and motor performance, with progression depending on individual's level. A face-to-face format with pen and paper exercises was used.* *No information was provided about how different cognitive domains were targeted; protocol group was inferred based on trial name.	• Memory (working memory) • Memory (short-term memory) • Memory (long-term declarative memory) • Perceptual function • Attention (working memory, processing speed and attention composite)
Mantynen 2014 RCT Finland	N=102 adults with multiple sclerosis • Neuropsychological rehabilitation: n=60 • No intervention: n=42	Neuropsychological rehabilitation One 1-hour session per week for 13 weeks delivered in an outpatient setting.	No intervention	• Processing speed • Memory (working memory) • Memory (long-term

Study	Population	Intervention	Comparison	Outcomes
	Age in years [Mean (SD)]: • Neuropsychological rehabilitation: 43.5 (8.7) • No intervention: 44.1 (8.8) Sex (M/F)*: • Neuropsychological rehabilitation: n=13/n=45 • No intervention: n=9/n=31 Chronic neurological disorder category: Progressive neurological diseases. *Data only available for participants analysed (n=98) rather than randomised.	Described as attention retraining and teaching compensatory strategies plus psychological support to better cope with cognitive impairments. Protocol intervention group: Interventions to improve and maintain executive function and attention.		declarative memory) • Attention • Attention (working memory, processing speed and attention composite)
Martin 2014 RCT UK	N=39* adults with multiple sclerosis • Compensation: n=12 • Restitution: n=17 • Self-help: n=10 Age in years [Mean (SD)]: • Compensation: 48.3 (10.8) • Restitution: 45.2 (7.5) • Self-help: 47.7 (10.9) Sex (M/F): • Compensation: n=3/n=9 • Restitution: n=4/n=13 • Self-help: n=3/n=7 Chronic neurological disorder category: Progressive	Compensation One 1.5-hour session per week for 10 weeks delivered by a trained clinical psychologist in an outpatient setting. Participants were taught to use internal memory aids and errorless learning techniques (a teaching technique where a skill is taught and immediately prompted, preventing the chance of incorrect responses). Participants in the compensation group learned how to use external memory aids such as diaries. Protocol intervention group: Interventions to improve memory and learning.	Restitution One 1.5-hour session per week for 10 weeks delivered by a trained clinical psychologist in an outpatient setting. Participants were taught to use internal memory aids and errorless learning techniques. Participants in the restitution group learned exercises for encoding and retrieval, attention-retraining exercises such as letter and number cancellation.	• Physical and mental health related quality of life and social care related quality of life • Independence in ADL • Memory (global memory)

Study	Population	Intervention	Comparison	Outcomes
	neurological diseases. Note: Data only analysed for participants randomised to 'compensation' and 'restitution' groups.			
Mattioli 2016 RCT Italy	N=20 adults with multiple sclerosis • a-tDCS plus cognitive training: n=10 • Sham a-tDCS plus cognitive training: n=10 Age in years [Mean (SD)]: • a-tDCS plus cognitive training: 38.2 (10.0) • Sham a-tDCS plus cognitive training: 47.4 (10.4) Sex (M/F): • a-tDCS plus cognitive training: n=3/n=7 • Sham a-tDCS plus cognitive training: n=1/n=9 Chronic neurological disorder category: Progressive neurological diseases.	Anodal transcranial magnetic stimulation (a-tDCS) plus cognitive training Five 30-minute sessions per week for 2 weeks delivered by psychologists in a community setting. Training consisted of modified PASAT tasks including months and words tasks. Months tasks included 60 randomly presented nouns (names and months) and participants were required to name which month of the last 2 presented is first in a calendar year. In the words task, 60 words were verbally presented to participants. After each word, participants were asked to create a new word starting with the 3rd letter of the previously presented word. Difficulty increased based on the speed of participants. Brain stimulation occurred with a current flow of 2mA via 2 conducting electrodes. Protocol intervention group: Interventions to improve processing speed, and attention.	Sham anodal transcranial magnetic stimulation (a-tDCS) plus cognitive training Five 30-minute sessions per week for 2 weeks delivered by psychologists in a community setting. Participant received the same training as the intervention group with sham brain stimulation.	• Executive function • Processing speed • Memory (long-term declarative memory) • Memory (working memory) • Attention (working memory, processing speed and attention composite)
Messinis 2017	N=58 adults with multiple sclerosis • Computerised cognitive	Computerised cognitive rehabilitation (RehaCom® modules)	Usual care	• Executive function

Study	Population	Intervention	Comparison	Outcomes
RCT Greece	rehabilitation (RehaCom® modules): n=32 • Usual care: n=26 Age in years [Mean (SD)]: • Computerised cognitive rehabilitation (RehaCom® modules): 46.03 (7.97) • Usual care: 45.15 (9.65) Sex (M/F): • Computerised cognitive rehabilitation (RehaCom® modules): n=10/n=22 • Usual care: n=8/n=13 Chronic neurological disorder category: Progressive neurological diseases.	Two 60-minute sessions per week for 10 weeks delivered by speech and language therapists or psychologists and supervised by a clinical neuropsychologist. Individualised and domain/task specific sessions, for example focusing on episodic memory, information processing speed/attention, and executive functions. Difficulty levels are automatically adjusted according to whether the patient successfully completes each task. Protocol intervention group: Interventions to improve and maintain executive function, processing speed, memory and learning, and attention.	No further details reported.	• Processing speed • Memory (working memory) • Memory (long-term declarative memory) • Attention
Messinis 2020 RCT Greece	N=36 adults with multiple sclerosis • Computerised cognitive rehabilitation (RehaCom® modules): n=19 • Sham cognitive intervention: n=17 Age in years [Mean (SD)]: • Computerised cognitive rehabilitation (RehaCom® modules): 46.47 (4.1) • Sham cognitive intervention: 45.29 (3.9) Sex (M/F): • Computerised cognitive	Computerised cognitive rehabilitation (RehaCom® modules) Three 45-minute sessions per week for 8 weeks delivered in the community (home-based) and directed by patient or caregiver. Individualised and domain/task specific sessions, for example focusing on episodic memory, information processing speed/attention, and executive functions. Difficulty levels are automatically adjusted according to whether the patient successfully completes each task. Sessions were completed under	Sham cognitive intervention Three 45-minute sessions per week for 8 weeks delivered in the community (home-based) and directed by patient/caregiver. Non-specific computerized activities such as solving puzzles, reading magazine or newspaper articles. Sessions were completed under 'supervision' of caregivers/relatives (able to help with accessing materials but	• Physical and mental health related quality of life and social care related quality of life • Processing speed • Memory (working memory)

Study	Population	Intervention	Comparison	Outcomes
	rehabilitation (RehaCom® modules): n=7/n=12 • Sham cognitive intervention: n=5/n=12 Chronic neurological disorder category: Progressive neurological diseases.	'supervision' of caregivers/relatives (able to help with accessing materials but instructed not to help with exercises/games). Patients and caregivers received training from psychologists initially and were contacted every week to encourage adherence and address any difficulties. Protocol intervention group: Interventions to improve and maintain executive function, processing speed, memory and learning, and attention	instructed not to help with exercises or games). Psychologists visited during the first session to ensure PCs were functioning and showed patients or caregivers how to access materials. They also contacted the patient every week to encourage adherence and address any difficulties.	
Ophey 2020 RCT Germany	N=76 adults with Parkinson's disease • Computerised working memory training: n=37 • Waitlist control: n=39 Age in years [Mean (SD)]: • Computerised working memory training: 64.09 (8.56) • Waitlist control: 63.88 (8.39) Sex (M/F): • Computerised working memory training: n=19/n=18 • Waitlist control: n=21/n=17 Chronic neurological disorder category: Progressive neurological diseases.	Computerised working memory training Five 30-minute sessions per week for 5 weeks delivered in community (home-based) setting. The computerised working memory training included 5 working memory tasks. Tasks were adapted according to user progression. Training was accompanied with weekly telephone calls from the researcher in case of any issues or questions. Protocol intervention group: Interventions to improve and maintain executive function.	Waitlist control	• Processing speed • Memory (working memory) • Attention • Attention (working memory and attention composite
Pedulla 2016 RCT	N=28 people with multiple sclerosis • Adaptive working memory cognitive	Adaptive working memory cognitive training (COGNI-TRAcK)	Non-adaptive working memory cognitive training (COGNI-TRAcK)	• Executive function • Processing speed

Study	Population	Intervention	Comparison	Outcomes
Italy	training (COGNI-TRAcK): n=14 • Non-adaptive working memory cognitive training (COGNI-TRAcK): n=14 Age in years [Mean (SD)]: • Adaptive working memory cognitive training (COGNI-TRAcK): 49.0 (7.1) • Non-adaptive working memory cognitive training (COGNI-TRAcK): 46.1 (11.2). Sex (M/F): • Adaptive working memory cognitive training (COGNI-TRAcK): n=5/n=9 • Non-adaptive working memory cognitive training (COGNI-TRAcK): n=3/n=11 Chronic neurological disorder category: Progressive neurological diseases.	Five 30-minute sessions per week for 8 weeks, self-administered and in the community (home-based). Sessions included 3 different types of exercises (each lasting around 10 minutes). These were: a visuospatial working memory task; an "operation" N-back task; and a "dual" N-back task. The difficulty level was automatically increased by 1 step every time an exercise was successfully completed and reduced by 1 step if a participant is unsuccessful 3 times in a row. Protocol intervention group: Interventions to improve and maintain executive function.	Five 30-minute sessions per week for 8 weeks, self-administered and in the community (home-based). Sessions included 3 different types of exercises (each lasting around 10 minutes). These were: a visuospatial working memory task; an "operation" N-back task; and a "dual" N-back task. One of two low difficulty levels were selected at random regardless of the participants performance.	• Memory (working memory) • Memory (long-term declarative memory) • Attention (working memory, processing speed and attention composite)
Perez-Martin 2017 RCT Spain	N=62 adults with multiple sclerosis • Computer-assisted neuropsychological cognitive training programme: n=30 • Waitlist control: n=32 Age in years [Mean (SD)]: • Computer-assisted neuropsychological cognitive training programme: 44.93 (9.89) • Waitlist control: 40.88 (8.50) Sex (M/F):	Computer-assisted neuropsychological cognitive training programme One 60-75-minute session per week for 12 consecutive weeks, delivered in outpatient (hospital clinic) setting. The programme focused on attention, processing speed, memory and executive functions through computerised and paper and pencil tasks and was standardised. Patients were provided with a booklet after	Waitlist control Participants received a booklet with guidelines and lifestyle advice on cognitive functioning, and information on their own cognitive status.	• Processing speed • Memory (working memory) • Memory (long-term declarative memory) • Attention (working memory, processing speed and attention composite)

Study	Population	Intervention	Comparison	Outcomes
	• Computer-assisted neuropsychological cognitive training programme: n=12/n=18 • Waitlist control: n=18/n=14 Chronic neurological disorder category: Progressive neurological diseases.	each session including exercises to practice at home to reinforce learning and encourage cognitive activity between sessions. Each session included 10 minutes at the start to review previous session and exercises between sessions, and discuss applying content to daily life. Protocol intervention group: Interventions to improve and maintain executive function, processing speed, memory and learning, and attention.		
Phillips 2016 RCT Australia	N=27 children and young people with traumatic brain injury • Adaptive working memory cognitive training (Cogmed): n=13 • Non-adaptive working memory cognitive training: n=14 Age in years [Median (IQR))]: • Adaptive working memory cognitive training (Cogmed): 11.82 (3.98) • Non-adaptive working memory cognitive training: 12.75 (2.62) Sex: Not reported Chronic neurological disorder category: Acquired brain injury.	Adaptive working memory cognitive training (Cogmed) Five 30-40-minute sessions per week for 5 weeks, delivered in community setting via weekly phone calls and check-ins by trained psychologist. The training involved a number of tasks that required storage and manipulation of verbal and/or visuospatial information. Each session included 8 from 12 possible pre-determined exercises, with difficulty level calculated on a trial-by-trial basis. Protocol intervention group: Interventions to improve and maintain executive function.	Non-adaptive working memory cognitive training Five 30-40-minute sessions per week for 5 weeks, delivered in community setting via weekly phone calls and check-ins by trained psychologist. The training was identical to the Cogmed training except that the working memory load was low and was not calculated on trial-by-trial basis.	• Attention
Piovesana 2017 RCT Australia	N=60 children and young people with acquired brain injury • Move it to improve it (Mitii™): n=30 • Usual care: n=30	Move it to improve it (Mitii™) Six 30-minute sessions per week for 20 weeks delivered in community setting. Therapists	Usual care Usual care (physiotherapy and occupational therapy) received during study	• Executive function • Attention

Study	Population	Intervention	Comparison	Outcomes
	Age in years [Mean (SD)]: • Move it to improve it (Mitii™): 11.10 (1.6) • Usual care: 11.11 (2.6) Sex (M/F): • Move it to improve it (Mitii™): n=15/n=14 • Usual care: n=17/n=12 Chronic neurological disorder category: Acquired brain injury. *Data only available for participants analysed (n=58) rather than randomised.	explained the programme, but it was performed at home without a practitioner. Participants received training and were provided with all material necessary to complete the 'Move it to improve it programme', including equipment to track body movement of children when completing training module. Families were provided with motivational strategies to keep their children motivated. The programme ranges in difficulties and can be delivered to left, right or bimanually impaired functions. Individualised programmes were designed according to the baseline assessment results. Modules were selected from 11 available and were targeted at gross motor or physical activity, combined cognitive and visual perception or upper limb modules for an individualised program time of 30 minutes. Protocol intervention group: Interventions to improve and maintain executive function*. *No information was provided about how executive function was targeted; protocol group was inferred from trial aim.	period. No further details reported.	
Rilo 2018 RCT Spain	N=42 adults with multiple sclerosis • Integrative cognitive rehabilitation	Integrative cognitive rehabilitation programme (REHACOP)	Waitlist control	• Processing speed • Memory (working memory)

Study	Population	Intervention	Comparison	Outcomes
	programme (REHACOP): n=21 • Waitlist control: n=21 Age in years [Mean (SD)]: • Integrative cognitive rehabilitation programme (REHACOP): 43.90 (9.51) • Waitlist control: 43.67 (6.89) Sex (M/F): • Integrative cognitive rehabilitation programme (REHACOP): n=8/n=13 • Waitlist control: n=7/n=14 Chronic neurological disorder category: Progressive neurological diseases.	Three 1-hour group sessions per week for 12 weeks, delivered in outpatient setting (multiple sclerosis association centre) by neuropsychologists, plus 3 tasks per week completed at home. The programme is divided into eight consecutive modules, starting with basic cognitive processes and advancing to more complex domains and activities of daily living: attention, learning and memory, language, executive functions, social cognition, social skills, activities of daily living, and psychoeducation. Patients were instructed to complete exercises at home during the learning and memory module to promote the generalisation of the strategies learned to daily life activities. Protocol intervention group: Interventions to improve and maintain executive function, memory and learning, social cognition, and attention.		• Attention • Attention (working memory and attention composite)
Siponkoski 2020 Crossover RCT Finland	N=40 adults with traumatic brain injury • Neurological musical therapy plus standard care: n=20 • Standard care only: n=20 Age in years [Mean (SD)]: • Neurological musical therapy plus standard care: 41.6 (14.7)	Neurological musical therapy plus standard care Two 60-minute sessions per week for 3 months delivered by trained musical therapist in community setting. The intervention focussed on active musical production with different instruments. The intervention	Standard care only No further details reported.	• Executive function • Memory (working memory)

Study	Population	Intervention	Comparison	Outcomes
	• Standard care only: 40.9 (12.0) Sex (M/F)*: • Neurological musical therapy plus standard care: n=10/n=10 • Standard care only: n=13/n=6 Chronic neurological disorder category: Acquired brain injury. *Data only available for participants analysed (n=39) rather than randomised.	included rhythmical training, structured cognitive-motor training, and assisted music playing. All modules included different difficulty levels which were adjusted to the individual and raised for progression. The intervention tapped into a number of executive (action planning and monitoring, inhibitory control, shifting), attentional (focused attention, spatial attention, vigilance), and working memory (updating) functions as well as motor (motor control, eye-movement coordination) and emotional (affect regulation, emotional expression) functions. Standard care was received in addition to the intervention. No details on what standard care entailed reported. Protocol intervention group: Interventions to improve and maintain executive function and attention.		
Stubberud 2013 RCT Norway	N=38 adults with spina bifida myelomeningocele • GMT: n=24 • Waitlist control: n=14 Age in years [Mean (SD)]: • GMT: 31.79 (8.38) • Waitlist control: 31.79 (8.50) Sex (M/F): • GMT: n=10/n=14 • Waitlist control: n=6/n=8	Goal management therapy (GMT) 7 GMT modules, minimum of 3 hours per module completed in three blocks of 3-day sessions with one month interval after each 3-day session, delivered by clinical neuropsychologist and nurse or social worker in inpatient setting. Participants received a PowerPoint presentation and	Waitlist control	• Attention

Study	Population	Intervention	Comparison	Outcomes
	Chronic neurological disorder category: Progressive neurological diseases.	workbooks, and sessions involved interactive discussions and exercises to increase awareness of GMT. Throughout the intervention, participants were encouraged to discuss their real-life executive problems, and how GMT strategies could be applied to these difficulties. Participants received training in stopping and orienting to relevant information, partitioning goals into subgoals, encoding and retaining goals, monitoring performance, and mindfulness. Protocol intervention group Interventions to improve and maintain executive function.		
Stubberud 2014 RCT Norway	N=38 adults with spina bifida myelomeningocele • Goal management training (GMT): n=24 • Waitlist control: n=14 Age in years [Mean (SD)]: See Stubberud 2013. Sex (M/F): See Stubberud 2013. Chronic neurological disorder category: Progressive neurological disease.	Goal management therapy (GMT) See Stubberud 2013. Protocol intervention group: Interventions to improve and maintain executive function.	Waitlist control	• Executive function • Functioning
Svaerke 2022 RCT Denmark	N=30 adults with Parkinson's disease • CBCR Professional Brain Training: n=10 • CBCR Brain + Parkinson Recover: n=10	Computer-based cognitive rehabilitation (CBCR) Professional Brain Training Five 18-24 minutes training per week for 8 weeks and follow up visit with a	No intervention	• Physical and mental health related quality of life and social care related quality of life • Processing speed

Study	Population	Intervention	Comparison	Outcomes
	• No intervention: n=10 Age in years [Mean (SD)]: • CBCR Professional Brain Training: 65.8 (9.9) • CBCR Brain + Parkinson Recover: 63.6 (8.2) • No intervention: 64.5 (11.0) Sex (M/F): • CBCR Professional Brain Training: n=3/n=5 • CBCR Brain + Parkinson Recover: n=8/n=0 • No intervention: n=3/n=5 Chronic neurological disorder category: Progressive neurological diseases.	neuropsychologist every second visit. 8 computer-based exercises targeting executive function were chosen with 9 levels of difficulty that encouraged advancing to the next level when a task was solved correctly (>75%) twice in a row. Protocol intervention group: Interventions to improve and maintain executive function. Computer-based cognitive rehabilitation (CBCR) Brain + Parkinson Recover Three 30-40 minutes training per week for 8 weeks and follow up visit with a neuropsychologist every second visit. Participants used 4 available exercises in the programme: one exercise aimed at episodic memory and 3 different exercises aimed at processing speed, working memory, and strategic thinking. The “Brain+ Parkinson Recover” edition is a modified version of the original app designed for cognitive rehabilitation, which starts out less difficult, advances more slowly, and has a more simple and manageable design. Each time a user completed a game in the app, feedback about performance is provided, and the level of difficulty increases or decreases accordingly.		• Attention • Attention (working memory and attention composite)

Study	Population	Intervention	Comparison	Outcomes
		Protocol intervention group: Interventions to improve and maintain executive function, processing speed, and memory and learning.		
Tramontano 2024 RCT Italy	N=38 adults with multiple sclerosis • CMg: n=19 • CTg: n=19 Age in years [Mean (SD)]: • CMg: 48.92 (10.13) • CTg: 46.58 (11.13) Sex (M/F)*: • CMg: n=1/n=11 • CTg: n=5/n=7 Chronic neurological disorder category: Progressive neurological diseases. *Data only available for participants analysed (n=24) rather than randomised.	Cognitive motor therapy (CMg) Three 50-minute sessions per week for 4 weeks, delivered by a physical therapist. In addition to conventional neuromotor therapy involving techniques such as muscle stretching, mobilisations, gait training, and balance exercises, cognitive motor therapy participants engaged in dual-task paradigm involving rotating their heads towards auditory stimuli while identifying visual targets and walking on unstable surfaces and treadmill. Protocol intervention group: Interventions to improve and maintain executive function and attention.	Cognitive therapy (CTg) Three 50-minute sessions per week for 4 weeks, delivered by a physical therapist. In addition to conventional neuromotor therapy involving techniques such as muscle stretching, mobilisations, gait training, and balance exercises, cognitive therapy participants focused on attention and executive functions using RehaCom® software such as memorising and identifying target stimuli among similar ones.	• Processing speed

2D: 2-dimensional; 3D: 3-dimensional; ADLs: activities of daily living; cm: centimetre; mA: milliampere; MS: multiple sclerosis; PASAT: paced auditory serial addition test; RCT: randomised controlled trial; SD: standard deviation;

See the full evidence tables in appendix D and the forest plots in appendix E.

Summary of the evidence

For clarity of reporting, any effect estimates where the 95% confidence interval crossed a line of no effect has been interpreted as no important difference, regardless of whether the point estimate exceeds the minimally important difference.

In addition to the individual outcomes listed in the protocol, scales measuring more than one protocol domain were extracted and analysed as composite outcomes. Cognitive domains are often interlinked and relevant interventions generally targeted multiple areas of cognition so the composite outcomes captured the breadth of effects.

No important differences between groups were observed on any outcomes for the following comparisons:

- Interventions to improve and maintain executive function compared with each other in adults
- Interventions to improve memory and learning compared with each other in adults
- Interventions to improve and maintain executive function and attention compared with each other in adults
- Interventions to improve and maintain executive function compared to placebo/sham in children
- Interventions to improve and maintain executive function compared to placebo/sham in adults
- Interventions to improve processing speed, memory and learning and attention compared to placebo/sham in children
- Interventions to improve and maintain executive function compared to control in children
- Interventions to improve and maintain executive function compared to control in adults
- Interventions to improve and maintain executive function and memory and learning compared to control in adults
- Interventions to improve and maintain executive function, memory and learning, and attention compared to control in adults
- Interventions to improve and maintain executive function, processing speed, memory and learning, and attention compared to control in children
- Interventions to improve and maintain executive function, processing speed, memory and learning, and attention compared to control in adults
- Interventions to improve and maintain executive function, memory and learning, social cognition and attention compared to control in adults
- Group interventions to improve and maintain executive function, memory and learning, and attention compared to control in adults
- Virtual interventions to improve and maintain executive function, visual, spatial and perceptual functions, and attention compared to face-to-face interventions to improve and maintain executive function, visual, spatial and perceptual functions, and attention in adults.

All evidence in these protocol intervention groups was judged to be of moderate to very low quality. Effect estimates were all marked down for imprecision, or risk of bias and typically only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Exceptions where there were important differences between groups are detailed below.

Interventions to improve processing speed and attention (Cognitive + anodal transcranial direct current stimulation (a-tDCS)) compared to interventions to improve and maintain processing speed and attention (Cognitive + Sham) in adults

There was evidence of an important benefit for change in processing speed from baseline to post-intervention, and change in a composite outcome of working memory, processing speed, and attention from baseline to follow-up, for adults who received a cognitive intervention combined with a-tDCS targeting processing speed and attention when compared to the same cognitive intervention targeting processing speed and attention that used sham stimulation. No important differences were found for this comparison for change in processing speed from baseline to follow-up or change from baseline to post-intervention for the working memory, processing speed and attention composite.

No important differences were found for all other outcomes for this comparison: change in executive function from baseline to post-intervention and follow-up, change in working

memory from baseline to post-intervention and follow-up, and change in long-term declarative memory from baseline to post-intervention and follow-up.

All evidence in this protocol intervention group was judged to be either very low or low quality. Effect estimates where no difference was found between interventions were all marked down for imprecision, and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Interventions to improve and maintain executive function; processing speed; memory and learning; and attention compared to placebo/sham in adults

An important benefit was found for processing speed measured post-intervention for adults who received an intervention to improve and maintain executive function, processing speed, memory and learning, and attention compared to those who received placebo or sham.

No important differences were found for this comparison for physical and mental health related quality of life and social care related quality of life measured post-intervention, and working memory measured post-intervention when compared to placebo/sham.

All evidence in this protocol intervention group was judged to be of low quality. Effect estimates where no difference was found between interventions were all marked down for imprecision and risk of bias, and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Interventions to improve memory and learning compared to control in adults

Important benefits were found for adults who received interventions to improve memory and learning for independence in activities of daily living measured post-intervention and at end of follow-up.

There were no important differences for physical and mental health related quality of life and social care related quality of life measured post-intervention and at end of follow-up, prospective memory measured post-intervention and at end of follow-up, and global memory measured at post-intervention and end of follow-up.

All evidence in this protocol intervention group was judged to be either very low or low quality. Effect estimates where no difference was found between interventions were all marked down for imprecision, risk of bias, and some for indirectness, and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Interventions to improve and maintain executive function and attention compared to control in adults

For interventions to improve and maintain executive function and attention there was an important benefit for working memory measured at the end of follow-up compared to control in adults; however, no differences were found for all other outcomes for this comparison: executive function measured post-intervention, processing speed measured post-intervention and at end of follow-up, working memory measured post-intervention, long-term declarative memory measured post-intervention and at end of follow-up, attention measured post-intervention and at end of follow-up, and a composite outcome of working memory, processing speed and attention measured post-intervention and at end of follow-up.

All evidence in this protocol intervention group was judged to be low or moderate quality. Effect estimates where no difference was found between interventions were all marked down for imprecision and risk or bias, and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Interventions to improve memory and learning and attention compared to control in adults

An important benefit was also found for physical and mental health related quality of life and social care related quality of life measured at the end of follow-up in adults who received interventions to improve memory and learning and attention compared to those who received control. No important differences were found for all other outcomes for this comparison: physical and mental health related quality of life and social care related quality of life measured post-intervention, processing speed measured post-intervention and at end of follow-up, global memory measured post-intervention and at end of follow-up, working memory measured at post-intervention and end of follow-up, long-term declarative memory measured post-intervention and at end of follow-up, attention measured post-intervention and at end of follow-up, and a composite working memory, processing speed and attention outcome measured post-intervention and at end of follow-up.

All evidence in this protocol intervention group was judged to be of low to very low quality. Effect estimates where no difference was found between interventions were marked down for imprecision and risk of bias and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Interventions to improve and maintain executive function; processing speed; and memory and learning compared to control in adults

Several important benefits were for found for interventions to improve and maintain executive function, processing speed, and memory and learning compared to control in adults: change in executive function from baseline to post-intervention, change in processing speed from baseline to post-intervention, change in working memory from baseline to post-intervention, change in long-term declarative memory from baseline to post-intervention, change in attention from baseline to post-intervention, change in a working memory and attention composite from baseline to post-intervention, and change in a working memory, processing speed, and attention composite outcome from baseline to post-intervention.

No important differences were found for this comparison on the outcomes of physical and mental health related quality of life and social care related quality of life measured post-intervention, processing speed measured post-intervention, attention measured post-intervention, and on the working memory and attention composite measured post-intervention.

All evidence in this protocol intervention group was judged to be of moderate to very low quality. Effect estimates where no difference was found between interventions were marked down for imprecision and risk of bias and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Interventions to improve memory and learning; visual, spatial and perceptual functions; and attention compared to control in adults

There was an important benefit for a working memory, processing speed and attention composite outcome measured post-intervention in adults who received an intervention to improve memory and learning, visual, spatial and perceptual functions, and attention compared to those in the control condition.

There was no evidence of important difference for this comparison for processing speed measured post-intervention.

All evidence in this protocol intervention group was judged to be of moderate quality. Effect estimates where no difference was found between interventions were marked down for imprecision and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Interventions to improve and maintain executive function; processing speed; visual, spatial and perceptual functions; and attention compared to control in adults

Important benefits were also found for an intervention to improve and maintain executive function, processing speed, visual, spatial and perceptual functions, and attention compared to control in adults, for the following outcomes: executive function measured post-intervention and at end of follow-up, working memory measured at the end of follow-up, long-term declarative memory measured post-intervention, and a composite outcome of working memory and attention measured post-intervention and at the end of follow-up.

No important differences were found for processing speed measured post-intervention and at end of follow-up, working memory measured post-intervention, long-term declarative memory measured at the end of follow-up, perceptual function measured post-intervention and at end of follow-up, and attention measured post-intervention and at end of follow-up.

All evidence in this protocol intervention group was judged to be of low to very low quality. Effect estimates where no difference was found between interventions were marked down for imprecision and risk of bias and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Higher intensity intervention to improve and maintain executive function compared to lower intensity intervention to improve and maintain executive function in adults

For the comparison of a higher intensity intervention to improve and maintain executive function in adults compared to the same intervention at a lower intensity, evidence of important benefit was found for executive function measured post-intervention, working memory measured post-intervention, and long-term declarative memory measured post-intervention.

No important differences were found for the other outcomes: processing speed measured post-intervention, and a working memory, processing speed and attention composite outcome measured post-intervention.

All evidence in this protocol intervention group was judged to be of very low quality. Effect estimates where no difference was found between interventions were marked down for imprecision and risk of bias and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Virtual interventions to improve attention compared to Face-to-face interventions to improve attention in adults

For the comparison of virtual interventions to improve attention compared to face-to-face interventions to improve attention in adults, there was a statistically significant difference for attention post-intervention favouring virtual interventions over face-to-face interventions.

The evidence was judged to be very low quality and was marked down for imprecision and risk of bias and only came from 1 study.

Group interventions to improve and maintain executive function; memory and learning; and attention compared to individual interventions to improve and maintain executive function; memory and learning; and attention in adults

For the comparison of group interventions to improve and maintain executive function; memory and learning; and attention compared to individual interventions to improve and maintain executive function; memory and learning; and attention in adults, evidence of important harm was found for long-term declarative memory post-intervention.

No important differences were found for the other outcomes: global memory post-intervention and end of follow-up, long-term declarative memory end of follow-up, attention post-intervention and end of follow-up.

No statistically significant results were found for the outcomes working memory post-intervention and end of follow-up.

All evidence in this protocol intervention group was judged to be of low to very low quality. Effect estimates where no difference was found between interventions were marked down for imprecision and risk of bias and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention compared to Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention in adults

For the comparison of virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention compared to Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention in adults, there was no important difference for the outcomes: processing speed change from baseline to post-intervention, working memory change from baseline to post-intervention, long-term declarative memory change from baseline to post-intervention and working memory, processing speed and attention composite change from baseline to post-intervention.

There was a statistically significant difference for the outcome executive function post-intervention favouring face-to-face interventions over virtual interventions. The term statistically significant benefit rather than important benefit is used because although there is a statistically significant benefit, we cannot ascertain clinical importance as only median IQRs-values were reported.

There were no statistically significant differences for processing speed post-intervention, global memory post-intervention, working memory post-intervention, short-term memory post-intervention, long-term declarative memory post-intervention, perceptual function post-intervention, attention and orientation post-intervention, and working memory, processing speed and attention composite post-intervention.

All evidence in this protocol intervention group was judged to be very low quality. Effect estimates where no difference was found between interventions were marked down for imprecision and risk of bias and only came from 1 study. As such, these findings should not be taken as definitive evidence of no difference between the interventions.

There was no evidence for the outcomes:

- Social cognition
- Orientation
- Return to work, education, and training

See appendix F for full GRADE tables.

Economic evidence

Included studies

Two economic studies were identified which were relevant to this review (das Nair 2019, Lincoln 2020).

See supplementary material 2 for details on the economic search undertaken for this guideline.

Excluded studies

Economic studies not included in this review are listed, and reasons for their exclusion are provided in appendix J.

Summary of included economic evidence

The systematic search of the economic literature undertaken for the guideline identified the following studies:

- A UK study which assessed the cost-effectiveness and cost-utility of a group-based memory rehabilitation programme alongside usual care for traumatic brain injury patients (das Nair 2019),
- A UK study which examined the cost-effectiveness and cost-utility of a group-based cognitive rehabilitation for attention and memory problems in people with relapsing-remitting or progressive multiple sclerosis, in addition to usual care (Lincoln 2020).

See the economic evidence tables in appendix H. See Table 3 to Table 4 for the economic evidence profiles of the included studies.

Table 3: Economic evidence profile for a group-based memory rehabilitation programme in addition to usual care (versus usual care only) in people with traumatic brain injury:

Study	Limitations	Applicability	Other comments	Incremental			Uncertainty
				Costs	Effectiveness	Cost effectiveness	
das Nair 2019 UK (England) Cost-utility analysis	Minor [1]	Directly [2]	Economic evaluation alongside an RCT (das Nair 2019, N=328) Time horizon: 12 months Outcome: Everyday Memory Questionnaire (EMQ) and QALYs (EQ-5D-5L)	-£27	-4.8 (EMQ score) -0.011 (QALYs)	Dominant using EMQ £2,445 per QALY lost	-The cost difference was not significant, 95% CI: –£455 to £401, p = 0.91. -The difference EMQ was not significant, 95% CI: –9.6 to 0.0. -The difference in QALYs was not significant, 95% CI: −0.031 to 0.011. -The probability of memory rehabilitation being cost-effective was 29% at £20,000/QALY and 24% at £30,000/QALY. - Results showed significant uncertainty. Cost effectiveness varied based on the imputation method and confidence interval ranges for costs and outcomes. In some scenarios, usual care dominated; in others, the intervention was dominant.

Abbreviations: CI: confidence interval; EMQ: Everyday memory questionnaire; EQ-5D-5L: EuroQol 5-dimension 5-level; QALY: quality-adjusted life year

[1] Based on a single RCT, otherwise a well conducted study.
[2] UK study, QALYs estimated but using EQ-5D-5L.

Table 4: Economic evidence profile for a group-based cognitive rehabilitation for attention and memory problems in addition to usual care (versus usual care only) in people with relapsing-remitting or progressive multiple sclerosis:

Study	Limitations	Applicability	Other comments	Incremental			Uncertainty
				Costs	Effectiveness	Cost effectiveness	
Lincoln 2020 UK (England) Cost-effectiveness and cost-utility analysis	Potentially serious [1]	Directly [2]	Economic evaluation alongside an RCT (Lincoln 2020, N=387) Time horizon: 12 months Outcome: Multiple Sclerosis Impact Scale (MSIS) Psychological subscale and QALYs (EQ-5D-5L)	-£808	-0.06 (MSIS-psychological subscale) 0.01 QALYs	Dominant using both outcomes	-The cost difference was not significant, 95% CI: −£2,248 to £632. -The difference in MSIS-psychological score was not significant, p-value = 0.20. -The difference in QALYs was not significant, 95% CI: −0.03 to 0.05. -The probability of cognitive rehabilitation being cost-effective was 95% at £20,000/QALY and 97% at £30,000/QALY.

Abbreviations: CI: confidence interval; EQ-5D-5L: EuroQol 5-dimension 5-level; MSIS: Multiple sclerosis impact scale; QALY: quality-adjusted life year

[1] Source of unit cost data was unclear, cost categories included were unclear.
[2] UK study, QALYs estimated but using EQ-5D-5L.

Economic model

No economic modelling was undertaken for this review because the committee agreed that other topics were higher priorities for economic evaluation.

The committee's discussion and interpretation of the evidence

The outcomes that matter most

Physical and mental health related quality of life & social care related quality of life, independence in ADLs, executive function, processing speed, memory, social cognition, perceptual function, orientation, and attention were prioritised as critical outcomes by the committee. This is because the aim of the question was to determine the effectiveness of interventions for improving and maintaining cognitive function for people with chronic neurological disorders.

Functioning and return to work, education & training were selected as important outcomes to assess the effect of the rehabilitation interventions on the lives of people with chronic neurological disorders. It is important to know how these interventions impact the day-to-day lives of people with chronic neurological disorders, including psychological and emotional factors.

No evidence was found for the critical outcomes of social cognition and orientation, and for the important outcome of return to work, education, and training.

The quality of the evidence

The evidence was assessed using GRADE methodology and the overall confidence in the findings ranged from very low to moderate. Findings were downgraded due to risk of bias stemming from lack of blinding (for example, when rehabilitation interventions and controls were difficult to conceal), poor reporting of randomisation procedures, or high rates of attrition from the study. Studies were also downgraded for imprecision when 95% confidence intervals crossed 1 or more decision-making thresholds. Some evidence was downgraded for inconsistency as heterogeneity could not be explained as it was not possible to perform subgroup analysis due to lack of variation between studies on subgroups specified in the protocol. Evidence was downgraded for indirectness when only part of the intervention was relevant.

There was no evidence for the following interventions:

- Interventions to improve social cognition
- Interventions to support orientation.

There was no evidence for the following outcomes:

- Social cognition
- Orientation
- Return to work, education, and training.

See appendix F for full GRADE tables with quality ratings of all outcomes.

Benefits and harms

The committee discussed the evidence presented in this review and agreed to use this to make recommendations but to also draw on their knowledge and expertise.

Holistic rehabilitation needs assessment

What to cover

Throughout their discussions of cognitive assessments and interventions, the committee agreed that in their experience, rehabilitation is often not considered feasible in people with memory and learning difficulties. The committee agreed that in these cases, individuals may need support to build insight into their memory problems and possible learning difficulties. The benefit is to support them to gain a sense of identity and acceptance so they emphasized this by recommending that individuals with learning and memory problems should not be excluded from rehabilitation programmes. Furthermore, the committee agreed that to ensure people with memory and learning difficulties access rehabilitation, reasonable adjustments should be made.

Cognitive function

Principles

In the committees' knowledge and experience people with chronic neurological disorders may lack insight and awareness especially at the onset of their condition and may not have fully accepted their diagnosis. This lack of awareness and acceptance can lead to reduced engagement in rehabilitation. The committee agreed to add a recommendation to emphasize the importance of providing support to help these individuals understand and accept any cognitive difficulties they may experience, both before and during rehabilitation. The committee agreed that this help can be offered via brain injury education, behavioural experiments, and supportive failure which may include encouraging individuals to attempt activities they find challenging, even if they have not yet acknowledged these difficulties. In the committees' experience, the person's support system can be further strengthened if their family or carers are helped to understand the person's cognitive strengths and challenges, so this was included in a recommendation.

The committee also discussed that people with cognitive changes may need more time to adjust or accept their changes. In the committees' knowledge and experience the time needed to adjust or accept any changes can vary greatly for each individual and there is no set or estimated time frame. The committee agreed that acknowledging that people may need time to adjust can help the person to explore where their challenges are, rediscover, redefine, and appreciate and value who they are as a person and incorporating any disabilities gained into their new sense of self. The committee also discussed the importance of repeating cognitive assessments for children and young people to track cognitive development and academic attainment.

Assessment

The committee discussed and agreed that involving registered health and mental health practitioners with expertise in neuropsychology and with oversight of cognitive functioning could improve the quality, safety, and appropriateness of rehabilitation planning. Neuropsychologists have specialist training in the interpretation of complex cognitive profiles and the use of standardised, validated tools. In the committees' experience these skills are essential for accurately identifying cognitive impairments and their functional implications. The committee agreed that there is a risk of misinterpretation of cognitive assessments when these are performed by professionals without appropriate training, which in turn could lead to inaccurate diagnoses or ineffective interventions. The committee agreed that involving appropriately trained specialists could promote safe and high-quality rehabilitation and planning.

The committee discussed the importance of assessing cognitive function alongside emotional health and wellbeing, particularly in the context of neurobehavioural disturbance and neurobehavioral changes. In their experience a joint neuropsychological assessment

could offer a more integrated understanding of a person's health, especially as cognitive impairments and emotional health often co-occur. The committee agreed that this would help ensure assessments are appropriately targeted and interpreted, and that the involvement of practitioners with expertise in neuropsychology would support safe, accurate, and person-centred care planning.

The committee discussed the complex interaction between cognitive difficulties and trauma-related symptoms. Based on their expertise, they knew that knowledge and emotional disturbances including low mood, anxiety, and psychological trauma can impact cognitive domains such as executive function, memory, and attention which could in turn complicate assessments and the rehabilitation plan. Therefore, the committee agreed that people with emotional disturbances may require trauma-informed adaptations in their rehabilitation plan.

In the committees' experience there is a high prevalence of people with cognitive communication disorder (CCD). Cognitive communication disorders can have a great impact on functional outcomes and engagement of the person with services. In view of this, the committee agreed to recommend that people with suspected CCD need coordinated and interdisciplinary assessments and planning of rehabilitation to ensure they receive the appropriate support. The committee discussed the evidence and agreed that in the few instances where benefits of an intervention were found these were in cognitive domain outcomes that were specifically targeted by the intervention. The committee discussed that based on the evidence and their own knowledge and experience, for interventions to be effective these need to target areas where people may have cognitive deficits, such as processing speed, processing speed and attention, and executive function. The committee also added that in their knowledge and experience the complexity of cognitive function and the potential masking of one impairment may lead to misdiagnosis and inappropriate treatment. Therefore, the committee agreed to add a recommendation to provide a cognitive assessment prior to starting the intervention to ensure the most appropriate and effective intervention is chosen.

Stemming from their discussion on assessment, the committee agreed on the importance of an accurate assessment so that people receive the most suitable treatment and intervention. In the committees' experience standardised assessments can be given greater weight in decision making over functional assessments, however functional assessments can better reflect how cognitive issues affect daily life. Furthermore, in the committees' experience individuals' performance on measures of cognitive function (and ability to engage with interventions) might be impacted by the environment. For example, some people may perform well in standardised tests in controlled environments compared to real-world settings where distractions commonly occur. The committee therefore agreed to add a recommendation to consider both standardised tests in controlled environments as well as functional assessments to provide the most accurate cognitive profile of a person to highlight their strengths and weaknesses.

As part of this discussion, the committee highlighted that a nuanced approach would be needed for people experiencing functional cognitive disorder, for whom , functional assessments, observation and dynamic testing are often more informative compared to standard psychometric tests. Dynamic testing assesses cognitive function over time and under varying conditions, rather than relying solely on a single test. This approach is particularly relevant for FCD because individuals may exhibit inconsistencies in their cognitive performance, with strengths and weaknesses that vary depending on the situation. The committee agreed, that misdiagnosis and unnecessary escalation can therefore be avoided as this type of testing provides a more accurate result. The committee also discussed considering a person's cognitive functioning prior to injury as well as co-morbidities when assessing a person's cognitive functioning, interpreting results and designing a rehabilitation plan. In the committees' knowledge and experience a person may be performing well in a cognitive assessment however this may still be a deficit compared to

their performance prior to injury. A person's performance may also be affected by co-morbidities as well as fatigue, mood, or pain levels on the day.

The committee discussed evidence presented in review C (Assessment, planning, and review) about people with chronic neurological disorders finding the use of some standard assessment tools patronising. The committee agreed that the purpose of these tools and tests should be explained by clinicians. The committee agreed to therefore add a recommendation to explain cognitive assessments to people to avoid confusion and patients potentially feeling ‘degraded’.

Finally, the committee discussed the importance of considering the interaction of the different cognitive domains in a broad sense when completing assessments and planning rehabilitation interventions. In their experience if a person shows deficits in one cognitive domain, they may also demonstrate deficits in other areas. The committee also agreed that language was important in enabling a person with cognitive impairment to explain how they are experiencing the world around them. Language was also essential for a person with cognitive impairments to understand the strategies and learning being offered to them for treatment. Furthermore, the committee discussed that the importance of language in the assessment of language deficits can strongly impact deficits in cognitive domains as the person’s ability to engage in the assessment may be impacted.

Interventions

The committee discussed that strategies and interventions which can optimise or maintain cognitive function were very important because in their experience, if cognitive function deteriorates it can have great detrimental effects on a person's daily living. The committee agreed that if cognitive function deteriorates there may be deterioration of the psycho-social functioning of a person, which is not necessarily caused by the decline of cognitive functioning itself but rather by the decline of participation in community activities. Community activities include maintaining contact with friends and family but also day-to-day activities such as eating regularly and well or attending appointments including GP appointments. In the committees' knowledge and experience cognitive functioning can be maintained by cognitive stimulation exercises, doing new things and activities, or playing games or puzzles.

The committee also discussed how some modifiable risk factors for cognitive decline can be minimised and agreed to add a recommendation to offer advice and support about the modifiable risk factors. In the committees’ knowledge and experience these risk factors include alcohol, smoking, high blood pressure and sleep hygiene. The committee agreed that in their knowledge and experience people would benefit from advice as well as support for acting on the given advice on how to reduce some of the modifiable risk factors.

The committee discussed the evidence on interventions that included compensatory strategies, which showed important benefits in independence in activities of daily living and physical and mental health related quality of life and social care related quality of life. In the committees’ knowledge and experience there are circumstances whereby people may not be able to improve cognitive function thus focusing on compensatory strategies in this way might help to improve overall quality of life. The committee agreed that memory and learning are fundamental skills which can be improved or maintained with compensatory strategies. Compensatory strategies can include prompting and cuing, using compensatory aids, and adapting to the environment. In the committees' knowledge and experience compensatory strategies can be performed with a support person which may include professionals, colleagues, friends, family, or partners.

Stemming from discussions on compensatory strategies, the committee agreed it was important that people are able to incorporate internal and external compensatory strategies into their rehabilitation. Internal compensatory strategies involve the person themselves organising, planning or monitoring their behaviour while external compensatory strategies involve external aids such as cue aids. In the committees’ knowledge and experience people

should be supported to learn and practice strategies in both the rehabilitation context as well as in daily life to support overall generalisation. The committee agreed the recommendation would have the benefit of focussing on people who experience difficulties with executive function in every-day life situations, despite generally performing well in cognitive tests. They also discussed evidence about goal management training as a compensatory strategy, noting evidence from studies comparing goal management training to psychoeducation. Results showed a benefit for goal management training but the committee argued that this evidence came from an intervention delivered to individuals where greater benefits are expected compared to group settings, which tend to be standard practice and for this reason they decided against using that evidence. The committee also discussed that in their knowledge and experience environmental adaptations can help to improve executive function for example by turning TVs or music off when a person is trying to make a decision. The committee therefore agreed to add a recommendation to include internal and external compensatory strategies and environmental adaptations in the rehabilitation plan.

The committee discussed the importance of including a person's family and carers in the rehabilitation process. Evidence from one study showed important benefits for the intervention compared to control for all outcomes (executive function, processing speed, working memory, long-term declarative memory, attention, and working memory and attention composite outcome). The committee highlighted that the intervention in this study included 5-minute daily cognitive exercises involving the patients and family members. This resonated with the committees' knowledge and experience that people who have deficits in executive function can struggle to self-manage their memory functioning and do benefit from involvement and help from family or carers. The committee therefore agreed to recommend explaining the compensatory strategies to a person's family and carers and to also include other people who are important to them and involved in the rehabilitation process.

Cost effectiveness and resource use

Consistent consideration of both emotional wellbeing and cognitive function as part of neuropsychological assessments and providing registered practitioner with expertise in neuropsychology to oversee and interpret cognitive assessment and oversee the cognitive functioning element of a person's rehabilitation plan, may require additional staff and training. However, this approach may enable earlier, targeted support, reduce inappropriate therapy and reliance on crisis care, and prevent potential harms all of which incur substantial costs to the healthcare system.

Repeating cognitive assessments in children and young people to track academic attainment and understand the impact of their condition or injury on their developmental trajectory should reflect standard practice for most services, with no resource impact anticipated.

The NHS is legally required to provide interpreting and translation services to ensure that all people can access healthcare. Therefore, translation services should already be available and no resource impact is anticipated. However, the committee agreed that staff may need additional training in best practices and there may be some resource implications where practices are sub-optimal. This may improve engagement with rehabilitation, resulting in improved outcomes, and less reliance on crisis care.

They noted that functional assessment is not commonly undertaken and that the timing of assessment varies, sometimes occurring too late or not at all. Despite being resource intensive and requiring staff upskilling and education, the committee was of a view that functional assessments might represent cost-effective use of NHS resources, given their potential to improve cognitive function in everyday life, leading to reduced support needs, better community integration, and improved social engagement.

Dynamic testing and observation for people with a functional neurological disorder may require more practitioner time compared to standard cognitive tests. However, the extra time

needed is unlikely to be significant and this approach may help prevent misdiagnosis and unnecessary or inappropriate interventions, potentially offsetting any additional costs.

In terms of interventions, there was mixed evidence from two economic evaluations. Evidence from a UK cost-effectiveness and cost-utility analysis (Das Nair 2019) suggested that a group-based memory rehabilitation programme, in addition to usual care, may not be cost effective compared with usual care in people with traumatic brain injury, using QALYs as an outcome measure. The intervention resulted in an ICER of £2,445 per QALY lost (lower cost and lower QALYs). However, using the lower NICE cost-effectiveness threshold of £20,000 per QALY, the savings of £2,445 would be insufficient to compensate for a QALY lost. The probability of memory rehabilitation being cost effective was only 29% at NICE's lower cost-effectiveness threshold of £20,000 per QALY.

This analysis also showed that the intervention may be cost effective when using the Everyday Memory Questionnaire (EMQ) scores as an outcome measure; that is, it was dominant, with lower costs and a greater reduction in EMQ scores. However, all these findings were based on non-significant differences in costs and outcomes. This evidence was directly applicable to the NICE decision-making context and had minor limitations.

Evidence from another UK cost-effectiveness and cost-utility analysis (Lincoln 2020) suggested that a group cognitive rehabilitation for attention and memory problems, in addition to usual care, was likely to be cost effective compared with usual care alone for people with relapsing-remitting or progressive multiple sclerosis. The probability of cognitive rehabilitation being cost effective was 95% at NICE's lower cost-effectiveness threshold of £20,000 per QALY. However, these findings were also based on non-significant differences in costs and outcomes. This evidence was directly applicable to the NICE decision-making context and had potentially serious limitations.

The committee highlighted that both economic evaluations were conducted alongside RCTs, which may not be the most appropriate source of effectiveness evidence. The committee noted that memory and learning interventions might increase individuals' awareness of their difficulties, causing emotional distress and leading to lower outcomes over time. Additionally, the committee explained that the lack of cost savings associated with cognitive rehabilitation interventions could be due to individuals with better cognitive outcomes, like improved memory, accessing more services. This may lead to higher NHS costs in the long run. These factors could contribute to the lack of cost effectiveness associated with cognitive rehabilitation interventions. The committee could not draw any firm conclusions from the existing economic evidence. However, they emphasised the importance of interventions aimed at improving memory and learning in the rehabilitation of individuals with chronic neurological disorders and that these interventions are currently widely used.

The committee discussed transcranial stimulation and noted that it is not widely available, although it is not expensive. However, it would require additional training.

Various cognitive rehabilitation approaches are available. However, the suitability of each depends on individual goals and needs. Computer-based interventions were seen as useful for offering greater intensity or follow-up rehabilitation after the face-to-face intervention. The committee discussed the format of cognitive rehabilitation, noting that individual sessions allow for personalised interventions tailored to a specific cognitive profile, while group rehabilitation is more generic. Even though group sessions are potentially lower cost, they may not be appropriate for some people, such as individuals with attention difficulties, for whom they might hinder progress or even cause harm. Flexibility in approach, such as delivering core rehabilitation in group sessions and individual sessions for personalised care, was noted.

It was discussed that a mix of approaches is currently used, and recommendations on cognitive rehabilitation do not represent a change in practice. The committee highlighted that recommendations might lead to more people accessing cognitive rehabilitation, putting more

pressure on existing services to meet demand. The committee highlighted the need for more cognitive-focused services in the NHS. They also discussed that the impact of cognitive rehabilitation extends to the success of all other rehabilitation domains; therefore, any additional expense would be justified.

Recommendations supported by this evidence review

This evidence review supports recommendations 1.18.1 to 1.18.18 and the recommendation for research on interventions and approaches for improving and maintaining cognitive function.

References – included studies

Effectiveness

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Economic

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Appendices

Appendix A Review protocols

Review protocol for review question: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

Table 5: Review protocol

Field	Content
PROSPERO registration number	CRD42023404412
Review title	Rehabilitation for cognitive function
Review question	What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?
Objective	To determine the effectiveness of interventions for improving and maintaining cognitive function for people with chronic neurological disorders.
Searches	The following databases will be searched: • Medline All • Embase • Cochrane Central Register of Controlled Trials (CENTRAL) • Cochrane Database of Systematic Reviews (CDSR) • PsycInfo • Social Policy and Practice Searches will be restricted by: • Date: 2013 onwards • English language • Human studies • Systematic Reviews

Field	Content
	• RCTs • Non-randomised studies Other searches: • Inclusion lists of systematic reviews With the agreement of the guideline committee the searches will be re-run 6 weeks before final submission of the review and further studies retrieved for inclusion. The full search strategies will be published in the final review.
Condition or domain being studied	Rehabilitation interventions to improve and maintain cognitive function for people with chronic neurological disorders
Population	Inclusion: Adults and children with rehabilitation needs due to the following chronic neurological disorders: • Acquired brain injury • Acquired spinal cord injury • Acquired peripheral nerve disorders • Progressive neurological diseases • Functional neurological disorders Exclusion: • Conditions which do not fit one of the 5 categories of chronic neurological disorder as defined in the guideline scope. These exclusions will be by exception and examined on a case-by-case basis rather than whole disorder groups. For example, this guideline will not cover autonomic neuropathy or the acute stabilisation of conditions such as encephalitis or hydrocephalus and will not cover degenerative disc disorder as spinal discs do not form part of the spinal cord. • Disorders for which interventions are primarily focused on altering body structure and functions, for example isolated peripheral nerve injuries, such as single nerve or plexus injuries. • Surgical management of conditions (for example brain tumours, orthopaedic complications).

Field	Content
	• Conditions for which NICE rehabilitation and rehabilitation related recommendations already exist, including stroke in people aged 16 years and over, dementia including Alzheimer's disease, cerebral palsy, myalgic encephalomyelitis (or encephalopathy)/chronic fatigue syndrome and post-COVID-19 syndrome. • Early rehabilitation after spinal cord injury as this will be covered in the NICE guideline on rehabilitation after traumatic injury
Intervention	**Intervention group 1:** Interventions to improve and maintain executive function (including hot and cold executive functions, working memory, attention and meta cognition). Examples include Strategic memory and reasoning training, Goal management training and Problem-solving training. **Intervention group 2:** Interventions to improve processing speed Examples include process training. **Intervention group 3:** Interventions to improve memory and learning Examples include errorless learning and memory aids such as diaries, calendars and notes and internal memory strategies such as mnemonics and visualisation. **Intervention group 4:** Interventions to improve social cognition Examples include Training of Affect Recognition (TAR), Emotion and Theory of Mind Imitation Training and Social Cognition and Interaction Training. **Interventions 5:** Interventions to improve visual, spatial and perceptual functions. Examples include visual scanning training, task analysis and environmental changes such as anchoring techniques. **Intervention group 6:** Interventions to support orientation. Examples include scripted routines, orientation activities and strategies such as environmental cues. **Intervention group 7:** Interventions to improve attention (including switching, sustaining, and focussing or dividing attention). Examples include attention process training, the 'lighthouse' technique and dual task training.

Field	Content

Comparator	Interventions compared with others in the same group or:
	• Placebo (placebo or sham)
	• Control (no intervention, waitlist, standard rehabilitation care alone, or 'usual care')
	• The same intervention (as listed under 'intervention') but varied in terms of:
	  ○ Frequency
	  ○ Intensity
	  ○ Timing
	  ○ Setting

Types of study to be included	Include published full-text papers**: • Systematic reviews of RCTs • Experimental studies with random assignment to intervention and control groups. If insufficient* RCT evidence is located to support decision making about children and young people, then experimental studies with non-random assignment to intervention and control groups (quasi-randomised controlled trials, non-randomised controlled trials and prospective and retrospective cohort studies) will also be considered, if a method of controlling for confounding variables is used. Systematic reviews of these studies will also be considered. *Sufficiency will be judged on issues such as the number and quality of the included studies; sample sizes, reported outcomes, and availability of data on subgroups of interest. **Studies must match or adjust for age and chronic neurological disorder. Other confounding factors are: • Sex • delivery setting, for instance whether community or inpatient.
Other exclusion criteria	Inclusion: • Full text papers

Field	Content
	• Studies conducted in the UK, Australia, New Zealand and Canada and high-income European countries (according to the World Bank). Exclusion: • Conference abstracts/proceedings • Non-English language articles • Articles published before 2013 • Books, book chapters and theses. • Papers that do not include methodological details will not be included as they do not provide sufficient information to evaluate risk of bias/study quality.
Context	Recommendations will apply to all inpatient (excluding critical care units), outpatient and community settings, including tertiary settings and care homes in which either fully or partially NHS-funded rehabilitation interventions for chronic neurological disorders are provided.
Primary outcomes (critical outcomes)	• **Physical and mental health related quality of life and social care related quality of life** (assessed using standardised, validated, global scales such as EQ 5D, SF-12, SFMA, ASCOT and ICECAP-A). • **Independence in ADLs** (assessed using a standardised, validated, global measure such as COPM, Barthel ADL index, Katz, PSMS, OARS, PAT, EADL-Test, GAS) • **Executive function** (measured using a standardised, validated measure of global executive such as the Global Executive Composite, DEX, FrSBe [executive subscale only] and BRIEF-A) • **Processing speed** (assessed using a standardised, validated measure such as the Symbol Digit Modalities Test Reaction times and the WAIS-IV Processing Speed Index [Coding/Symbol Search]). • **Memory** (measured using a standardised, validated tool such as the Rivermead Behavioural Memory Test, Wechsler Memory Scales and the Everyday Memory Checklist.) • **Social cognition** (measured using a standardised, validated, global measure such as the BIRT Social Cognition Questionnaire, the Edinburgh Social Cognition Test and the Awareness of Social Inferences Test) • **Perceptual function** (measured using a standardised, validated measure of global perceptual function such as the Rivermead Perceptual Assessment Battery and VOSP)

Field	Content
	• **Orientation** (measured using a standardised, validated, global measure of orientation such as the Test of Orientation for Rehabilitation Patients, O-Log and GOAT.) • **Attention** (measured using a standardised, validated, global measure of attentional outcome such as TEA and TEA-Ch)
Secondary outcomes (important outcomes)	• **Functioning** (assessed using a standardised, validated measure of global functioning such as FIMFAM for adults or PEDI-CAT for children and young people) • **Return to work, education, training** (assessed objectively by a count of return to work, education, training or 'meaningful activity')
Data extraction (selection and coding)	All references identified by the searches and from other sources will be uploaded into EPPI reviewer and de-duplicated. Titles and abstracts of the retrieved citations will be screened to identify studies that potentially meet the inclusion criteria outlined in the review protocol. Dual sifting will be performed on at least 10% of records (or 300 records, whichever is smaller); 90% agreement is required and disagreements will be resolved via discussion with the senior systematic reviewer. The full set of records will not be dual screened because the population, interventions and relevant study designs are relatively clear and should be readily identified from titles and abstracts. Full versions of the selected studies will be obtained for assessment. Studies that fail to meet the inclusion criteria once the full version has been checked will be excluded at this stage. Each study excluded after checking the full version will be listed, along with the reason for its exclusion. The included and excluded studies lists will be circulated to the Topic Group for their comments. Resolution of disputes will be by discussion between the senior reviewer, Topic Advisor and Chair. A standardised form will be used to extract the following data from included studies: study details (reference, country where study was carried out, type and dates), participant characteristics, inclusion and exclusion criteria, details of the interventions if relevant, setting and follow-up, relevant outcome data and source of funding. This will be quality assessed by the senior reviewer.

Field	Content
Risk of bias (quality) assessment	Quality assessment of individual studies will be performed according to Developing NICE guidelines: the manual, using the following checklists. • ROBIS tool for systematic reviews • Cochrane RoB tool v.2 for RCTs • Cochrane ROBINS-I for non-randomised controlled trials. The quality assessment will be performed by one reviewer and this will be quality assured by a senior reviewer.
Strategy for data synthesis	Depending on the availability of the evidence, the findings will be summarised narratively or quantitatively. Where possible, pairwise meta-analyses will be conducted using Cochrane Review Manager software. A fixed effect meta-analysis will be conducted and data will be presented as odds ratios or risk ratios for dichotomous outcomes. Peto odds ratio will be used for outcomes with zero events. Mean differences or standardised mean differences will be calculated for continuous outcomes. Heterogeneity in the effect estimates of the individual studies will be assessed using the I2 statistic. Alongside visual inspection of the point estimates and confidence intervals, I2 values of greater than 50% and 80% will be considered as significant and very significant heterogeneity, respectively. Heterogeneity will be explored as appropriate using sensitivity analyses and pre-specified subgroup analyses. If heterogeneity cannot be explained through subgroup analysis then a random effects model will be used for meta-analysis, or the data will not be pooled. The confidence in the findings across all available evidence will be evaluated for each outcome using an adaptation of the 'Grading of Recommendations Assessment, Development and Evaluation (GRADE) toolbox' developed by the international GRADE working group: http://www.gradeworkinggroup.org/ Importance and imprecision of findings will be assessed against minimally important differences (MIDs). Default MIDs will be used for risk ratios and continuous outcomes only, unless the committee pre-specifies published or other MIDs for specific outcomes • For risk ratios: 0.8 and 1.25. • For continuous outcomes: ○ MID is calculated by ranking the studies in order of SD in the control arms. The MID is calculated as +/- 0.5 times median SD.

Field	Content	
	○ For studies that have been pooled using SMD (meta-analysed): +0.5 and -0.5 in the SMD scale are used as MID boundaries.	
Analysis of sub-groups	Evidence will be stratified by: • Age at time of intervention (children vs. adults). Children are classified as being aged 17 years or younger. • Functional neurological disorders as distinct from the 4 other categories of neurological disorder. Evidence will be subgrouped by the following only in the event that there is significant heterogeneity in outcomes: • The 4 disorder categories not separated out through a priori stratification (acquired brain injury, acquired spinal cord injury, acquired peripheral nerve disorders and progressive neurological diseases • Study design (RCT v. NRS) • Age (for the ≤17 years of age stratification only). Categories are <4 years, 4-11 years and >11 years Where evidence is stratified or subgrouped the committee will consider on a case by case basis if separate recommendations should be made for distinct groups. Separate recommendations may be made where there is evidence of a differential effect of interventions in distinct groups. If there is a lack of evidence in one group, the committee will consider, based on their experience, whether it is reasonable to extrapolate and assume the interventions will have similar effects in that group compared with others.	
Type and method of review	☒	Intervention
	☐	Diagnostic
	☐	Prognostic
	☐	Qualitative
	☐	Epidemiologic
	☐	Service Delivery
	☐	Other (please specify)
Language	English	
Country	England	

Field	Content		
Anticipated or actual start date	May 2022		
Anticipated completion date	December 2023		
Stage of review at time of this submission	Review stage	Started	Completed
	Preliminary searches	☑	☑
	Piloting of the study selection process	☑	☑
	Formal screening of search results against eligibility criteria	☑	☑
	Data extraction	☑	☑
	Risk of bias (quality) assessment	☑	☑
	Data analysis	☑	☑
Named contact	5a. Named contact NICE 5b. Named contact e-mail rehabforcnd@nice.org.uk 5c. Organisational affiliation of the review National Institute for Health and Care Excellence (NICE)		
Review team members	NICE Technical Team		

Field	Content
Funding sources/sponsor	This systematic review is being completed by NICE, which receives funding from the Department of Health and Social Care.
Conflicts of interest	All guideline committee members and anyone who has direct input into NICE guidelines (including the evidence review team and expert witnesses) must declare any potential conflicts of interest in line with NICE's code of practice for declaring and dealing with conflicts of interest. Any relevant interests, or changes to interests, will also be declared publicly at the start of each guideline committee meeting. Before each meeting, any potential conflicts of interest will be considered by the guideline committee Chair and a senior member of the development team. Any decisions to exclude a person from all or part of a meeting will be documented. Any changes to a member's declaration of interests will be recorded in the minutes of the meeting. Declarations of interests will be published with the final guideline.
Collaborators	Development of this systematic review will be overseen by an advisory committee who will use the review to inform the development of evidence-based recommendations in line with section 3 of Developing NICE guidelines: the manual. Members of the guideline committee are available on the NICE website: https://www.nice.org.uk/guidance/indevelopment/gid-ng10181
Other registration details	N/A
Reference/URL for published protocol	https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42023404412
Dissemination plans	NICE may use a range of different methods to raise awareness of the guideline. These include standard approaches such as: • notifying registered stakeholders of publication • publicising the guideline through NICE's newsletter and alerts • issuing a press release or briefing as appropriate, posting news articles on the NICE website, using social media channels, and publicising the guideline within NICE.
Keywords	Acquired brain injury; acquired spinal cord injury; activities of daily living; neurological diseases; neurological disorders; peripheral nerve disorders; rehabilitation.
Details of existing review of same topic by same authors	N/A

Field	Content	
Current review status	☐	Ongoing
	☐	Completed but not published
	☒	Completed and published
	☐	Completed, published and being updated
	☐	Discontinued
Additional information	N/A	
Details of final publication	www.nice.org.uk	

ADL: activity of daily living; ASCOT: adults social care outcomes toolkit; BIRT: brain injury rehabilitation trust; BRIEF-A: behaviour rating inventory of executive function for adults; CDSR: Cochrane database of systematic reviews; CENTRAL: Cochrane central register of controlled trials; COPM: Canadian occupational performance measure; COVID: coronavirus disease; DEX: dysexecutive questionnaire; EADL: extended activities of daily living; EPPI: Evidence for policy and practice information; EQ 5D: EuroQoL five dimensions; FIMFAM: UK functional assessment measure; FrSBe: frontal systems behaviour scale; GAS: goal attainment scale; GOAT: Galveston orientation and amnesia test; GRADE: Grading of recommendations assessment, development and evaluation; ICECAP-A: ICEpop capability measure for adults; MID: minimally important difference; NRS: non-randomised study; OARS: older Americans resources and services; O-Log: orientation log; PAT: performance ADL test; PEDI-CAT: paediatric evaluation of disability inventory- computer adaptive test; PSMS: physical self-maintenance scale; SFMA: selective functional movement assessment; RCT: randomised controlled trial; RoB: risk of bias; ROBIS: risk of bias in systematic reviews; ROBINS-I: risk of bias in non-randomised studies -of interventions; SD: standard deviation; SF-12: 12-item short form survey; SMD: standardised mean difference; TAR: training of affect recognition; TEA: test of everyday attention; TEA-ch: test of everyday attention for children; VOSP: visual object and space perception battery; WAIS-IV: Wechsler adult intelligence scale, fourth edition.

Appendix B Literature search strategies

Literature search strategies for review question: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

Database: Ovid MEDLINE(R) ALL

Date of last search: Ovid MEDLINE(R) ALL <1946 to October 21, 2022>

1	(CRANIOCEREBRAL TRAUMA/ or brain injuries/ or exp brain hemorrhage, traumatic/ or exp brain injuries, diffuse/ or exp brain injuries, traumatic/ or exp brain injury, chronic/ or Shaken Baby Syndrome/ or HYPOXIA, BRAIN/ or Brain Damage, Chronic/ or exp INTRACRANIAL HEMORRHAGE, TRAUMATIC/ or exp BRAIN NEOPLASMS/ or BRAIN DISEASES/ or BRAIN ABSCESS/ or BRAIN DISEASES, METABOLIC/ or CEREBELLAR DISEASES/ or cerebrovascular disorders/ or basal ganglia cerebrovascular disease/ or cerebrovascular trauma/ or intracranial arteriovenous malformations/ or "intracranial embolism and thrombosis"/ or intracranial hemorrhages/ or leukomalacia, periventricular/ or vascular headaches/ or exp ENCEPHALITIS/ or exp HYDROCEPHALUS/) not (exp STROKE/ or dementia/) (471596)
2	((brain* or cereb* or craniocereb* or cranial or intracrani* or neurocognit*) adj2 (injur* or trauma* or damage* or disease*1 or disorder* or infect* or h?emorrhag* or neoplasm* or cancer* or tumo?r* or insult* or impair* or ischemi* or ischaemi* or infarcti* or hypoxi* or drown*)).ti,ab. (345383)
3	(chronic* adj1 trauma* adj2 encephalopath*).ti,ab. (870)
4	((infratentorial* or supratentorial* or hypothalam* or pituitar* or choroid plexus) adj2 (neoplasm* or cancer* or tumo?r* or carcinom* or adenocarcinom*)).ti,ab. (13218)
5	(brain* adj2 abscess*).ti,ab. (5675)
6	(carotid arter* adj2 (disease* or injur*)).ti,ab. (4958)
7	("basal ganglia disease*" or encephalitis or meningoencephalitis or hydrocephal* or "paraneoplastic cereb* degenerat*" or "shak* baby syndrome*" or "Periventricular leukomalacia*").ti,ab. (83309)
8	exp STROKE/ and (ADOLESCENT/ or MINORS/ or exp CHILD/ or exp INFANT/ or exp PEDIATRICS/ or exp PUBERTY/) (10311)
9	(stroke? adj3 (p?ediatric* or child* or adolescen* or kid or kids or youth* or youngster* or minor or minors or underage* or under-age* or "under age*" or teen or teens or teenager* or juvenile* or boy or boys or boyhood or girl or girls or girlhood or schoolchild* or "school age*" or schoolage* or "under 16" or "under sixteen*")).ti,ab. (5206)
10	exp SPINAL CORD INJURIES/ or exp SPINAL CORD NEOPLASMS/ or EPIDURAL ABSCESS/ or SPINAL CORD DISEASES/ or exp SPINAL CORD VASCULAR DISEASES/ or SPINAL CORD COMPRESSION/ or MYELITIS, TRANSVERSE/ (80711)
11	((spinal* or spine?) adj2 (injur* or trauma* or tumo?r* or neoplasm* or cancer* or infect* or insult* or disease? or disorder* or degenrat* or compress* or vascular* or ischemi* or ischaemi* or infarct* or h?emorrhag*)).ti,ab. (81524)
12	(Central cord syndrome* or transverse myelitis).ti,ab. (2846)
13	(epidural* adj2 (neoplasm* or cancer* or tumo?r* or abscess*)).ti,ab. (2881)
14	((spinal* or spine?) adj2 (viral* or virus* or polio* or acquired immunodeficiency syndrome or AIDS or HIV or bacterial* or neurosyphili* or neuro-syphili* or tubercul*)).ti,ab. (2076)
15	PERIPHERAL NERVE INJURIES/ or exp CRANIAL NERVE INJURIES/ or PERIPHERAL NERVOUS SYSTEM NEOPLASMS/ or exp CRANIAL NERVE NEOPLASMS/ or exp PERIPHERAL NERVOUS SYSTEM DISEASES/ or exp CRANIAL NERVE DISEASES/ (277367)
16	((periph* or cranial*) adj1 (nerve? or nervous system) adj2 (injur* or trauma* or disorder* or disease* or damage* or neoplasm* or cancer* or tumo?r* or inflamm* or autoimmun* or paraneoplastic* or neuropath* or syndrome?)).ti,ab. (16184)
17	(Guillain* adj1 Barr*).ti,ab. (11000)
18	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) adj1 nerve* adj1 injur*).ti,ab. (2665)
19	(optic* adj1 nerve* adj2 (neoplasm* or cancer* or tumo?r*)).ti,ab. (247)
20	(brachial plexus adj1 (neuropath* or neuritis)).ti,ab. (262)
21	(complex regional pain syndrome* or causalgia or mononeuropath* or nerve compression syndrome*).ti,ab. (6020)
22	((femoral or median or peroneal or radial or sciatic or tibial or ulnar) adj1 neuropath*).ti,ab. (2173)
23	((carpal-tunnel or piriformis-muscle or tarsal-tunnel or thoracic-outlet) adj1 syndrome*).ti,ab. (11990)

24	(pudendal neuralgia or polyneuropath* or polyradiculoneuropath* or polyradiculopath* or radiculopath*).ti,ab. (24885)
25	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) adj1 nerve* adj1 disease*).ti,ab. (646)
26	(periph* adj2 neuropath*).ti,ab. (25583)
27	(((periph* or cranial*) adj2 (nerve? or nervous system)) and lupus).ti,ab. (209)
28	((multi-focal* or multifocal*) adj2 motor adj1 neuropath*).ti,ab. (859)
29	(((periph* or cranial*) adj2 (nerve? or nervous system)) and alcohol*).ti,ab. (491)
30	exp MOTOR NEURON DISEASE/ or POSTPOLIOMYELITIS SYNDROME/ or exp PARKINSONIAN DISORDERS/ or MUSCULAR DYSTROPHY, DUCHENNE/ or exp MULTIPLE SCLEROSIS/ or NEUROMUSCULAR DISEASES/ or SPASTIC PARAPLEGIA, HEREDITARY/ or FRIEDREICH ATAXIA/ or exp MULTIPLE SYSTEM ATROPHY/ or SUPRANUCLEAR PALSY, PROGRESSIVE/ or CORTICOBASAL DEGENERATION/ or LEUKODYSTROPHY, METACHROMATIC/ or exp MITOCHONDRIAL MYOPATHIES/ or exp MUCOPOLYSACCHARIDOSES/ or WILLIAMS SYNDROME/ or GENETIC DISEASES, INBORN/ or RETT SYNDROME/ or FETAL ALCOHOL SPECTRUM DISORDERS/ or DYSTONIC DISORDERS/ or "HEREDITARY SENSORY AND MOTOR NEUROPATHY"/ or SPINAL DYSRAPHISM/ (265185)
31	(neurolog* adj1 (disease* or damage* or disorder* or impair*)).ti,ab. (81584)
32	((motor-neuron* or gehrig* or charcott* or kennedy*) adj1 disease*).ti,ab. (7054)
33	((amyotroph* or primary) adj1 lateral* adj1 sclero*).ti,ab. (27677)
34	(bulbar adj1 pals*).ti,ab. (514)
35	((muscular or muscle* or bulbo) adj1 atroph* adj1 spin*).ti,ab. (6319)
36	(progressiv* adj1 (muscular or muscle*) adj1 atroph*).ti,ab. (584)
37	((postpolio* or post-polio*) adj1 syndrome?).ti,ab. (717)
38	(Parkinson* or duchenne* or multiple scleros?s* or aphasia or creutzfeldt-jakob or huntington* or kluver-bucy).ti,ab. (267892)
39	(muscular adj1 dystroph*).ti,ab. (26059)
40	(neuromusc* adj1 (disease* or disorder?)).ti,ab. (12094)
41	(heredit* adj1 spastic* adj1 parapleg*).ti,ab. (1907)
42	friedreich* ataxia*.ti,ab. (3020)
43	((multiple system or olivopontocerebellar) adj1 atroph*).ti,ab. (5172)
44	(shy-drager syndrome* or striatonigral degenerat* or batten* disease?).ti,ab. (1422)
45	(progressive adj1 supranuclear adj1 pals*).ti,ab. (4561)
46	(richardson* adj1 (disease? or syndrome?)).ti,ab. (233)
47	((corticobasal or cortico basal) adj1 degenerat*).ti,ab. (1704)
48	(white adj1 matter adj1 disorder?).ti,ab. (292)
49	(metachromatic leukodystroph* or mitochondrial myopath* or mucopolysaccharidos*).ti,ab. (8554)
50	(lysosomal adj1 storage adj1 disorder?).ti,ab. (4015)
51	((genetic or William* or catch-22 or rett* or congenital or f?etal alcohol) adj1 (syndrome or disorder*)).ti,ab. (35629)
52	(perinatal illness* or perinatal hypoxia*).ti,ab. (827)
53	(primary adj1 dystonia?).ti,ab. (560)
54	(heredit* adj1 motor* adj1 sens* adj1 neuropath*).ti,ab. (141)
55	(spina bifida? or spinal dysraphism?).ti,ab. (8759)
56	MOVEMENT DISORDERS/ or MOTOR DISORDERS/ or CONVERSION DISORDER/ (20534)
57	((functional* or psychogenic* or dissociative*) adj1 neurologic* adj1 (disorder* or dysfunction* or difficult*)).ti,ab. (509)
58	((movement* or motor* or convers*) adj1 (disorder* or dysfunct*)).ti,ab. (29709)
59	((psychogenic or dissociative or non-epilep* or nonepilep*) adj1 (seizure* or convulsion* or fit or fits or spasm* or attack*)).ti,ab. (2121)
60	(pseudo-seizure* or pseudoseizure*).ti,ab. (410)
61	(medical* adj1 (unexplain* or un-explain*) adj1 symptom?).ti,ab. (854)
62	or/1-61 (1600114)
63	NEUROLOGICAL REHABILITATION/ (1424)
64	(COGNITIVE DYSFUNCTION/ or Cognition/) and REHABILITATION/ (87)
65	(COGNITIVE DYSFUNCTION/ or Cognition/) and rehab*.ti. (968)

66	or/63-65 (2392)
67	66 not (exp STROKE/ or dementia/) (2046)
68	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) adj2 ((brain* or cogniti* or visual* or spatial* or percept* or executive*) adj1 (social* or plasticit* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or activat* or global or impair*))).ti,ab. (24856)
69	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) adj2 (thinking or learning* or intellect* or "decision making*" or (problem adj2 solv*) or memor* or remember* or recall* or attenti* or concentrat* or (acquir* adj2 knowledg*))).ti,ab. (291029)
70	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) adj2 (process* adj2 (speed* or train* or abilit* or perform* or strateg* or technique*))).ti,ab. (2624)
71	((memor* or cognitiv* or visual*) adj2 (Art or stimulat* or prompt* or diary* or diaries* or calendar or mnemonics or visualisation* or puzzle* or scan* or anchor* or environment*)).ti,ab. (22633)
72	socialville*.ti,ab. (4)
73	(orientat* adj2 (prompt* or routin* or activit* or strateg* or enviroment* or cue or cues)).ti,ab. (1279)
74	((Mnemonic-strateg* or cue?) adj2 (train* or aid? or technique*)).ti,ab. (585)
75	(attention adj2 (switch* or sustain* or focus* or divide* or dividing* or "process* train*" or lighthouse* or "dual task*") adj2 (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)).ti,ab. (470)
76	((cogniti* or visual* or spatial* or percept* or executive* or attention) adj1 (plasticit* or based* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or strateg* or prompt*) adj2 (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)).ti,ab. (14724)
77	((thinking or learning* or intellect* or "decision making*" or (problem adj2 solv*) or memor* or remember* or recall* or reasoning* or attenti* or ((acquir* adj2 knowledg*) or percept* or imitat*)) adj2 (treatment* or therap* or train* or rehab* or remediat* or pathol* or strateg* or follow-up)).ti,ab. (44446)
78	(goal* adj2 (manag* or orientat*) adj2 (treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)).ti,ab. (210)
79	(error* adj2 learn*).ti,ab. (1496)
80	(("Affect Recognition" or "Visual scan*" or "Social Cognition" or "Theory of Mind Imitation") adj1 train*).ti,ab. (106)
81	or/68-80 (387815)
82	(62 or 67) and 81 (20327)
83	limit 82 to english language (19180)
84	limit 83 to yr="2005 -Current" (15288)
85	LETTER/ or EDITORIAL/ or NEWS/ or exp HISTORICAL ARTICLE/ or ANECDOTES AS TOPIC/ or COMMENT/ or CASE REPORT/ or (letter or comment*).ti. (4822520)
86	RANDOMIZED CONTROLLED TRIAL/ or random*.ti,ab. (1489140)
87	85 not 86 (4791487)
88	ANIMALS/ not HUMANS/ (5024201)
89	exp ANIMALS, LABORATORY/ or exp ANIMAL EXPERIMENTATION/ or exp MODELS, ANIMAL/ or exp RODENTIA/ or (rat or rats or mouse or mice).ti. (3728359)
90	or/87-89 (10693505)
91	84 not 90 (10558)
92	META-ANALYSIS/ or META-ANALYSIS AS TOPIC/ (190161)
93	(meta analy* or metanaly* or metaanaly*).ti,ab. (249553)
94	((systematic* or evidence*) adj2 (review* or overview*)).ti,ab. (310692)
95	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab. (52000)
96	(search strategy or search criteria or systematic search or study selection or data extraction).ab. (75590)
97	(search* adj4 literature).ab. (90135)
98	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab. (331501)
99	cochrane.jw. (16115)
100	or/92-99 (620794)
101	randomized controlled trial.pt. (579325)

102	controlled clinical trial.pt. (95078)
103	pragmatic clinical trial.pt. (2153)
104	randomi#ed.ab. (692659)
105	placebo.ab. (232631)
106	randomly.ab. (393888)
107	CLINICAL TRIALS AS TOPIC/ or trial.ti. (456445)
108	or/101-107 (1524433)
109	exp Cohort studies/ (2407744)
110	((follow up* or followup* or concurrent* or incidence* or population*) adj3 (study* or studies* or analy* or observation* or design* or method* or research*)).ti,ab. (450821)
111	(longitudinal* or prospective* or retrospective* or cohort*).ti,ab. (2387484)
112	Cross-Sectional Studies/ (443864)
113	((prevalence* or disease frequenc*) adj3 (study* or studies* or analy* or observation* or design* or method* or research*)).ti,ab. (59277)
114	cross sectional*.ti,ab. (477892)
115	Pilot Project/ (143235)
116	(pilot adj3 (project* or study* or studies* or analy* or observation* or design* or method* or research*)).ti,ab. (133516)
117	or/109-116 (4180086)
118	91 and 100 (827)
119	91 and 108 (1754)
120	91 and 117 (3191)
121	118 or 119 or 120 (4807)

Database: Embase

Date of last search: Embase <1974 to 2022 October 21>

1	(head injury/ or exp brain injury/ or chronic brain disease/ or brain hemorrhage/ or exp brain tumor/ or brain disease/ or brain hypoxia/ or brain abscess/ or metabolic encephalopathy/ or cerebellum disease/ or exp cerebrovascular disease/ or encephalitis/ or hydrocephalus/) not (exp cerebrovascular accident/ or dementia/) (945935)
2	((brain* or cereb* or craniocereb* or cranial or intracrani* or neurocognit*) adj2 (injur* or trauma* or damage* or disease*1 or disorder* or infect* or h?emorrhag* or neoplasm* or cancer* or tumo?r* or insult* or impair* or ischemi* or ischaemi* or infarcti* or hypoxi* or drown*)).ti,ab. (477489)
3	(chronic* adj1 trauma* adj2 encephalopath*).ti,ab. (1378)
4	((infratentorial* or supratentorial* or hypothalam* or pituitar* or choroid plexus) adj2 (neoplasm* or cancer* or tumo?r* or carcinom* or adenocarcinom*)).ti,ab. (16547)
5	(brain* adj2 abscess*).ti,ab. (6439)
6	(carotid arter* adj2 (disease* or injur*)).ti,ab. (6906)
7	("basal ganglia disease*" or encephalitis or meningoencephalitis or hydrocephal* or "paraneoplastic cereb* degenerat*" or "shak* baby syndrome*" or "Periventricular leukomalacia*").ti,ab. (101283)
8	exp cerebrovascular accident/ and (adolescent/ or "minor (person)"/ or exp child/ or exp infant/ or pediatrics/ or exp pediatrics/ or exp puberty/) (12620)
9	(stroke? adj3 (p?ediatric* or child* or adolescen* or kid or kids or youth* or youngster* or minor or minors or underage* or under-age* or "under age*" or teen or teens or teenager* or juvenile* or boy or boys or boyhood or girl or girls or girlhood or schoolchild* or "school age*" or schoolage* or "under 16" or "under sixteen*")).ti,ab. (8904)
10	exp spinal cord injury/ or exp spinal cord tumor/ or epidural abscess/ or spinal cord disease/ or exp spinal cord vascular disease/ or spinal cord compression/ or transverse myelitis/ (127413)
11	((spinal* or spine?) adj2 (injur* or trauma* or tumo?r* or neoplasm* or cancer* or infect* or insult* or disease? or disorder* or degenrat* or compress* or vascular* or ischemi* or ischaemi* or infarct* or h?emorrhag*)).ti,ab. (105116)
12	(Central cord syndrome* or transverse myelitis).ti,ab. (4966)
13	(epidural* adj2 (neoplasm* or cancer* or tumo?r* or abscess*)).ti,ab. (3658)
14	((spinal* or spine?) adj2 (viral* or virus* or polio* or acquired immunodeficiency syndrome or AIDS or HIV or bacterial* or neurosyphili* or neuro-syphili* or tubercul*)).ti,ab. (2339)

15	peripheral nerve injury/ or exp cranial nerve injury/ or peripheral nerve tumor/ or exp cranial nerve tumor/ or exp peripheral neuropathy/ or exp cranial neuropathy/ (238059)
16	((periph* or cranial*) adj1 (nerve? or nervous system) adj2 (injur* or trauma* or disorder* or disease* or damage* or neoplasm* or cancer* or tumo?r* or inflamm* or autoimmun* or paraneoplastic* or neuropath* or syndrome?)).ti,ab. (20776)
17	(Guillain* adj1 Barr*).ti,ab. (14666)
18	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) adj1 nerve* adj1 injur*).ti,ab. (3387)
19	(optic* adj1 nerve* adj2 (neoplasm* or cancer* or tumo?r*)).ti,ab. (338)
20	(brachial plexus adj1 (neuropath* or neuritis)).ti,ab. (335)
21	(complex regional pain syndrome* or causalgia or mononeuropath* or nerve compression syndrome*).ti,ab. (8385)
22	((femoral or median or peroneal or radial or sciatic or tibial or ulnar) adj1 neuropath*).ti,ab. (2845)
23	((carpal-tunnel or piriformis-muscle or tarsal-tunnel or thoracic-outlet) adj1 syndrome*).ti,ab. (15114)
24	(pudendal neuralgia or polyneuropath* or polyradiculoneuropath* or polyradiculopath* or radiculopath*).ti,ab. (38147)
25	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) adj1 nerve* adj1 disease*).ti,ab. (842)
26	(periph* adj2 neuropath*).ti,ab. (40601)
27	(((periph* or cranial*) adj2 (nerve? or nervous system)) and lupus).ti,ab. (432)
28	((multi-focal* or multifocal*) adj2 motor adj1 neuropath*).ti,ab. (1429)
29	(((periph* or cranial*) adj2 (nerve? or nervous system)) and alcohol*).ti,ab. (842)
30	exp motor neuron disease/ or postpoliomyelitis syndrome/ or exp parkinsonism/ or Duchenne muscular dystrophy/ or exp multiple sclerosis/ or neuromuscular disease/ or hereditary motor sensory neuropathy/ or Friedreich ataxia/ or exp Shy Drager syndrome/ or progressive supranuclear palsy/ or corticobasal degeneration/ or metachromatic leukodystrophy/ or exp mitochondrial myopathy/ or exp mucopolysaccharidosis/ or Williams Beuren syndrome/ or genetic disorder/ or Rett syndrome/ or fetal alcohol syndrome/ or dystonic disorder/ or hereditary motor sensory neuropathy/ or spinal dysraphism/ (391845)
31	(neurolog* adj1 (disease* or damage* or disorder* or impair*)).ti,ab. (111959)
32	((motor-neuron* or gehrig* or charcott* or kennedy*) adj1 disease*).ti,ab. (10332)
33	((amyotroph* or primary) adj1 lateral* adj1 sclero*).ti,ab. (37119)
34	(bulbar adj1 pals*).ti,ab. (785)
35	((muscular or muscle* or bulbo) adj1 atroph* adj1 spin*).ti,ab. (9106)
36	(progressiv* adj1 (muscular or muscle*) adj1 atroph*).ti,ab. (720)
37	((postpolio* or post-polio*) adj1 syndrome?).ti,ab. (948)
38	(Parkinson* or duchenne* or multiple scleros?s* or aphasia or creutzfeldt-jakob or huntington* or kluver-bucy).ti,ab. (389550)
39	(muscular adj1 dystroph*).ti,ab. (34242)
40	(neuromusc* adj1 (disease* or disorder?)).ti,ab. (18466)
41	(heredit* adj1 spastic* adj1 parapleg*).ti,ab. (2622)
42	friedreich* ataxia*.ti,ab. (3815)
43	((multiple system or olivopontocerebellar) adj1 atroph*).ti,ab. (7824)
44	(shy-drager syndrome* or striatonigral degenerat* or batten* disease?).ti,ab. (1710)
45	(progressive adj1 supranuclear adj1 pals*).ti,ab. (7135)
46	(richardson* adj1 (disease? or syndrome?)).ti,ab. (423)
47	((corticobasal or cortico basal) adj1 degenerat*).ti,ab. (2660)
48	(white adj1 matter adj1 disorder?).ti,ab. (422)
49	(metachromatic leukodystroph* or mitochondrial myopath* or mucopolysaccharidos*).ti,ab. (11996)
50	(lysosomal adj1 storage adj1 disorder?).ti,ab. (6029)
51	((genetic or William* or catch-22 or rett* or congenital or f?etal alcohol) adj1 (syndrome or disorder*)).ti,ab. (50002)
52	(perinatal illness* or perinatal hypoxia*).ti,ab. (1103)
53	(primary adj1 dystonia?).ti,ab. (1033)
54	(heredit* adj1 motor* adj1 sens* adj1 neuropath*).ti,ab. (218)
55	(spina bifida? or spinal dysraphism?).ti,ab. (10999)

56	motor dysfunction/ or motor dysfunction/ or conversion disorder/ (79450)
57	((functional* or psychogenic* or dissociative*) adj1 neurologic* adj1 (disorder* or dysfunction* or difficult*)).ti,ab. (752)
58	((movement* or motor* or convers*) adj1 (disorder* or dysfunct*)).ti,ab. (49623)
59	((psychogenic or dissociative or non-epilep* or nonepilep*) adj1 (seizure* or convulsion* or fit or fits or spasm* or attack*)).ti,ab. (3388)
60	(pseudo-seizure* or pseudoseizure*).ti,ab. (602)
61	(medical* adj1 (unexplain* or un-explain*) adj1 symptom?).ti,ab. (1099)
62	or/1-61 (2307069)
63	neurorehabilitation/ (6928)
64	(cognitive defect/ or cognition/) and rehabilitation/ (3998)
65	(cognitive defect/ or cognition/) and rehab*.ti. (4626)
66	or/63-65 (14050)
67	66 not (exp cerebrovascular accident/ or dementia/) (11300)
68	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) adj2 ((brain* or cogniti* or visual* or spatial* or percept* or executive*) adj1 (social* or plasticit* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or activat* or global or impair*))).ti,ab. (34247)
69	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) adj2 (thinking or learning* or intellect* or "decision making*" or (problem adj2 solv*) or memor* or remember* or recall* or attenti* or concentrat* or (acquir* adj2 knowledg*))).ti,ab. (350853)
70	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) adj2 (process* adj2 (speed* or train* or abilit* or perform* or strateg* or technique*))).ti,ab. (3272)
71	((memor* or cognitiv* or visual*) adj2 (Art or stimulat* or prompt* or diary* or diaries* or calendar or mnemonics or visualisation* or puzzle* or scan* or anchor* or environment*)).ti,ab. (30990)
72	socialville*.ti,ab. (16)
73	(orientat* adj2 (prompt* or routin* or activit* or strateg* or enviroment* or cue or cues)).ti,ab. (1452)
74	((Mnemonic-strateg* or cue?) adj2 (train* or aid? or technique*)).ti,ab. (739)
75	(attention adj2 (switch* or sustain* or focus* or divide* or dividing* or "process* train*" or lighthouse* or "dual task*") adj2 (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)).ti,ab. (615)
76	((cogniti* or visual* or spatial* or percept* or executive* or attention) adj1 (plasticit* or based* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or strateg* or prompt*) adj2 (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)).ti,ab. (20103)
77	((thinking or learning* or intellect* or "decision making*" or (problem adj2 solv*) or memor* or remember* or recall* or reasoning* or attenti* or ((acquir* adj2 knowledg*) or percept* or imitat*)) adj2 (treatment* or therap* or train* or rehab* or remediat* or pathol* or strateg* or follow-up)).ti,ab. (59833)
78	(goal* adj2 (manag* or orientat*) adj2 (treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)).ti,ab. (308)
79	(error* adj2 learn*).ti,ab. (1793)
80	(("Affect Recognition" or "Visual scan*" or "Social Cognition" or "Theory of Mind Imitation") adj1 train*).ti,ab. (162)
81	or/68-80 (481767)
82	(62 or 67) and 81 (34918)
83	limit 82 to english language (32901)
84	limit 83 to yr="2005 -Current" (28256)
85	letter.pt. or LETTER/ (1250629)
86	note.pt. (910448)
87	editorial.pt. (740582)
88	CASE REPORT/ or CASE STUDY/ (2863738)
89	(letter or comment*).ti. (226215)
90	or/85-89 (5511944)
91	RANDOMIZED CONTROLLED TRIAL/ or random*.ti,ab. (1958761)
92	90 not 91 (5456368)

93	ANIMAL/ not HUMAN/ (1166059)
94	NONHUMAN/ (7069557)
95	exp ANIMAL EXPERIMENT/ (2912093)
96	exp EXPERIMENTAL ANIMAL/ (779365)
97	ANIMAL MODEL/ (1597586)
98	exp RODENT/ (3883192)
99	(rat or rats or mouse or mice).ti. (1566612)
100	or/92-99 (14319510)
101	84 not 100 (17759)
102	SYSTEMATIC REVIEW/ (374976)
103	META-ANALYSIS/ (260103)
104	(meta analy* or metanaly* or metaanaly*).ti,ab. (319103)
105	((systematic or evidence) adj2 (review* or overview*)).ti,ab. (366317)
106	(reference list* or bibliograph* or hand search* or manual search* or relevant journals).ab. (63522)
107	(search strategy or search criteria or systematic search or study selection or data extraction).ab. (90668)
108	(search* adj4 literature).ab. (113263)
109	(medline or pubmed or cochrane or embase or psychlit or psyclit or psychinfo or psycinfo or cinahl or science citation index or bids or cancerlit).ab. (403802)
110	((pool* or combined) adj2 (data or trials or studies or results)).ab. (86538)
111	cochrane.jw. (23803)
112	or/102-111 (876034)
113	random*.ti,ab. (1848482)
114	factorial*.ti,ab. (45020)
115	(crossover* or cross over*).ti,ab. (120508)
116	((doubl* or singl*) adj blind*).ti,ab. (262450)
117	(assign* or allocat* or volunteer* or placebo*).ti,ab. (1200634)
118	CROSSOVER PROCEDURE/ (71811)
119	SINGLE BLIND PROCEDURE/ (47999)
120	RANDOMIZED CONTROLLED TRIAL/ (733244)
121	DOUBLE BLIND PROCEDURE/ (199933)
122	or/113-121 (2748703)
123	cohort analysis/ or longitudinal study/ or prospective study/ or retrospective study/ or follow up/ (3981618)
124	((follow up* or followup* or concurrent* or incidence* or population*) adj3 (study* or studies* or analy* or observation* or design* or method* or research*)).ti,ab. (748782)
125	(longitudinal* or prospective* or retrospective* or cohort*).ti,ab. (3767993)
126	cross-sectional study/ (512645)
127	((prevalence* or disease frequenc*) adj3 (study* or studies* or analy* or observation* or design* or method* or research*)).ti,ab. (87165)
128	cross sectional*.ti,ab. (622831)
129	pilot study/ (191137)
130	(pilot adj3 (project* or study* or studies* or analy* or observation* or design* or method* or research*)).ti,ab. (198144)
131	or/123-130 (6315802)
132	101 and 112 (1255)
133	101 and 122 (3882)
134	101 and 131 (6852)
135	or/132-134 (9643)

Database: Cochrane Database of Systematic Reviews

Date of last search: Issue 10 of 12, October 2022

#1	MeSH descriptor: [Craniocerebral Trauma] this term only
#2	MeSH descriptor: [Brain Injuries] this term only
#3	MeSH descriptor: [Brain Hemorrhage, Traumatic] explode all trees
#4	MeSH descriptor: [Brain Injuries, Diffuse] explode all trees
#5	MeSH descriptor: [Brain Injuries, Traumatic] explode all trees
#6	MeSH descriptor: [Brain Injury, Chronic] explode all trees
#7	MeSH descriptor: [Shaken Baby Syndrome] this term only
#8	MeSH descriptor: [Hypoxia, Brain] this term only
#9	MeSH descriptor: [Brain Damage, Chronic] this term only
#10	MeSH descriptor: [Intracranial Hemorrhage, Traumatic] explode all trees
#11	MeSH descriptor: [Brain Neoplasms] explode all trees
#12	MeSH descriptor: [Brain Diseases] this term only
#13	MeSH descriptor: [Brain Abscess] this term only
#14	MeSH descriptor: [Brain Diseases, Metabolic] this term only
#15	MeSH descriptor: [Cerebellar Diseases] this term only
#16	MeSH descriptor: [Cerebrovascular Disorders] this term only
#17	MeSH descriptor: [Basal Ganglia Cerebrovascular Disease] this term only
#18	MeSH descriptor: [Cerebrovascular Trauma] this term only
#19	MeSH descriptor: [Intracranial Arteriovenous Malformations] this term only
#20	MeSH descriptor: [Intracranial Embolism and Thrombosis] this term only
#21	MeSH descriptor: [Intracranial Hemorrhages] this term only
#22	MeSH descriptor: [Leukomalacia, Periventricular] this term only
#23	MeSH descriptor: [Vascular Headaches] this term only
#24	MeSH descriptor: [Encephalitis] this term only
#25	MeSH descriptor: [Hydrocephalus] this term only
#26	{or #1-#25}
#27	MeSH descriptor: [Stroke] explode all trees
#28	MeSH descriptor: [Dementia] this term only
#29	{or #27-#28}
#30	#26 NOT #29
#31	((brain* or cereb* or craniocereb* or cranial or intracrani* or neurocognit*) NEAR/2 (injur* or trauma* or damage* or disease*1 or disorder* or infect* or hemorrhag* or haemorrhag* or neoplasm* or cancer* or tumour* or tumor* or insult* or impair* or ischemi* or infarcti* or hypoxi* or drown*)):ti,ab
#32	(chronic* NEAR/1 trauma* NEAR/2 encephalopath*):ti,ab
#33	((infratentorial* or supratentorial* or hypothalam* or pituitar* or choroid plexus) NEAR/2 (neoplasm* or cancer* or tumour* or tumor* or carcinom* or adenocarcinom*)):ti,ab
#34	(brain* NEAR/2 abscess*):ti,ab
#35	(carotid arter* NEAR/2 (disease* or injur*)):ti,ab
#36	("basal ganglia disease" or "basal ganglia diseases" or encephalitis or meningoencephalitis or hydrocephal* or "paraneoplastic cerebellar degenerate" or "paraneoplastic cerebellar degenerated" or "paraneoplastic cerebellar degenerative" or "paraneoplastic cerebellar degeneration" or "shaken baby syndrome" or "shaken baby syndromes" or "shaking baby syndrome" or "shaking baby syndromes" or "Periventricular leukomalacia" or "Periventricular leukomalacias"):ti,ab
#37	MeSH descriptor: [Stroke] explode all trees
#38	MeSH descriptor: [Adolescent] this term only
#39	MeSH descriptor: [Minors] this term only
#40	MeSH descriptor: [Child] explode all trees
#41	MeSH descriptor: [Infant] explode all trees
#42	MeSH descriptor: [Pediatrics] explode all trees
#43	MeSH descriptor: [Puberty] explode all trees
#44	{or #38-#43}

#45	#37 and #44
#46	(stroke or strokes NEAR/3 (paediatric* or pediatric* or child* or adolescen* or kid or kids or youth* or youngster* or minor or minors or underage* or under-age* or "under age" or "under ages" or teen or teens or teenager* or juvenile* or boy or boys or boyhood or girl or girls or girlhood or schoolchild* or "school ages" or "school age" or schoolage* or "under 16" or "under sixteen" or "under sixteens")):ti,ab
#47	MeSH descriptor: [Spinal Cord Injuries] explode all trees
#48	MeSH descriptor: [Spinal Cord Neoplasms] explode all trees
#49	MeSH descriptor: [Epidural Abscess] this term only
#50	MeSH descriptor: [Spinal Cord Diseases] this term only
#51	MeSH descriptor: [Spinal Cord Vascular Diseases] explode all trees
#52	MeSH descriptor: [Spinal Cord Compression] this term only
#53	MeSH descriptor: [Myelitis, Transverse] this term only
#54	((spinal* or spine or spines) NEAR/2 (injur* or trauma* or tumour* or tumor* or neoplasm* or cancer* or infect* or insult* or disease or diseases or disorder* or degenrat* or compress* or vascular* or ischemi* or infarct* or hemorrhag* or haemorrhag*)):ti,ab
#55	(Central cord syndrome* or transverse myelitis):ti,ab
#56	(epidural* NEAR/2 (neoplasm* or cancer* or tumour* or tumor* or abscess*)):ti,ab
#57	((spinal* or spine or spines) NEAR/2 (viral* or virus* or polio* or acquired immunodeficiency syndrome or AIDS or HIV or bacterial* or neurosyphili* or neuro-syphili* or tubercul*)):ti,ab
#58	MeSH descriptor: [Peripheral Nerve Injuries] this term only
#59	MeSH descriptor: [Cranial Nerve Injuries] explode all trees
#60	MeSH descriptor: [Peripheral Nervous System Neoplasms] this term only
#61	MeSH descriptor: [Cranial Nerve Neoplasms] explode all trees
#62	MeSH descriptor: [Peripheral Nervous System Diseases] explode all trees
#63	MeSH descriptor: [Cranial Nerve Diseases] explode all trees
#64	((periph* or cranial*) NEAR/1 (nerve or nerves or nervous system) NEAR/2 (injur* or trauma* or disorder* or disease* or damage* or neoplasm* or cancer* or tumour* or tumor* or inflamm* or autoimmun* or paraneoplastic* or neuropath* or syndrome or syndromes)):ti,ab
#65	(Guillain* NEAR/1 Barr*):ti,ab
#66	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) NEAR/1 nerve* NEAR/1 injur*):ti,ab
#67	(optic* NEAR/1 nerve* NEAR/2 (neoplasm* or cancer* or tumour* or tumor*)):ti,ab
#68	(brachial plexus NEAR/1 (neuropath* or neuritis)):ti,ab
#69	(complex regional pain syndrome* or causalgia or mononeuropath* or nerve compression syndrome*):ti,ab
#70	((femoral or median or peroneal or radial or sciatic or tibial or ulnar) NEAR/1 neuropath*):ti,ab
#71	((carpal-tunnel or piriformis-muscle or tarsal-tunnel or thoracic-outlet) NEAR/1 syndrome*):ti,ab
#72	(pudendal neuralgia or polyneuropath* or polyradiculoneuropath* or polyradiculopath* or radiculopath*):ti,ab
#73	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) NEAR/1 nerve* NEAR/1 disease*):ti,ab
#74	(periph* NEAR/2 neuropath*):ti,ab
#75	(((periph* or cranial*) NEAR/2 (nerve or nerves or nervous system)) and lupus):ti,ab
#76	((multi-focal* or multifocal*) NEAR/2 motor NEAR/1 neuropath*):ti,ab
#77	(((periph* or cranial*) NEAR/2 (nerve or nerves or nervous system)) and alcohol*):ti,ab
#78	{or #30-#36, #45-#77}
#79	MeSH descriptor: [Motor Neuron Disease] explode all trees
#80	MeSH descriptor: [Postpoliomyelitis Syndrome] this term only
#81	MeSH descriptor: [Parkinsonian Disorders] explode all trees
#82	MeSH descriptor: [Muscular Dystrophy, Duchenne] this term only
#83	MeSH descriptor: [Multiple Sclerosis] explode all trees
#84	MeSH descriptor: [Neuromuscular Diseases] this term only
#85	MeSH descriptor: [Spastic Paraplegia, Hereditary] this term only
#86	MeSH descriptor: [Friedreich Ataxia] this term only

#87	MeSH descriptor: [Multiple System Atrophy] explode all trees
#88	MeSH descriptor: [Supranuclear Palsy, Progressive] this term only
#89	MeSH descriptor: [Corticobasal Degeneration] explode all trees
#90	MeSH descriptor: [Leukodystrophy, Metachromatic] this term only
#91	MeSH descriptor: [Mitochondrial Myopathies] explode all trees
#92	MeSH descriptor: [Mucopolysaccharidoses] explode all trees
#93	MeSH descriptor: [Williams Syndrome] this term only
#94	MeSH descriptor: [Genetic Diseases, Inborn] this term only
#95	MeSH descriptor: [Rett Syndrome] this term only
#96	MeSH descriptor: [Fetal Alcohol Spectrum Disorders] this term only
#97	MeSH descriptor: [Dystonic Disorders] this term only
#98	MeSH descriptor: [Hereditary Sensory and Motor Neuropathy] this term only
#99	MeSH descriptor: [Spinal Dysraphism] this term only
#100	(neurolog* NEAR/1 (disease* or damage* or disorder* or impair*)):ti,ab
#101	((motor-neuron* or gehrig* or charcott* or kennedy*) NEAR/1 disease*):ti,ab
#102	((amyotroph* or primary) NEAR/1 lateral* NEAR/1 sclero*):ti,ab
#103	(bulbar NEAR/1 pals*):ti,ab
#104	((muscular or muscle* or bulbo) NEAR/1 atroph* NEAR/1 spin*):ti,ab
#105	(progressiv* NEAR/1 (muscular or muscle*) NEAR/1 atroph*):ti,ab
#106	((postpolio* or post-polio*) NEAR/1 (syndrome or syndromes)):ti,ab
#107	(Parkinson* or duchenne* or multiple sclerosis* or sclerosos* or aphasia or creutzfeldt-jakob or huntington* or kluver-bucy):ti,ab
#108	(muscular NEAR/1 dystroph*):ti,ab
#109	(neuromusc* NEAR/1 (disease* or disorder or disorders)):ti,ab
#110	(heredit* NEAR/1 spastic* NEAR/1 parapleg*):ti,ab
#111	("friedreich ataxia" or "friedreich ataxias" or "friedreichs ataxia" or "friedreichs ataxias"):ti,ab
#112	((multiple system or olivopontocerebellar) NEAR/1 atroph*):ti,ab
#113	(shy-drager syndrome* or striatonigral degenerat* or batten* disease or diseases):ti,ab
#114	(progressive NEAR/1 supranuclear NEAR/1 pals*):ti,ab
#115	(richardson* NEAR/1 (disease or diseases or syndrome or syndromes)):ti,ab
#116	((corticobasal or cortico basal) NEAR/1 degenerat*):ti,ab
#117	(white NEAR/1 matter NEAR/1 (disorder or disorders)):ti,ab
#118	(metachromatic leukodystroph* or mitochondrial myopath* or mucopolysaccharidos*):ti,ab
#119	(lysosomal NEAR/1 storage NEAR/1 (disorder or disorders)):ti,ab
#120	((genetic or William* or catch-22 or rett* or congenital or fetal or faetal alcohol) NEAR/1 (syndrome or disorder*)):ti,ab
#121	(perinatal illness* or perinatal hypoxia*):ti,ab
#122	(primary NEAR/1 (dystonia or dystonias)):ti,ab
#123	(heredit* NEAR/1 motor* NEAR/1 sens* NEAR/1 neuropath*):ti,ab
#124	(spina bifida or bifidas or spinal dysraphism or dysraphisms):ti,ab
#125	MeSH descriptor: [Movement Disorders] this term only
#126	MeSH descriptor: [Motor Disorders] this term only
#127	MeSH descriptor: [Conversion Disorder] this term only
#128	((functional* or psychogenic* or dissociative*) NEAR/1 neurologic* NEAR/1 (disorder* or dysfunction* or difficult*)):ti,ab
#129	((movement* or motor* or convers*) NEAR/1 (disorder* or dysfunct*)):ti,ab
#130	((psychogenic or dissociative or non-epilep* or nonepilep*) NEAR/1 (seizure* or convulsion* or fit or fits or spasm* or attack*)):ti,ab
#131	(pseudo-seizure or pseudoseizure):ti,ab
#132	(medical* NEAR/1 (unexplain* or un-explain*) NEAR/1 (symptom or symptoms)):ti,ab
#133	{or #78-#132}
#134	MeSH descriptor: [Neurological Rehabilitation] this term only
#135	MeSH descriptor: [Cognitive Dysfunction] this term only

#136	MeSH descriptor: [Cognition] this term only
#137	{or #135-#136}
#138	MeSH descriptor: [Rehabilitation] this term only
#139	rehab*:ti
#140	{or #138-#139}
#141	#137 and #140
#142	#134 or #141
#143	MeSH descriptor: [Stroke] explode all trees
#144	MeSH descriptor: [Dementia] this term only
#145	#143 or #144
#146	#142 not #145
#147	#133 or #146
#148	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) NEAR/2 ((brain* or cogniti* or visual* or spatial* or percept* or executive*) NEAR/1 (social* or plasticit* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or activat* or global or impair*))):ti,ab
#149	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) NEAR/2 (thinking or learning* or intellect* or "decision making" or "decision makings" or (problem NEAR/2 solv*) or memor* or remember* or recall* or attenti* or concentrat* or (acquir* NEAR/2 knowledg*))):ti,ab
#150	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) NEAR/2 (process* NEAR/2 (speed* or train* or abilit* or perform* or strateg* or technique*))):ti,ab
#151	((memor* or cognitiv* or visual*) NEAR/2 (Art or stimulat* or prompt* or diary* or diaries* or calendar or mnemonics or visualisation* or puzzle* or scan* or anchor* or environment*)):ti,ab
#152	socialville*:ti,ab
#153	(orientat* NEAR/2 (prompt* or routin* or activit* or strateg* or enviroment* or cue or cues)):ti,ab
#154	((Mnemonic-strateg* or cue or cues) NEAR/2 (train* or aid or aids or technique*)):ti,ab
#155	(attention NEAR/2 (switch* or sustain* or focus* or divide* or dividing* or "process train" or "process trains" or "process trained" or "process trainer" or "process training" or "process trainings" or "processes train" or "processes trains" or "processes trained" or "processes trainer" or "processes training" or "processes trainings" or "processing train" or "processing trains" or "processing trained" or "processing trainer" or "processing training" or "processing trainings" or "processive train" or "processive trains" or "processive trained" or "processive trainer" or "processive training" or "processive trainings" or lighthouse* or "dual task" or "dual tasks") NEAR/2 (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)):ti,ab
#156	((cogniti* or visual* or spatial* or percept* or executive* or attention) NEAR/1 (plasticit* or based* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or strateg* or prompt*) NEAR/2 (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)):ti,ab
#157	((thinking or learning* or intellect* or "decision making" or "decision makings" or (problem NEAR/2 solv*) or memor* or remember* or recall* or reasoning* or attenti* or ((acquir* NEAR/2 knowledg*) or percept* or imitat*)) NEAR/2 (treatment* or therap* or train* or rehab* or remediat* or pathol* or strateg* or follow-up)):ti,ab
#158	(goal* NEAR/2 (manag* or orientat*) NEAR/2 (treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)):ti,ab
#159	(error* NEAR/2 learn*):ti,ab
#160	(("Affect Recognition" or "Visual scan" or "Visual scanner" or "Visual scanners" or "Visual scanning" or "Visual scannings" or "Social Cognition" or "Theory of Mind Imitation") NEAR/1 train*):ti,ab
#161	{or #148-#160}
#162	#147 and #161
#163	#147 and #161 with Cochrane Library publication date Between Jan 2005 and Oct 2022, in Cochrane Reviews

Database: Cochrane Central Register of Controlled Trials

Date of last search: Issue 10 of 12, October 2022

#1	MeSH descriptor: [Craniocerebral Trauma] this term only
#2	MeSH descriptor: [Brain Injuries] this term only
#3	MeSH descriptor: [Brain Hemorrhage, Traumatic] explode all trees
#4	MeSH descriptor: [Brain Injuries, Diffuse] explode all trees
#5	MeSH descriptor: [Brain Injuries, Traumatic] explode all trees
#6	MeSH descriptor: [Brain Injury, Chronic] explode all trees
#7	MeSH descriptor: [Shaken Baby Syndrome] this term only
#8	MeSH descriptor: [Hypoxia, Brain] this term only
#9	MeSH descriptor: [Brain Damage, Chronic] this term only
#10	MeSH descriptor: [Intracranial Hemorrhage, Traumatic] explode all trees
#11	MeSH descriptor: [Brain Neoplasms] explode all trees
#12	MeSH descriptor: [Brain Diseases] this term only
#13	MeSH descriptor: [Brain Abscess] this term only
#14	MeSH descriptor: [Brain Diseases, Metabolic] this term only
#15	MeSH descriptor: [Cerebellar Diseases] this term only
#16	MeSH descriptor: [Cerebrovascular Disorders] this term only
#17	MeSH descriptor: [Basal Ganglia Cerebrovascular Disease] this term only
#18	MeSH descriptor: [Cerebrovascular Trauma] this term only
#19	MeSH descriptor: [Intracranial Arteriovenous Malformations] this term only
#20	MeSH descriptor: [Intracranial Embolism and Thrombosis] this term only
#21	MeSH descriptor: [Intracranial Hemorrhages] this term only
#22	MeSH descriptor: [Leukomalacia, Periventricular] this term only
#23	MeSH descriptor: [Vascular Headaches] this term only
#24	MeSH descriptor: [Encephalitis] this term only
#25	MeSH descriptor: [Hydrocephalus] this term only
#26	{or #1-#25}
#27	MeSH descriptor: [Stroke] explode all trees
#28	MeSH descriptor: [Dementia] this term only
#29	{or #27-#28}
#30	#26 NOT #29
#31	((brain* or cereb* or craniocereb* or cranial or intracrani* or neurocognit*) NEAR/2 (injur* or trauma* or damage* or disease*1 or disorder* or infect* or hemorrhag* or haemorrhag* or neoplasm* or cancer* or tumour* or tumor* or insult* or impair* or ischemi* or infarcti* or hypoxi* or drown*)):ti,ab
#32	(chronic* NEAR/1 trauma* NEAR/2 encephalopath*):ti,ab
#33	((infratentorial* or supratentorial* or hypothalam* or pituitar* or choroid plexus) NEAR/2 (neoplasm* or cancer* or tumour* or tumor* or carcinom* or adenocarcinom*)):ti,ab
#34	(brain* NEAR/2 abscess*):ti,ab
#35	(carotid arter* NEAR/2 (disease* or injur*)):ti,ab
#36	("basal ganglia disease" or "basal ganglia diseases" or encephalitis or meningoencephalitis or hydrocephal* or "paraneoplastic cerebellar degenerate" or "paraneoplastic cerebellar degenerated" or "paraneoplastic cerebellar degenerative" or "paraneoplastic cerebellar degeneration" or "shaken baby syndrome" or "shaken baby syndromes" or "shaking baby syndrome" or "shaking baby syndromes" or "Periventricular leukomalacia" or "Periventricular leukomalacias"):ti,ab
#37	MeSH descriptor: [Stroke] explode all trees
#38	MeSH descriptor: [Adolescent] this term only
#39	MeSH descriptor: [Minors] this term only
#40	MeSH descriptor: [Child] explode all trees
#41	MeSH descriptor: [Infant] explode all trees
#42	MeSH descriptor: [Pediatrics] explode all trees
#43	MeSH descriptor: [Puberty] explode all trees
#44	{or #38-#43}
#45	#37 and #44
#46	(stroke or strokes NEAR/3 (paediatric* or pediatric* or child* or adolescen* or kid or kids or youth* or youngster* or minor or minors or underage* or under-age* or "under age" or "under ages" or teen or

	teens or teenager* or juvenile* or boy or boys or boyhood or girl or girls or girlhood or schoolchild* or "school ages" or "school age" or schoolage* or "under 16" or "under sixteen" or "under sixteens")):ti,ab
#47	MeSH descriptor: [Spinal Cord Injuries] explode all trees
#48	MeSH descriptor: [Spinal Cord Neoplasms] explode all trees
#49	MeSH descriptor: [Epidural Abscess] this term only
#50	MeSH descriptor: [Spinal Cord Diseases] this term only
#51	MeSH descriptor: [Spinal Cord Vascular Diseases] explode all trees
#52	MeSH descriptor: [Spinal Cord Compression] this term only
#53	MeSH descriptor: [Myelitis, Transverse] this term only
#54	((spinal* or spine or spines) NEAR/2 (injur* or trauma* or tumour* or tumor* or neoplasm* or cancer* or infect* or insult* or disease or diseases or disorder* or degenrat* or compress* or vascular* or ischemi* or infarct* or hemorrhag* or haemorrhag*)):ti,ab
#55	(Central cord syndrome* or transverse myelitis):ti,ab
#56	(epidural* NEAR/2 (neoplasm* or cancer* or tumour* or tumor* or abscess*)):ti,ab
#57	((spinal* or spine or spines) NEAR/2 (viral* or virus* or polio* or acquired immunodeficiency syndrome or AIDS or HIV or bacterial* or neurosyphili* or neuro-syphili* or tubercul*)):ti,ab
#58	MeSH descriptor: [Peripheral Nerve Injuries] this term only
#59	MeSH descriptor: [Cranial Nerve Injuries] explode all trees
#60	MeSH descriptor: [Peripheral Nervous System Neoplasms] this term only
#61	MeSH descriptor: [Cranial Nerve Neoplasms] explode all trees
#62	MeSH descriptor: [Peripheral Nervous System Diseases] explode all trees
#63	MeSH descriptor: [Cranial Nerve Diseases] explode all trees
#64	((periph* or cranial*) NEAR/1 (nerve or nerves or nervous system) NEAR/2 (injur* or trauma* or disorder* or disease* or damage* or neoplasm* or cancer* or tumour* or tumor* or inflamm* or autoimmun* or paraneoplastic* or neuropath* or syndrome or syndromes)):ti,ab
#65	(Guillain* NEAR/1 Barr*):ti,ab
#66	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) NEAR/1 nerve* NEAR/1 injur*):ti,ab
#67	(optic* NEAR/1 nerve* NEAR/2 (neoplasm* or cancer* or tumour* or tumor*)):ti,ab
#68	(brachial plexus NEAR/1 (neuropath* or neuritis)):ti,ab
#69	(complex regional pain syndrome* or causalgia or mononeuropath* or nerve compression syndrome*):ti,ab
#70	((femoral or median or peroneal or radial or sciatic or tibial or ulnar) NEAR/1 neuropath*):ti,ab
#71	((carpal-tunnel or piriformis-muscle or tarsal-tunnel or thoracic-outlet) NEAR/1 syndrome*):ti,ab
#72	(pudendal neuralgia or polyneuropath* or polyradiculoneuropath* or polyradiculopath* or radiculopath*):ti,ab
#73	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) NEAR/1 nerve* NEAR/1 disease*):ti,ab
#74	(periph* NEAR/2 neuropath*):ti,ab
#75	(((periph* or cranial*) NEAR/2 (nerve or nerves or nervous system)) and lupus):ti,ab
#76	((multi-focal* or multifocal*) NEAR/2 motor NEAR/1 neuropath*):ti,ab
#77	(((periph* or cranial*) NEAR/2 (nerve or nerves or nervous system)) and alcohol*):ti,ab
#78	{or #30-#36, #45-#77}
#79	MeSH descriptor: [Motor Neuron Disease] explode all trees
#80	MeSH descriptor: [Postpoliomyelitis Syndrome] this term only
#81	MeSH descriptor: [Parkinsonian Disorders] explode all trees
#82	MeSH descriptor: [Muscular Dystrophy, Duchenne] this term only
#83	MeSH descriptor: [Multiple Sclerosis] explode all trees
#84	MeSH descriptor: [Neuromuscular Diseases] this term only
#85	MeSH descriptor: [Spastic Paraplegia, Hereditary] this term only
#86	MeSH descriptor: [Friedreich Ataxia] this term only
#87	MeSH descriptor: [Multiple System Atrophy] explode all trees
#88	MeSH descriptor: [Supranuclear Palsy, Progressive] this term only

#89	MeSH descriptor: [Corticobasal Degeneration] explode all trees
#90	MeSH descriptor: [Leukodystrophy, Metachromatic] this term only
#91	MeSH descriptor: [Mitochondrial Myopathies] explode all trees
#92	MeSH descriptor: [Mucopolysaccharidoses] explode all trees
#93	MeSH descriptor: [Williams Syndrome] this term only
#94	MeSH descriptor: [Genetic Diseases, Inborn] this term only
#95	MeSH descriptor: [Rett Syndrome] this term only
#96	MeSH descriptor: [Fetal Alcohol Spectrum Disorders] this term only
#97	MeSH descriptor: [Dystonic Disorders] this term only
#98	MeSH descriptor: [Hereditary Sensory and Motor Neuropathy] this term only
#99	MeSH descriptor: [Spinal Dysraphism] this term only
#100	(neurolog* NEAR/1 (disease* or damage* or disorder* or impair*)):ti,ab
#101	((motor-neuron* or gehrig* or charcott* or kennedy*) NEAR/1 disease*):ti,ab
#102	((amyotroph* or primary) NEAR/1 lateral* NEAR/1 sclero*):ti,ab
#103	(bulbar NEAR/1 pals*):ti,ab
#104	((muscular or muscle* or bulbo) NEAR/1 atroph* NEAR/1 spin*):ti,ab
#105	(progressiv* NEAR/1 (muscular or muscle*) NEAR/1 atroph*):ti,ab
#106	((postpolio* or post-polio*) NEAR/1 (syndrome or syndromes)):ti,ab
#107	(Parkinson* or duchenne* or multiple sclerosis* or sclerosos* or aphasia or creutzfeldt-jakob or huntington* or kluver-bucy):ti,ab
#108	(muscular NEAR/1 dystroph*):ti,ab
#109	(neuromusc* NEAR/1 (disease* or disorder or disorders)):ti,ab
#110	(heredit* NEAR/1 spastic* NEAR/1 parapleg*):ti,ab
#111	("friedreich ataxia" or "friedreich ataxias" or "friedreichs ataxia" or "friedreichs ataxias"):ti,ab
#112	((multiple system or olivopontocerebellar) NEAR/1 atroph*):ti,ab
#113	(shy-drager syndrome* or striatonigral degenerat* or batten* disease or diseases):ti,ab
#114	(progressive NEAR/1 supranuclear NEAR/1 pals*):ti,ab
#115	(richardson* NEAR/1 (disease or diseases or syndrome or syndromes)):ti,ab
#116	((corticobasal or cortico basal) NEAR/1 degenerat*):ti,ab
#117	(white NEAR/1 matter NEAR/1 (disorder or disorders)):ti,ab
#118	(metachromatic leukodystroph* or mitochondrial myopath* or mucopolysaccharidos*):ti,ab
#119	(lysosomal NEAR/1 storage NEAR/1 (disorder or disorders)):ti,ab
#120	((genetic or William* or catch-22 or rett* or congenital or fetal or faetal alcohol) NEAR/1 (syndrome or disorder*)):ti,ab
#121	(perinatal illness* or perinatal hypoxia*):ti,ab
#122	(primary NEAR/1 (dystonia or dystonias)):ti,ab
#123	(heredit* NEAR/1 motor* NEAR/1 sens* NEAR/1 neuropath*):ti,ab
#124	(spina bifida or bifidas or spinal dysraphism or dysraphisms):ti,ab
#125	MeSH descriptor: [Movement Disorders] this term only
#126	MeSH descriptor: [Motor Disorders] this term only
#127	MeSH descriptor: [Conversion Disorder] this term only
#128	((functional* or psychogenic* or dissociative*) NEAR/1 neurologic* NEAR/1 (disorder* or dysfunction* or difficult*)):ti,ab
#129	((movement* or motor* or convers*) NEAR/1 (disorder* or dysfunct*)):ti,ab
#130	((psychogenic or dissociative or non-epilep* or nonepilep*) NEAR/1 (seizure* or convulsion* or fit or fits or spasm* or attack*)):ti,ab
#131	(pseudo-seizure or pseudoseizure):ti,ab
#132	(medical* NEAR/1 (unexplain* or un-explain*) NEAR/1 (symptom or symptoms)):ti,ab
#133	{or #78-#132}
#134	MeSH descriptor: [Neurological Rehabilitation] this term only
#135	MeSH descriptor: [Cognitive Dysfunction] this term only
#136	MeSH descriptor: [Cognition] this term only
#137	{or #135-#136}

#138	MeSH descriptor: [Rehabilitation] this term only
#139	rehab*:ti
#140	{or #138-#139}
#141	#137 and #140
#142	#134 or #141
#143	MeSH descriptor: [Stroke] explode all trees
#144	MeSH descriptor: [Dementia] this term only
#145	#143 or #144
#146	#142 not #145
#147	#133 or #146
#148	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) NEAR/2 ((brain* or cogniti* or visual* or spatial* or percept* or executive*) NEAR/1 (social* or plasticit* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or activat* or global or impair*))):ti,ab
#149	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) NEAR/2 (thinking or learning* or intellect* or "decision making" or "decision makings" or (problem NEAR/2 solv*) or memor* or remember* or recall* or attenti* or concentrat* or (acquir* NEAR/2 knowledg*))):ti,ab
#150	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) NEAR/2 (process* NEAR/2 (speed* or train* or abilit* or perform* or strateg* or technique*))):ti,ab
#151	((memor* or cognitiv* or visual*) NEAR/2 (Art or stimulat* or prompt* or diary* or diaries* or calendar or mnemonics or visualisation* or puzzle* or scan* or anchor* or environment*)):ti,ab
#152	socialville*:ti,ab
#153	(orientat* NEAR/2 (prompt* or routin* or activit* or strateg* or enviroment* or cue or cues)):ti,ab
#154	((Mnemonic-strateg* or cue or cues) NEAR/2 (train* or aid or aids or technique*)):ti,ab
#155	(attention NEAR/2 (switch* or sustain* or focus* or divide* or dividing* or "process train" or "process trains" or "process trained" or "process trainer" or "process training" or "process trainings" or "processes train" or "processes trains" or "processes trained" or "processes trainer" or "processes training" or "processes trainings" or "processing train" or "processing trains" or "processing trained" or "processing trainer" or "processing training" or "processing trainings" or "processive train" or "processive trains" or "processive trained" or "processive trainer" or "processive training" or "processive trainings" or lighthouse* or "dual task" or "dual tasks") NEAR/2 (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)):ti,ab
#156	((cogniti* or visual* or spatial* or percept* or executive* or attention) NEAR/1 (plasticit* or based* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or strateg* or prompt*) NEAR/2 (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)):ti,ab
#157	((thinking or learning* or intellect* or "decision making" or "decision makings" or (problem NEAR/2 solv*) or memor* or remember* or recall* or reasoning* or attenti* or ((acquir* NEAR/2 knowledg*) or percept* or imitat*)) NEAR/2 (treatment* or therap* or train* or rehab* or remediat* or pathol* or strateg* or follow-up)):ti,ab
#158	(goal* NEAR/2 (manag* or orientat*) NEAR/2 (treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up)):ti,ab
#159	(error* NEAR/2 learn*):ti,ab
#160	(("Affect Recognition" or "Visual scan" or "Visual scanner" or "Visual scanners" or "Visual scanning" or "Visual scannings" or "Social Cognition" or "Theory of Mind Imitation") NEAR/1 train*):ti,ab
#161	{or #148-#160}
#162	#147 and #161
#164	#147 and #161 with Publication Year from 2005 to 2022, in Trials
#165	conference:pt or (clinicaltrials or trialsearch or "www.who.int"):so
#166	#163 NOT #164

Database:INAHTA

Date of last search: 24/10/2022

#1	(brain* or cereb* or craniocereb* or cranial or intracrani* or neurocognit*) AND (injur* or trauma* or damage* or disease*1 or disorder* or infect* or hemorrhag* or haemorrhag* or neoplasm* or cancer* or tumour* or tumor* or insult* or impair* or ischemi* or infarcti* or hypoxi* or drown*)
#2	(chronic* AND trauma* AND encephalopath*)
#3	(infratentorial* or supratentorial* or hypothalam* or pituitar* or choroid plexus) AND (neoplasm* or cancer* or tumour* or tumor* or carcinom* or adenocarcinom*)
#4	(brain* AND abscess*)
#5	(carotid arter* AND (disease* or injur*))
#6	("basal ganglia disease" or "basal ganglia diseases" or encephalitis or meningoencephalitis or hydrocephal* or "paraneoplastic cerebellar degenerate" or "paraneoplastic cerebellar degenerated" or "paraneoplastic cerebellar degenerative" or "paraneoplastic cerebellar degeneration" or "shaken baby syndrome" or "shaken baby syndromes" or "shaking baby syndrome" or "shaking baby syndromes" or "Periventricular leukomalacia" or "Periventricular leukomalacias")
#7	(stroke or strokes AND (paediatric* or pediatric* or child* or adolescen* or kid or kids or youth* or youngster* or minor or minors or underage* or under-age* or "under age" or "under ages" or teen or teens or teenager* or juvenile* or boy or boys or boyhood or girl or girls or girlhood or schoolchild* or "school ages" or "school age" or schoolage* or "under 16" or "under sixteen" or "under sixteens"))
#8	((spinal* or spine or spines) AND (injur* or trauma* or tumour* or tumor* or neoplasm* or cancer* or infect* or insult* or disease or diseases or disorder* or degenrat* or compress* or vascular* or ischemi* or infarct* or hemorrhag* or haemorrhag*))
#9	(Central cord syndrome* or transverse myelitis)
#10	(epidural* AND (neoplasm* or cancer* or tumour* or tumor* or abscess*))
#11	((spinal* or spine or spines) AND (viral* or virus* or polio* or acquired immunodeficiency syndrome or AIDS or HIV or bacterial* or neurosyphili* or neuro-syphili* or tubercul*))
#12	((periph* or cranial*) AND (nerve or nerves or nervous system) AND (injur* or trauma* or disorder* or disease* or damage* or neoplasm* or cancer* or tumour* or tumor* or inflamm* or autoimmun* or paraneoplastic* or neuropath* or syndrome or syndromes))
#13	(Guillain* AND Barr*)
#14	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) AND nerve* AND injur*)
#15	(optic* AND nerve* AND (neoplasm* or cancer* or tumour* or tumor*))
#16	(brachial plexus AND (neuropath* or neuritis))
#17	(complex regional pain syndrome* or causalgia or mononeuropath* or nerve compression syndrome*)
#18	((femoral or median or peroneal or radial or sciatic or tibial or ulnar) AND neuropath*)
#19	((carpal-tunnel or piriformis-muscle or tarsal-tunnel or thoracic-outlet) AND syndrome*)
#20	(pudendal neuralgia or polyneuropath* or polyradiculoneuropath* or polyradiculopath* or radiculopath*)
#21	((abducen* or accessory or facial or glossopharyngeal or hypoglossal or oculomotor or ocular motility or olfactory or optic* or trigeminal or trochlear or vestibulocochlear) AND nerve* AND disease*)
#22	(periph* AND neuropath*)
#23	(((periph* or cranial*) AND (nerve or nerves or nervous system)) and lupus)
#24	(((periph* or cranial*) AND (nerve or nerves or nervous system)) and alcohol*)
#25	(neurolog* AND (disease* or damage* or disorder* or impair*))
#26	((motor-neuron* or gehrig* or charcott* or kennedy*) AND disease*)
#27	((amyotroph* or primary) AND lateral* AND sclero*)
#28	(bulbar AND pals*)
#29	((muscular or muscle* or bulbo) AND atroph* AND spin*)
#30	(progressiv* AND (muscular or muscle*) AND atroph*)
#31	((postpolio* or post-polio*) AND (syndrome or syndromes))
#32	(Parkinson* or duchenne* or multiple sclerosis* or sclerosos* or aphasia or creutzfeldt-jakob or huntington* or kluver-bucy)
#33	(muscular AND dystroph*)
#34	(neuromusc* AND (disease* or disorder or disorders))
#35	(heredit* AND spastic* AND parapleg*)
#36	("friedreich ataxia" or "friedreich ataxias" or "friedreichs ataxia" or "friedreichs ataxias")

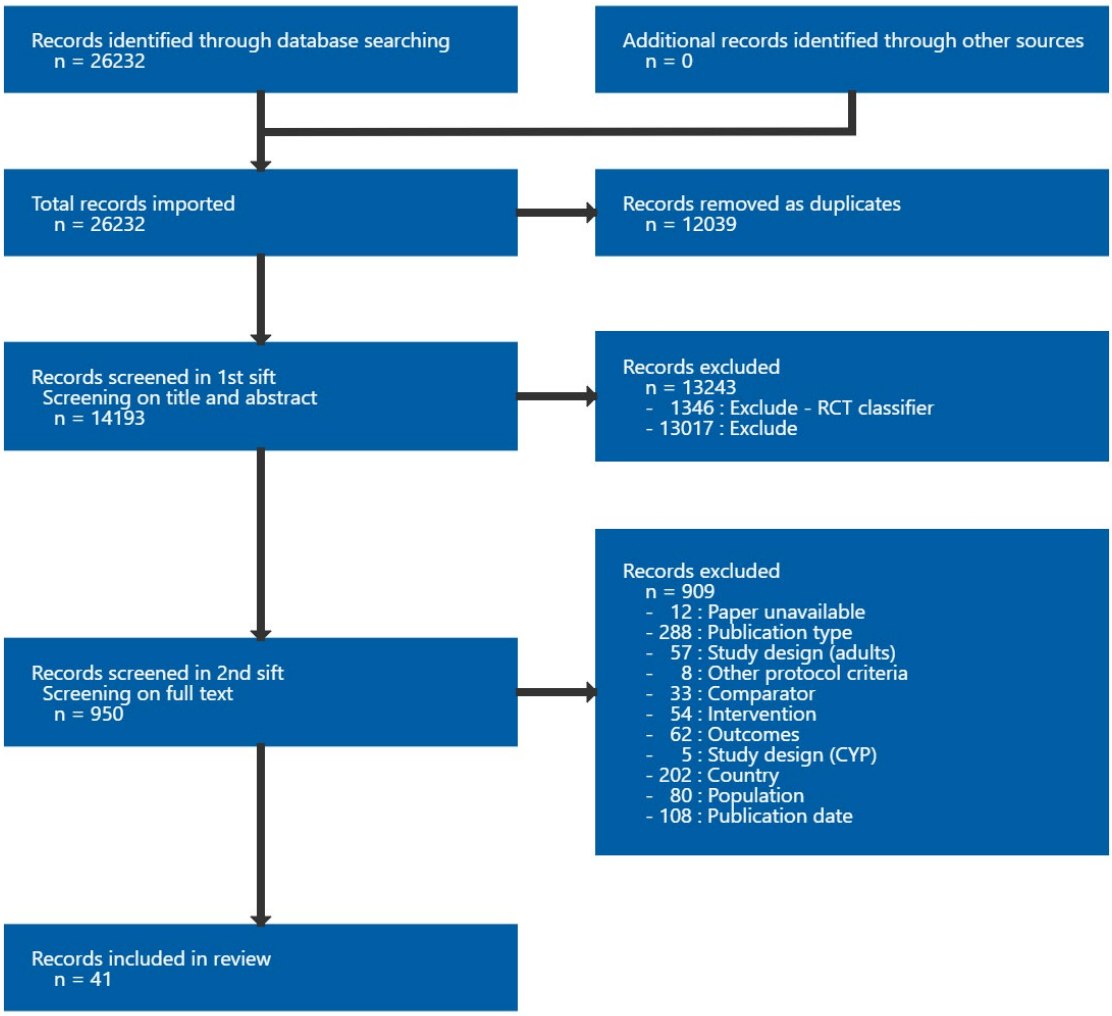
#37	((multiple system or olivopontocerebellar) AND atroph*)
#38	(shy-drager syndrome* or striatonigral degenerat* or batten* disease or diseases)
#39	(progressive AND supranuclear AND pals*)
#40	(richardson* AND (disease or diseases or syndrome or syndromes))
#41	((corticobasal or cortico basal) AND degenerat*)
#42	(white AND matter AND (disorder or disorders))
#43	(metachromatic leukodystroph* or mitochondrial myopath* or mucopolysaccharidos*)
#44	(lysosomal AND storage AND (disorder or disorders))
#45	((genetic or William* or catch-22 or rett* or congenital or fetal or faetal alcohol) AND (syndrome or disorder*))
#46	(perinatal illness* or perinatal hypoxia*)
#47	(primary AND (dystonia or dystonias))
#48	(heredit* AND motor* AND sens* AND neuropath*)
#49	(spina bifida or bifidas or spinal dysraphism or dysraphisms)
#50	((functional* or psychogenic* or dissociative*) AND neurologic* AND (disorder* or dysfunction* or difficult*))
#51	((movement* or motor* or convers*) AND (disorder* or dysfunct*))
#52	((psychogenic or dissociative or non-epilep* or nonepilep*) AND (seizure* or convulsion* or fit or fits or spasm* or attack*))
#53	(pseudo-seizure or pseudoseizure)
#54	(medical* AND (unexplain* or un-explain*) AND (symptom or symptoms))
#55	((multi-focal* or multifocal*) AND motor AND neuropath*)
#56	rehab*
#57	#28 OR #27 OR #26 OR #25 OR #24 OR #23 OR #22 OR #21 OR #20 OR #19 OR #18 OR #17 OR #16 OR #15 OR #14 OR #13 OR #12 OR #11 OR #10 OR #9 OR #8 OR #7 OR #6 OR #5 OR #4 OR #3 OR #2 OR #1
#58	#56 OR #55 OR #54 OR #53 OR #52 OR #51 OR #50 OR #49 OR #48 OR #47 OR #46 OR #45 OR #44 OR #43 OR #42 OR #41 OR #40 OR #39 OR #38 OR #37 OR #36 OR #35 OR #34 OR #33 OR #32 OR #31 OR #30 OR #29
#59	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) AND ((brain* or cogniti* or visual* or spatial* or percept* or executive*) AND (social* or plasticit* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or activat* or global or impair*)))
#60	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) AND (thinking or learning* or intellect* or "decision making" or "decision makings" or (problem AND solv*) or memor* or remember* or recall* or attenti* or concentrat* or (acquir* AND knowledg*)))
#61	((improv* or enrich* or benefit* or increas* or enhanc* or support* or encourag* or promot* or optimiz* or optimis* or motivat* or incentiv* or great* or maintain* or strengthen* or rehab* or restor*) AND (process* AND (speed* or train* or abilit* or perform* or strateg* or technique*)))
#62	((memor* or cognitiv* or visual*) AND (Art or stimulat* or prompt* or diary* or diaries* or calendar or mnemonics or visualisation* or puzzle* or scan* or anchor* or environment*))
#63	socialville*
#64	(orientat* AND (prompt* or routin* or activit* or strateg* or enviroment* or cue or cues))
#65	((Mnemonic-strateg* or cue or cues) AND (train* or aid or aids or technique*))
#66	(attention AND (switch* or sustain* or focus* or divide* or dividing* or "process train" or "process trains" or "process trained" or "process trainer" or "process training" or "process trainings" or "processes train" or "processes trains" or "processes trained" or "processes trainer" or "processes training" or "processes trainings" or "processing train" or "processing trains" or "processing trained" or "processing trainer" or "processing training" or "processing trainings" or "processive train" or "processive trains" or "processive trained" or "processive trainer" or "processive training" or "processive trainings" or lighthouse* or "dual task" or "dual tasks") AND (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up))
#67	((cogniti* or visual* or spatial* or percept* or executive* or attention) AND (plasticit* or based* or function* or abilit* or capacit* or capabilit* or perform* or impair* or aid* or manag* or speed* or train* or strateg* or prompt*) AND (analys* or technique* or treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up))
#68	((thinking or learning* or intellect* or "decision making" or "decision makings" or (problem AND solv*) or memor* or remember* or recall* or reasoning* or attenti* or ((acquir* AND knowledg*) or percept* or imitat*)) AND (treatment* or therap* or train* or rehab* or remediat* or pathol* or strateg* or follow-up))

#69	(goal* AND (manag* or orientat*) AND (treatment* or therap* or train* or rehab* or remediat* or pathol* or follow-up))
#70	(error* AND learn*)
#71	(("Affect Recognition" or "Visual scan" or "Visual scanner" or "Visual scanners" or "Visual scanning" or "Visual scannings" or "Social Cognition" or "Theory of Mind Imitation") AND train*)
#72	#71 OR #70 OR #69 OR #68 OR #67 OR #66 OR #65 OR #64 OR #63 OR #62 OR #61 OR #60 OR #59
#73	#72 AND #57 With date limit 2005-2022 & english language
#74	#72 AND #58 With date limit 2005-2022 & english language

Appendix C Effectiveness evidence study selection

Study selection for: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

Figure 1: Study selection flow chart



Appendix D Evidence tables

Evidence tables for review question: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

Table 6: Evidence tables

Bernini, 2019

Bibliographic Reference	Bernini, S.; Alloni, A.; Panzarasa, S.; Picascia, M.; Quaglini, S.; Tassorelli, C.; Sinforiani, E.; A computer-based cognitive training in Mild Cognitive Impairment in Parkinson's Disease; NeuroRehabilitation; 2019; vol. 44 (no. 4); 555-567

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Diagnosis of idiopathic Parkinson’s disease according to UKPDBB diagnostic criteria and Hoehn & Yahr scale ≤4, - Presence of PD-MCI single-domain (executive) or PD-MCI multiple-domain with executive involvement, - Aged between 50 and 85 years, - Education level ≥5 years.
Exclusion criteria	- Pre-existing cognitive impairment (for example, aphasia, neglect), - Severe disturbances in consciousness,

	- Severe sensory or motor disturbances that do not allow the patient to control their trunk or to maintain a sitting position; in particular patients with disturbing resting and/or action tremor (corresponding to scores 2–4 in the specific items of Unified Parkinson's Disease Rating Scale (UPDRS III), - Concomitant severe psychiatric or neurological conditions, - Patients being treated with deep brain stimulation.
Patient characteristics	N=41 adults with Parkinson's disease and Parkinson's disease related mild cognitive impairment in 1 or more cognitive domains, including executive function. - CoRe plus standard physical rehabilitation: n=23 - Standard physical rehabilitation only: n=18 Age in years [Mean (SD)]: - CoRe plus standard physical rehabilitation: 71.18 (7.04) - Standard physical rehabilitation only: 69.33 (7.72) Sex (M/F): - CoRe plus standard physical rehabilitation: n=6/n=11 - Standard physical rehabilitation only: n=7/n=11 Time since diagnosis or injury in years [Mean (SD)]: - CoRe plus standard physical rehabilitation: 7.18 (3.19) - Standard physical rehabilitation care only: 10.67 (7.36)

	Chronic neurological disorder category: Progressive neurological diseases.
Intervention(s)/control	**Intervention** Name: CoRe plus standard physical rehabilitation Protocol intervention group: Interventions to improve and maintain executive function (1), processing speed (2), visual, spatial and perceptual functions (5), and attention (7) Delivery setting: Inpatient hospital setting (individual patients) Number/ frequency of sessions: 3x 45-minute sessions per week Duration: 4 weeks Practitioner(s): Not reported Ontology-based software tool which allowed cognitive (logical-executive) exercises to be personalised to each person. Participants also received the same standard physical rehabilitation care as the control arm. **Control** Name: Standard physical rehabilitation only Protocol description: Control (standard rehabilitation care alone) Delivery setting: Inpatient hospital setting Number/ frequency of sessions: 3x 45-minute sessions per week Duration: 4 weeks Practitioner(s): Not reported Cardiovascular warm-up activities and exercises to improve the range of motion, abdominal muscles stretches, paravertebral muscles strengthening, postural changes, and exercises operating on balance and postural control.
Duration of follow-up	6 months

Sources of funding	Not industry funded
Sample size	N=41 - CoRe plus standard physical rehabilitation: n=23 - Standard physical rehabilitation only: n=18

CoRe: computerised cognitive rehabilitation; PD-MCI: Parkinson's disease - mild cognitive impairment; N/n: number of participants; SD: standard deviation; UKPDBB: UK Parkinson's disease society brain bank diagnostic criteria; UPDRS III: unified Parkinson's disease rating scale part 3

Outcomes

Study timepoints

- Post-intervention (4 weeks from baseline)
- 6 months from post-intervention

CoRe plus standard physical rehabilitation versus Standard physical rehabilitation care only: Executive function outcomes
Executive function as measured by Weigls test - Polarity - Higher values are better
Executive function as measured by FAB - Polarity - Higher values are better
Executive function as measured by phonological fluency - Polarity - Higher values are better
Executive function as measured by semantic fluency - Polarity - Higher values are better

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 months, N = 18
Weigls test Mean scores at follow-up. Mean (SD)	9.32 (2.64)	8.32 (1.98)	6.15 (2.44)	5.62 (2.29)

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 months, N = 18
FAB Mean scores at follow-up. Mean (SD)	14.48 (2.25)	14.09 (1.53)	12.35 (1.68)	11.13 (1.37)
Phonological fluency Mean scores at follow-up. Mean (SD)	33.15 (11.1)	28.17 (8.71)	24.87 (7.67)	23.43 (7.24)
Semantic fluency Mean scores at follow-up. Mean (SD)	32.88 (4.58)	33.64 (5.72)	28.96 (6.49)	29.83 (5.5)

CoRe: computerised cognitive rehabilitation; FAB: frontal assessment battery; N/n: number of participants; SD: standard deviation

CoRe plus standard physical rehabilitation versus Standard physical rehabilitation only: Processing speed outcomes
Processing speed as measured by Stroop Test (time) - Polarity - Lower values are better
Processing speed as measured by Stroop test error - Polarity - Lower values are better

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 months, N = 18
Stroop Test (time)	19.66 (13.13)	24.63 (15.84)	24.66 (11.44)	29.4 (14.5)

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 months, N = 18
Mean scores at follow-up. Mean (SD)				
Stroop test error Mean scores at follow-up. Mean (SD)	5.16 (4.2)	5.64 (4.55)	5.67 (4.34)	8.47 (10.77)

CoRe: Computerised cognitive rehabilitation; N/n: number of participants; SD: standard deviation

CoRe plus standard physical rehabilitation versus Standard physical rehabilitation only: Working memory outcomes

Working memory outcomes as measured by Corsi's block-tapping test - Polarity - Higher values are better

Working memory outcomes as measured by Verbal Span (selective reminding test) - Polarity - Higher values are better

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 months, N = 18
CBTT Mean scores at follow-up. Mean (SD)	4.16 (0.82)	3.98 (0.6)	3.77 (7.39)	3.56 (0.58)
Verbal Span (selective reminding test) Mean scores at follow-up.	3.85 (0.62)	3.69 (0.49)	3.55 (0.78)	3.37 (0.58)

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 months, N = 18
Assumes that this measures immediate/total recall. Mean (SD)				

CBTT: Corsi's block-tapping test; CoRe: computerised cognitive rehabilitation; N/n: number of participants; SD: standard deviation

CoRe plus standard physical rehabilitation versus Standard physical rehabilitation only: Long-term declarative memory outcomes

Long-term declarative memory as measured by Rey complex figure delayed recall - Polarity - Higher values are better

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 months, N = 18
RCF-dr Mean scores at follow-up. Mean (SD)	15.91 (4.39)	14.54 (5.54)	12.19 (5.33)	10.75 (7.26)

CoRe: computerised cognitive rehabilitation; N/n: number of participants; RCF-dr: Rey complex figure delayed recall; SD: standard deviation

CoRe plus standard physical rehabilitation versus Standard physical rehabilitation only: Perceptual function outcomes

Perceptual function as measured by Rey complex figure-copy - Polarity - Higher values are better

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 month, N = 18
RCF-copy Mean scores at follow-up.	28.05 (6.95)	26.16 (7.34)	24.84 (8.82)	23.76 (8.2)

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 month, N = 18
Mean (SD)				

CoRe: computerised cognitive rehabilitation; N/n: number of participants; RCF-copy: Rey complex figure-copy; SD: standard deviation

CoRe plus standard physical rehabilitation versus Standard physical rehabilitation only: Attention outcomes
Attention as measured by Trail Making Test A - Polarity - Lower values are better
Attention as measured by Trail Making Test B - Polarity - Lower values are better
Attention as measured by Attentive Matrices - Polarity - Higher values are better

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 months, N = 18
TNT-A Mean scores at follow-up. Mean (SD)	108.82 (58.33)	121.94 (53.21)	124.82 (59.54)	145.64 (77.68)
TNT-B Mean scores at follow-up. Mean (SD)	212.11 (74.28)	227.05 (94.76)	213.94 (112.53)	182.7 (122.7)
Attentive Matrices Mean scores at follow-up. Mean (SD)	43.29 (5.89)	41.89 (9.07)	39.9 (7.97)	38.48 (8.64)

CoRe: computerised cognitive rehabilitation; N/n: number of participants; SD: standard deviation; TNT-A: trail making test A; TBT-B: trail making test B

CoRe plus standard physical rehabilitation versus Standard physical rehabilitation only: Working memory and attention composite outcomes

Working memory and attention as measured by Digit Span - Polarity - Higher values are better

Outcome	CoRe plus standard physical rehabilitation, post-intervention, N = 17	CoRe plus standard physical rehabilitation, 6 months, N = 17	Standard physical rehabilitation only, post-intervention, N = 18	Standard physical rehabilitation only, 6 months, N = 18
Digit Span Mean scores at follow-up. Mean (SD)	4.51 (0.62)	4.27 (0.3)	4.11 (0.47)	3.79 (0.9)

CoRe: computerised cognitive rehabilitation; N/n: number of participants; SD: standard deviation

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Allocation sequence was randomised via computer software. Likely that allocation sequence was concealed until participants were enrolled and assigned to interventions. No significant baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Trial was unblinded, however, no deviations occurred and appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(26% and 0% of participants in the intervention and control groups, respectively were lost to follow up (n=6 discharged before end of cognitive*

Section	Question	Answer
		training). Loss to follow-up not balanced between groups so missingness may depend on true value. No sensitivity analyses reported.)
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol reported.)*
Overall bias and Directness	Risk of bias judgement	High *(High attrition and some concerns for bias in selection of the reported result.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Blair, 2021

Bibliographic Reference	Blair, M.; Goveas, D.; Safi, A.; Marshall, C.; Rosehart, H.; Orenczuk, S.; Morrow, S.A.; Does cognitive training improve attention/working memory in persons with MS? A pilot study using the Cogmed Working Memory Training program; Multiple Sclerosis and Related Disorders; 2021; vol. 49; 102770

Study details

Country/ies where study was carried out	Canada

Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Diagnosis of RRMS, PPMS, or SPMS, - Aged 18-64, - Expanded Disability Status Scale score of ≤7.0, - Visual acuity (corrected) of at least 20/70, - Attention/working memory deficits (defined as a z-score lower than -1.5 on at least 2 of the following 3 measures: PASAT, SDMT, and the DKEFS Color-Word Interference Test).
Exclusion criteria	- Clinical relapse and/or corticosteroid treatment for in the month prior to study entry, - Daily marijuana use, - Loss of visual acuity, - History of bipolar disorder or other psychiatric illness.
Patient characteristics	N=30 adults with multiple sclerosis and attention or working memory deficits. - Online working memory training (Cogmed): n=15 - Standard medical care: n=15 Age in years [Mean (SD)]: - Online working memory training (Cogmed): 51.07 (7.29) - Standard medical care: 52.13 (8.71)

	Sex (M/F): - Online working memory training (Cogmed): n=3/n=12 - Standard medical care: n=6/n=9 Time since diagnosis or injury in years [Mean (SD)]: - Online working memory training (Cogmed): 14.87 (8.47) - Standard medical care: 16.25 (10.94) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Online working memory training (Cogmed) Protocol intervention group: Interventions to improve memory and learning (1) Delivery setting: Patient's own home Number/ frequency of sessions: 1x 30-45-minute session per day, 5 days per week Duration: 5 weeks Practitioner(s): None. Computerised programme Adaptive training – levels are adjusted in real time (for each exercise) based on the trainee's performance. Each session consists of various tasks that target different aspects of working memory. Reinforcement is built into the program (for example, through small weekly rewards for completing the training sessions). Each participant is assigned a coach who is qualified in the use of Cogmed and provides structure, motivation, and feedback on progress in order to optimise training gains. Qualified health professionals provide oversight to coaches.

	Each participant's performance was tracked online and reviewed by the subject and his/her coach in once per week phone meetings throughout the 5-week period (total of 5 phone interactions). At the end of training, the coach summarised the training together with the participant and provided feedback data from rating scales embedded in the programme. **Control** Name: Standard medical care Protocol description: Control (usual care) Delivery setting: Not reported Number/ frequency of sessions: Not reported Duration: Not reported Practitioner(s): Not reported
Duration of follow-up	6 months
Sources of funding	Industry funding, unclear
Sample size	N=30 - Online working memory training (Cogmed): n=15 - Standard medical care: n=15

DKEFS: Delis-Kaplan executive function system; MSNQ: multiple sclerosis neuropsychological questionnaire; N/A: not applicable; N/n: number of participants; PASAT: paced auditory serial addition test; PPMS: primary progressive multiple sclerosis; RRMS: relapsing-remitting multiple sclerosis; SD: standard deviation; SDMT: symbol digit modalities test; SPMS: secondary progressive multiple sclerosis

Outcomes

Study timepoints

- Post-intervention (5-weeks from baseline) (post-treatment)
- 6 months from post-intervention

Online working memory training (Cogmed) versus Standard medical care: Physical and Mental Health related Quality of Life and social care related Quality of Life

Physical and Mental Health related Quality of Life and social care related Quality of Life as measured by SF-36 (QoL) - Polarity - Higher values are better

Outcome	Online working memory training (Cogmed), post-intervention, N = 11	Online working memory training (Cogmed), 6 months, N = 11	Standard medical care, post-intervention, N = 13	Standard medical care, 6 months, N = 11
SF-36 (QoL) Mean scores at follow-up. Mean (SD)	53.91 (20.07)	56.45 (23.79)	48.92 (18.21)	44.55 (12.78)

N/n: number of participants; QoL: quality of life; SD: standard deviation; SF-36: 36-item short form survey

Online working memory training (Cogmed) versus Standard medical care: Executive function

Executive function as measured by DEX - Polarity - Lower values are better

Executive function as measured by DKEFS Colour-Word Interference - Polarity - Higher values are better

Outcome	Online working memory training (Cogmed), post-intervention, N = 11	Online working memory training (Cogmed), 6 months, N = 11	Standard medical care, post-intervention, N = 13	Standard medical care, 6 months, N = 11
DEX Mean scores at follow-up. Mean (SD)	24.64 (20.73)	23.09 (17.68)	19.31 (8.5)	20.55 (10.82)
DKEFS Colour-Word Interference Mean scores at follow-up.	27.82 (10.3)	28.27 (10.87)	29.08 (5.89)	29.73 (4.32)

Outcome	Online working memory training (Cogmed), post-intervention, N = 11	Online working memory training (Cogmed), 6 months, N = 11	Standard medical care, post-intervention, N = 13	Standard medical care, 6 months, N = 11
Mean (SD)				

DKEFS: Delis-Kaplan executive function system; DEX: dysexecutive questionnaire; N/n: number of participants; SD: standard deviation

Online working memory training (Cogmed) versus Standard medical care: Processing speed
Processing speed as measured by SDMT - Polarity - Higher values are better

Outcome	Online working memory training (Cogmed), post-intervention, N = 11	Online working memory training (Cogmed), 6 months, N = 11	Standard medical care, post-intervention, N = 13	Standard medical care, 6 months, N = 11
SDMT Mean scores at follow-up. Mean (SD)	40.91 (6.02)	39.73 (7.51)	41.85 (9.54)	40.64 (9.79)

N/n: number of participants; SD: standard deviation; SDMT: symbol digit modalities test

Online working memory training (Cogmed) versus Standard medical care: Working memory outcomes
Working memory as measured by CVLT2 Total Immediate Recall - Polarity - Higher values are better
Working memory as measured by BVMT-R Total Immediate Recall - Polarity - Higher values are better
Working memory as measured by WMS-III Spatial Span (Forward) - Polarity - Higher values are better
Working memory as measured by WMS-III Spatial Span (Backward) - Polarity - Higher values are better
Working memory as measured by WAIS-III Letter-Number Sequencing - Polarity - Higher values are better

Outcome	Online working memory training (Cogmed), post-intervention, N = 11	Online working memory training (Cogmed), 6 months, N = 11	Standard medical care, post-interventionN = 13	Standard medical care, 6 months, N = 11
CVLT2 Total Immediate Recall Mean scores at follow-up.	46 (15.74)	46.55 (13.53)	47.15 (12.89)	45 (13.09)

Outcome	Online working memory training (Cogmed), post-intervention, N = 11	Online working memory training (Cogmed), 6 months, N = 11	Standard medical care, post-interventionN = 13	Standard medical care, 6 months, N = 11
Mean (SD)				
BVMT-R Total Immediate Recall Mean scores at follow-up. Mean (SD)	18.18 (9.88)	19.27 (10.43)	19.46 (9.77)	17.64 (8.38)
WMS-III Spatial Span (Forward) Mean scores at follow-up. Mean (SD)	6.27 (1.68)	6.09 (1.22)	6.62 (1.81)	6.82 (1.47)
WMS-III Spatial Span (Backward) Mean scores at follow-up. Mean (SD)	6.73 (2.1)	6.18 (1.66)	6.38 (1.85)	6.45 (1.51)
WAIS-III Letter-Number Sequencing Mean scores at follow-up. Mean (SD)	9.18 (2.86)	8.45 (2.58)	8.08 (2.33)	7.82 (3.28)

BVMT-R: brief visuospatial memory test - recall; CVLT2: California verbal learning test- second UK edition; N/n: number of participants; SD: standard deviation; WAIS-III: Wechsler adult intelligence scale third edition; WMS-III: Wechsler memory scale third edition

Online working memory training (Cogmed) versus Standard medical care: Functioning

Functioning as measured by CFQ - Polarity - Lower values are better

Outcome	Online working memory training (Cogmed), post-intervention, N = 11	Online working memory training (Cogmed), 6 months, N = 11	Standard medical care, post-intervention, N = 13	Standard medical care, 6 months, N = 11
CFQ Mean scores at follow-up. Mean (SD)	44.55 (29.26)	42.36 (24.25)	33.08 (20.63)	36.45 (20.54)

CFQ: cognitive failures questionnaire; N/n: number of participants; SD: standard deviation

Online working memory training (Cogmed) versus Standard medical care: Working memory, processing speed and attention composite

Working memory, processing speed and attention as measured by PASAT - Polarity - Higher values are better

Outcome	Online working memory training (Cogmed), post-intervention, N = 11	Online working memory training (Cogmed), 6 months, N = 11	Standard medical care, post-intervention, N = 13	Standard medical care, 6 months, N = 11
PASAT Mean scores at follow-up. Mean (SD)	37.18 (12.11)	35.18 (10.69)	30.08 (11.01)	33.91 (12.2)

PASAT: paced auditory serial addition test; N/n: number of participants; SD: standard deviation

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information regarding randomisation process provided.)*

Section	Question	Answer
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Trial was unblinded, however, no deviations occurred and appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(30% of participants withdrew consent at various points in the study. Unclear why participants withdrew consent and if missingness is based on true value. No indication that attempts were made to correct for missing outcome data.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol reported.)*
Overall bias and Directness	Risk of bias judgement	High *(No information regarding randomisation process provided. 30% of participants withdrew consent at various points in the study. No indication that attempts were made to correct for missing outcome data. No trial protocol reported.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Carr, 2014

Bibliographic Reference	Carr, S.E.; das Nair, R.; Schwartz, A.F.; Lincoln, N.B.; Group memory rehabilitation for people with multiple sclerosis: a feasibility randomized controlled trial; Clinical rehabilitation; 2014; vol. 28 (no. 6); 552-561

Study details

Country/ies where study was carried out	UK
Study type	Randomised controlled trial (RCT)
Study dates	January - May 2011
Inclusion criteria	- People living with multiple sclerosis who attended Central Surrey Health MS clinics, - Reported memory difficulties.
Exclusion criteria	Not reported
Patient characteristics	N=48 adults with multiple sclerosis - Memory rehabilitation programme: n=24 - Usual care: n=24 Age in years [Mean (SD)]: - Memory rehabilitation programme: 55.8 (10.2) - Usual care: 52.9 (11.8) Sex (M/F):

	- Memory rehabilitation programme: n=7/n=17 - Usual care: n=8/n=16 Time since diagnosis in years [Mean (SD)]: - Memory rehabilitation programme: 16.3 (11.3) - Usual care: 12.3 (9.1) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Memory rehabilitation programme Protocol intervention group: Interventions to improve memory and learning (3) and attention (7) Delivery setting: Outpatient unit Number/ frequency of sessions: 10x 1.5-hour sessions and homework over 10 weeks Duration: 10 weeks Practitioner(s): Assistant psychologist The program incorporated both restitution and compensation strategies, and consisted of 1 introductory session, 3 sessions each for attention training and internal memory strategies, 2 sessions for external memory aids, and 1 final session. Homework was suggested at the conclusion of each session. Participants who missed any sessions were encouraged to arrive early for the subsequent session to review the material they missed. Sessions were video recorded. **Control** Name: Usual care

	Protocol description: Control (usual care) Delivery setting: Not reported Number/ frequency of sessions: Not reported Duration: Not reported Practitioner(s): Not reported Standard care and other rehabilitation services, such as physiotherapy and occupational therapy, proceeded as normal. Participants were given the chance to join the memory rehabilitation program after all 8-month outcomes were recorded.
Duration of follow-up	8 months after randomisation
Sources of funding	Industry funded (Biogen Idec Limited, Maidenhead, Berkshire)
Sample size	N=48 - Memory rehabilitation programme: n=24 - Usual care: n=24

N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (4 months from baseline)8 months from post-intervention

Memory rehabilitation programme versus Usual care: Physical and mental health related quality of life and social care related quality of life

Physical and mental health related quality of life and social care related quality of life as measured by GHQ-28 - Polarity - Lower values are better
Physical and mental health related quality of life and social care related quality of life as measured by MS Impact Scale - Polarity - Lower values are better

Outcome	Memory rehabilitation programme, post-intervention, N = 16	Memory rehabilitation programme, 8 months, N = 17	Usual care, post-intervention, N = 21	Usual care, 8 months, N = 16
GHQ-28 Mean scores at follow-up. Mean (SD)	23.7 (10.9)	18.4 (7)	22.7 (9.9)	25.3 (10.9)
MS Impact Scale Mean scores at follow-up. Mean (SD)	77.2 (30.7)	68.3 (28)	69 (23.6)	74.6 (25.4)

GHQ-28: general health questionnaire- 28 item version; MS: multiple sclerosis; N/n: number of participants; SD: standard deviation

Memory rehabilitation programme versus Usual care: Global memory
Global memory as measured by EMQ - self report - Polarity - Lower values are better
Global memory as measured by EMQ - carer report - Polarity - Lower values are better

Outcome	Memory rehabilitation programme, post-intervention, N = 17	Memory rehabilitation programme, 8 months, N = 15	Usual care, post-intervention, N = 21	Usual care, 8 months, N = 16
EMQ - self report Mean scores at follow-up. Mean (SD)	21.7 (13.1)	17.3 (11.2)	25.8 (19.9)	26.9 (19.3)
EMQ - carer report Mean scores at follow-up. n=15 for control group at 8 months Mean (SD)	21.2 (19.9)	22 (23.9)	20.2 (17)	21.6 (20.1)

EMQ: everyday memory questionnaire; N/n: number of participants; SD: standard deviation

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Allocation sequence was random and concealed with no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention assignment, however, no deviations occurred and appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(Data available only for at least 75% of randomised participants. Missing data due to participants not returning questionnaires. Missingness of data unlikely to depend on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware and knowledge could have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for bias due to missing outcome data. Outcome assessor aware of intervention received and outcome may have been influence by this knowledge.)*
Overall bias and Directness	Overall Directness	Directly applicable

Section	Question	Answer
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Cisneros, 2021a

Bibliographic Reference	Cisneros, E.; Beausejour, V.; de Guise, E.; Belleville, S.; McKerral, M.; The impact of multimodal cognitive rehabilitation on executive functions in older adults with traumatic brain injury; Annals of Physical and Rehabilitation Medicine; 2021; vol. 64 (no. 5); 101559

Study details

Country/ies where study was carried out	Canada
Study type	Randomised controlled trial (RCT)
Study dates	September 2012 - April 2015
Inclusion criteria	- Diagnosis of mild, moderate or severe traumatic brain injury based on the World Health Organization criteria at least 6 months before enrolment in the study, - Post-traumatic amnesia period already resolved, - Age at least 55 years, - Fluent in French (speaking, understanding, reading), - Presenting comprehensive interdisciplinary rehabilitation needs.
Exclusion criteria	- Previously received or receiving another specific or direct cognitive intervention focusing on similar or identical cognitive functions,

	- Diagnosis or documented clinical impressions of dementia (medical files) or Montreal Cognitive Assessment score <20, - Diagnosis of an active psychiatric condition, - Consumption of alcohol (drinking 5 or more drinks on the same occasion on 5 or more days per week in the past 30 days) or consuming illicit drugs.
Patient characteristics	N=37 adults with traumatic brain injury - Cognitive enrichment programme: n=23 - Usual care: n=14 Age in years [Mean (SD)]: - Cognitive enrichment programme: 64.9 (7.18) - Usual care: 63.75 (5.63) Sex (M/F): - Cognitive enrichment programme: n=14/n=6 - Usual care: n=5/n=7 Time since diagnosis or injury in days [Mean (SD)]: - Cognitive enrichment programme: 595.75 (926.67) - Usual care: 859.33 (772.04) Chronic Neurological disorder category: Acquired brain injury

Intervention(s)/control	**Intervention** Name: Cognitive enrichment programme Protocol intervention group: Interventions to improve and maintain executive function (1), memory and learning (3), attention (7) Delivery setting: Inpatient Number/ frequency of sessions: 2x 90 minute sessions per week Duration: 12 week Practitioner(s): Neuropsychologists The cognitive rehabilitation programme consisted of 3 modules: Introduction and self-awareness, attention and memory, and executive function. **Control** Name: Usual care Protocol description: Control (usual care) Delivery setting: Inpatient Number/ frequency of sessions: Not reported Duration: Not reported Practitioner(s): Not reported Usual care involved individual interventions focusing on resumption of daily activities and social roles (which could be physiotherapy, physical training, occupational therapy, speech therapy, and neuropsychology). Interventions aimed at reducing the impact of cognitive difficulties in daily life using self-guided and environmental strategies.
Duration of follow-up	6 months
Sources of funding	Not industry funded

Sample size	N=37 - Cognitive enrichment programme: n=23 - Usual care: n=14

N/n: number of participants; SD: standard deviation; TBI: traumatic brain injury

Outcomes

Study timepoints

- Post-intervention (14 weeks from baseline)
- 6 months from post-intervention

Cognitive enrichment programme versus Usual care: Executive function
Executive function as measured by Six Element Task - Adapted (Total score) - Polarity - Higher values are better

Outcome	Cognitive enrichment programme, post-intervention, N = 20	Cognitive enrichment programme, 6 months, N = 17	Usual care, post-intervention, N = 11	Usual care, 6 months, N = 7
Six Element Task - Adapted (Total score) Scale: 0 - 15. Mean scores at follow-up. Mean (SD)	10.5 (3.02)	9.29 (2.97)	8.27 (3.29)	7.57 (3.55)

N/n: number of participants; SD: standard deviation

Cognitive enrichment programme versus Usual care: Executive function
Executive function as measured by DKEFS Sorting test (CCS) - Polarity - Higher values are better
Executive function as measured by DKEFS Sorting test (FSD) - Polarity - Higher values are better
Executive function as measured by DKEFS Sorting test (TSR) - Polarity - Lower values are better

Outcome	Cognitive enrichment programme, post-intervention, N = 20	Cognitive enrichment programme, 6 months, N = 17	Usual care, post-intervention, N = 10	Usual care, 6 months, N = 7
DKEFS Sorting test (CCS) Mean scores at follow up. Mean (SD)	8.1 (2.97)	8.82 (1.98)	5.91 (2.55)	6.86 (2.79)
DKEFS Sorting test (FSD) Mean scores at follow-up. Mean (SD)	30 (12.1)	32.35 (7)	21.27 (11.46)	24.71 (10.11)
DKEFS Sorting test (TSR) Mean scores at follow-up. Mean (SD)	31.49 (7.83)	30.67 (10.82)	45.25 (20.96)	41.47 (22.08)

CCS: confirmed correct sort total; DKEFS: Delis-Kaplan executive function system; FSD: free sorting description; N/n: number of participants; SD: standard deviation; TSR: time per sort ratio

Cognitive enrichment programme versus Usual care: Processing speed
Processing speed as measured by Stroop test (Inhibition) - Polarity - Lower values are better
Processing speed as measured by Stroop test (Flexibility) - Polarity - Lower values are better

Outcome	Cognitive enrichment programme, post-intervention, N = 20	Cognitive enrichment programme,, 6 months, N = 17	Active control group, post-intervention, N = 10	Active control group, 6 months, N = 7
Stroop test (Inhibition) (seconds)	117.25 (31.12)	118.04 (19.06)	148.1 (35.36)	135.39 (57.01)

Outcome	Cognitive enrichment programme, post-intervention, N = 20	Cognitive enrichment programme,, 6 months, N = 17	Active control group, post-intervention, N = 10	Active control group, 6 months, N = 7
Mean scores at follow-up. Mean (SD)				
Stroop test (Flexibility) (seconds) Mean scores at follow-up. Mean (SD)	136.15 (23.68)	145.21 (30.13)	168.39 (39.19)	153.75 (54.33)

N/n: number of participants; SD: standard deviation

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on randomisation process.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention assignment; however no deviations occurred and appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(Data available only for at least 75% of randomised*

Section	Question	Answer
		participants and no intention to treat analysis used. Missingness of data unlikely to depend on its true value.)
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to missing information regarding randomisation process and missing data.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Cisneros, 2021b

Bibliographic Reference	Cisneros, E.; de Guise, E.; Belleville, S.; McKerral, M.; A controlled clinical efficacy trial of multimodal cognitive rehabilitation on episodic memory functioning in older adults with traumatic brain injury; Annals of Physical and Rehabilitation Medicine; 2021; vol. 64 (no. 5); 101563

Study details

Country/ies where study was carried out	See Cisneros 2021a

Study dates	See Cisneros 2021a
Inclusion criteria	See Cisneros 2021a
Exclusion criteria	See Cisneros 2021a
Patient characteristics	See Cisneros 2021a
Intervention(s)/control	See Cisneros 2021a
Duration of follow-up	See Cisneros 2021a
Sources of funding	See Cisneros 2021a
Sample size	See Cisneros 2021a

Outcomes

Study timepoints

- Post-intervention (14 week from baseline)
- 6 months from post-intervention

Cognitive enrichment programme versus Usual care: Physical and mental health related quality of life and social care related quality of life

Physical and mental health related quality of life and social care related quality of life as measures by PGWBI - Polarity - Higher values are better

Outcome	Cognitive enrichment programme, post-intervention, N = 18	Cognitive enrichment programme, 6 months, N = 17	Usual care, post-intervention, N = 9	Usual care, 6 months, N = 6
PGWBI Scale: Maximum total score of 110. Mean scores at follow-up. Mean (SD)	72.78 (24.41)	70.41 (20.79)	76.33 (18.87)	84.17 (21.47)

N/n: number of participants; PGWBI: psychological general wellbeing index; SD: standard deviation

Cognitive enrichment programme versus Usual care: Processing speed
Processing speed as measured by Coding from WAIS-III - Polarity - Higher values are better

Outcome	Cognitive enrichment programme, post-intervention, N = 20	Cognitive enrichment programme, 6 months, N = 17	Usual care, post-intervention, N = 11	Usual care, 6 months, N = 6
Coding from WAIS-III Mean scores at follow-up Mean (SD)	54.45 (13.99)	58.59 (12.25)	48.45 (15.23)	57 (19.79)

N/n: number of participants; SD: standard deviation; WAIS-III: Wechsler adult intelligence scale third edition

Cognitive enrichment programme versus Usual care: Working memory and attention composite
Working memory and attention as measured by Digit Span (scaled score) from WAIS-III- Forward - Polarity - Higher values are better
Working memory and attention as measured by Digit Span (scaled score) from WAIS-III- Backward - Polarity - Higher values are better

Outcome	Cognitive enrichment programme, post-intervention, N = 20	Cognitive enrichment programme, 6 months, N = 16	Usual care, post-intervention, N = 11	Usual care, 6 months, N = 5
Digit Span (scaled score) from WAIS-III- Forward Mean scores at follow-up	9.65 (2.23)	9.38 (2.58)	9.82 (3.28)	11.4 (3.29)

Outcome	Cognitive enrichment programme, post-intervention, N = 20	Cognitive enrichment programme, 6 months, N = 16	Usual care, post-intervention, N = 11	Usual care, 6 months, N = 5
Mean (SD)				
Digit Span (scaled score) from WAIS-III- Backward Mean scores at follow-up Mean (SD)	7.15 (2.52)	7.06 (2.17)	6.82 (2.71)	9 (3.67)

N/n: number of participants; SD: standard deviation; WAIS-III: Wechsler adult intelligence scale third edition

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on randomisation process.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention assignment; however, no deviations occurred and appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(Data available only for at least 75% of randomised participants and no intention to treat analysis used. Missingness of data unlikely to depend on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used*

Section	Question	Answer
		tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to missing information regarding randomisation process and missing data.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Corti, 2020

Bibliographic Reference	Corti, C.; Urgesi, C.; Poggi, G.; Strazzer, S.; Borgatti, R.; Bardoni, A.; Home-based cognitive training in pediatric patients with acquired brain injury: preliminary results on efficacy of a randomized clinical trial; Scientific reports; 2020; vol. 10 (no. 1); 1391

Study details

Country/ies where study was carried out	Italy
Study type	Stepped wedge randomised controlled trial
Study dates	2016 - 2017
Inclusion criteria	- Present with brain damage (congenital or acquired),

	- Be in chronic phase (at least 1 year after the event), - Aged 11–16 years, - Speak Italian as a primary language.
Exclusion criteria	- Previous diagnosis of psychiatric or cognitive problems (only for children with ABI), - Severe visual, auditory or motor deficits that could interfere with training execution and outcome assessment, - Undergoing a parallel cognitive rehabilitation treatment, - Diagnosis of photosensitive epilepsy, as a computer-based stimulation may produce negative health effects.
Patient characteristics	N=48 children and young people with acquired brain injury - Computerised cognitive training (Lumosity Cognitive Training): n=24 - Waitlist control: n=24 Age in years [Mean (SD)]: - Computerised cognitive training (Lumosity Cognitive Training): 13.83 (1.65) - Waitlist control: 13.50 (1.99) Sex (M/F): - Computerised cognitive training (Lumosity Cognitive Training): n=12/n=6 - Waitlist control: n=11/n=3 Time since diagnosis or injury: Not reported

	Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: Computerised cognitive training (Luminosity Cognitive Training) Protocol intervention group: Interventions to improve and maintain executive function (1), processing speed (2), memory and learning (3), and attention (7) Delivery setting: Community Number/ frequency of sessions: 2x 20 minute sessions per day 5 times a week Duration: 8 weeks Practitioner(s): Clinician only ensured adherence to the programme Lumosity cognitive training programme was used for the training. All training was performed at home and included game-like exercises aimed at stimulating cognitive domains (memory, attention, cognitive flexibility, speed, and problem-solving). The programme was able to automatically adjust the training difficulty to the individual using it. **Control** Name: Waitlist control Protocol description: Control (waitlist) Delivery setting: Not reported Number/ frequency of sessions: Not reported Duration: Not reported Practitioner(s): Not reported
Duration of follow-up	8-weeks

Sources of funding	Funding received but not reported by whom.
Sample size	N=48 - Computerised cognitive training (Lumosity Cognitive Training): n=24 - Waitlist control: n=24

ABI: acquired brain injury; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (10 weeks from baseline))

Computerised cognitive training (Lumosity Cognitive Training) versus Waitlist: Working memory
Working memory as measured by Corsi's block-tapping test - Polarity - Higher values are better

Outcome	Computerised cognitive training (Lumosity Cognitive Training), post-intervention, N = 18	Waitlist control, post-intervention, N = 14
Working memory (Corsi's block-tapping test) Mean scores at follow-up. Mean (z value)	-0.1 (1.21)	-1.07 (1.64)

N/n: number of participants

Computerised cognitive training (Lumosity Cognitive Training) versus Waitlist: Executive function
Executive function as measured by Wisconsin Card Sorting Test- total errors - Polarity - Lower values are better

Outcome	Computerised cognitive training (Lumosity Cognitive Training), post-intervention, N = 18	Waitlist control, post-intervention, N = 14
Executive function (Wisconsin Card Sorting Test-total errors) Mean (z value)	0.65 (1.24)	0.02 (1.55)

N/n: number of participants

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Participants were randomised using the randomisation tool on Microsoft Excel. Allocation sequence concealed and no baseline differences were found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention received but no deviations arose.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for 99.94% of participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to pre-specified protocol.)*

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias for all domains.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Costa, 2014

Bibliographic Reference	Costa, A.; Peppe, A.; Serafini, F.; Zabberoni, S.; Barban, F.; Caltagirone, C.; Carlesimo, G.A.; Prospective memory performance of patients with Parkinson's disease depends on shifting aptitude: evidence from cognitive rehabilitation; Journal of the International Neuropsychological Society : JINS; 2014; vol. 20 (no. 7); 717-726

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Presence of mild cognitive impairment (Parkinson's Disease patients who performed 1.5 SD below the normative population in two tests of a neuropsychological screening battery).
Exclusion criteria	- Major psychiatric disorders, - Neurological conditions other than Parkinson's disease, - Vascular brain lesions,

	- Major systemic or metabolic diseases that could affect cognitive status, - Significant changes in the management of routine activities, - Significant signs of depression (BDI>14) and apathy (AES>41).
Patient characteristics	N=17 adults with Parkinson's disease - Prospective memory exercises: n=9 - Simple cognition exercises: n=8 Age in years [Mean (SD)]: Prospective memory exercises: 66.1 (7.1) Simple cognition exercises: 70.9 (4.8) Sex: Not reported Time since diagnosis in years [Mean (SD)]: Prospective memory exercises: 11.0 (9.4) Simple cognition exercises: 7.2 (6.4) Chronic neurological disorder condition: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Prospective memory exercises

	Protocol intervention group: Interventions to improve and maintain executive function (1) Delivery setting: Community Number/ frequency of sessions: 3x 45min sessions weekly Duration: 1 month Practitioner(s): Not reported Paper and pen exercises involving different stimuli whereby participants had to alternately select between the different stimuli belonging to different semantic categories with exercises increasing in difficulty. Participants were seated in front of screen where stimuli were presented. **Control** Name: Simple cognition exercises Protocol description: Placebo Delivery setting: Community Number/ frequency of sessions: 3x 45min sessions weekly Duration: 1 month Practitioner(s): Not reported Participants performed simple cognitive exercises for language abilities and respiratory exercises.
Duration of follow-up	1 month
Sources of funding	Not reported
Sample size	N=17 Prospective memory exercises: n=9 Simple cognition exercises: n=8

	Note: Study also included healthy controls (n=8), but data on these were not extracted because this population was not of interest for this review question.

AES: apathy evaluation scale; BDI: Beck's depression inventory; MMSE: mini mental state examination; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (1 month from baseline)

Prospective memory exercises versus Simple cognition exercises: Attention
Attention as measured by Trail Making Test Part A - Polarity - Lower values are better
Attention as measured by Trail Making Test Part B - Polarity - Lower values are better

Outcome	Prospective memory exercises, post-intervention, N = 9	Simple cognition exercises, post-intervention, N = 8
Trail Making Test Part A Mean scores at follow-up. Mean (SD)	57.5 (19.4)	70.1 (23.1)
Trail Making Test Part B Mean scores at follow-up. Mean (SD)	280 (70.1)	252.2 (83.8)

N/n: number of participants; SD: standard deviation

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(No details provided on the randomisation process but participants were randomised. Allocation was concealed and there were no baseline differences between intervention groups.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Both participants and researchers were blinded to interventions and therefore no deviations from the intervention are likely.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(No information reported on participants flow through the study. Authors report number of completers but unclear on numbers randomised at baseline.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol available.)*
Overall bias and Directness	Risk of bias judgement	High *(High risk of bias as no information on participant numbers at the end of the treatment provided. No information regarding trial protocol provided.)*
Overall bias and Directness	Overall Directness	Directly applicable

Section	Question	Answer
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Cuberos-Urbano, 2018

Bibliographic Reference	Cuberos-Urbano, G.; Caracuel, A.; Valls-Serrano, C.; Garcia-Mochon, L.; Gracey, F.; Verdejo-Garcia, A.; A pilot investigation of the potential for incorporating lifelog technology into executive function rehabilitation for enhanced transfer of self-regulation skills to everyday life; Neuropsychological rehabilitation; 2018; vol. 28 (no. 4); 589-601

Study details

Country/ies where study was carried out	Spain
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Aged >18 years, - Able to understand, read and speak Spanish, - Symptoms of executive dysfunction indicated via clinical reports of the treating team, - Minimum of 6 months post-injury.
Exclusion criteria	- Severe cognitive (in that, non-executive) deficits that could interfere with the patient's ability to engage in the training, - Indicated with a comprehensive neuropsychological assessment, - DSM-IV Axis I disorders (identified from informant reports and medical records).

Patient characteristics	N=16 adults with acquired brain injury - GMT plus lifelog: n=8 - GMT only: n=8 Age in years [Mean (SD)]: - GMT plus lifelog: 34.13 (14.13) - GMT only: 37.25 (10.99) Sex: Not reported Time since diagnosis or injury in months [Mean (SD)]: - GMT plus lifelog: 60.88 (43.47) - GMT only: 56.38 (55.45) Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: GMT plus lifelog Protocol intervention group: Interventions to improve memory and learning (1) Delivery setting: Outpatient Number/ frequency of sessions: 2x 1-hour sessions per week Duration: 7 weeks

	Practitioner(s): Occupational therapists/Neuropsychologists GMT was delivered as per the control group with SenseCam and ActiHeart devices (lifelog devices), which recorded participants' everyday life experiences between GMT sessions. These recordings were used to identify situations where goal-neglect behaviours arose, to provide specific feedback about real-life problems via GMT, and to raise awareness and boost ongoing monitoring of slips. **Control** Name: GMT only Protocol description: Interventions to improve memory and learning (1) Delivery setting: Outpatient Number/ frequency of sessions: 2x 1-hour sessions per week Duration: 7 weeks Practitioner(s): Occupational therapists/Neuropsychologists GMT was delivered in groups of 4 following a trainers manual. GMT uses cognitive exercises and psychoeducation to enhance goal control.
Duration of follow-up	7-weeks
Sources of funding	Not industry funded
Sample size	N=16 - GMT plus lifelog: n=8 - GMT only: n=8

GMT: goal management training; DSM-IV: diagnostic and statistical manual of mental disorders fourth edition; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (7 weeks from baseline)

GMT plus lifelog versus GMT only: Executive function
Executive function as measured by Zoo Map Test - Polarity - Higher values are better
Executive function as measured by Revised Strategy Application Test - Polarity - Higher values are better

Outcome	GMT plus lifelog, post-intervention, N = 8	GMT only, post-intervention, N = 8
Zoo Map Test Mean scores at follow-up. Mean (SD)	1 (1.77)	0 (4.21)
Revised Strategy Application Test Mean scores at follow-up. Mean (SD)	78.63 (8.14)	79.5 (10.53)

GMT: goal management training; N/n: number of participants; SD: standard deviation

GMT plus lifelog versus GMT only: Processing speed
Processing speed as measured by Stroop Test - Polarity - Higher values are better

Outcome	GMT plus lifelog, post-intervention, N = 8	GMT only, post-intervention, N = 8
Stroop Test Mean scores at follow-up. Mean (SD)	-2.38 (9.6)	-5 (4.31)

GMT: goal management training; N/n: number of participants; SD: standard deviation

GMT plus lifelog versus GMT only: Working memory
Working memory as measured by Letter Number Sequencing subtest of the WAIS III - Polarity - Higher values are better

Outcome	GMT plus lifelog, post-intervention, N = 8	GMT only, post-intervention, N = 8
Letter Number Sequencing subtest of the WAIS III Mean score at follow-up. Mean (SD)	7.63 (1.6)	7.38 (2.39)

GMT: goal management training; N/n: number of participants; SD: standard deviation; WAIS-III: Wechsler Adult Intelligence Scale Third Edition

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(No details provided on the randomisation process but authors report participants were randomised. Allocation was concealed and there were no baseline differences between intervention groups.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(People delivering the intervention were aware of intervention assignment. No ITT was used. No deviations from the intervention occurred.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for all participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*

Section	Question	Answer
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol reported)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(People delivering the intervention were aware of assigned intervention and no trial protocol was available.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

ITT: intention-to-treat; N/A: not applicable

das Nair, 2019

Bibliographic Reference	das Nair, R.; Bradshaw, L.E.; Day, F.E.; Drummond, A.; Harris, S.R.; Fitzsimmons, D.; Montgomery, A.A.; Newby, G.; Sackley, C.; Lincoln, N.B.; Clinical and cost effectiveness of memory rehabilitation following traumatic brain injury: a pragmatic cluster randomized controlled trial; Clinical rehabilitation; 2019; vol. 33 (no. 7); 1171-1184

Study details

Country/ies where study was carried out	UK
Study type	Cluster randomised controlled trial
Study dates	September 2012 - May 2017
Inclusion criteria	- Admitted to hospital with a traumatic brain injury more than 3 months prior to recruitment, - Memory problems, defined as a score ⩾24 on the Everyday Memory Questionnaire or a score <25th percentile on the Rivermead Behavioural Memory Test,

	- Ages 18–69 years, - Able to travel to one of the study sites and attend group sessions, and willing to receive treatment in a group if allocated to intervention, - Giving written consent.
Exclusion criteria	- Unable to engage in group treatment if allocated, such as severe hearing or behavioural problems, assessed by the clinicians at recruitment sites, - Participating in other psychological intervention studies, - Impairment of language, scoring <17 on the Sheffield Screening Test for Acquired Language Disorders.
Patient characteristics	N=328 adults with traumatic brain injury - Manualised memory rehabilitation plus usual care: n=171 - Usual care only: n=157 Age in years [Mean (SD)]: - Manualised memory rehabilitation plus usual care: 45.8 (11.5) - Usual care only: 45.1 (12.5) Sex (M/F): - Manualised memory rehabilitation plus usual care: n=123/n=48 - Usual care only: n=116/n=41 Time since diagnosis or injury in months [Mean (SD) not reported] [Median (IQR)]:

	- Manualised memory rehabilitation plus usual care: 58 (24-118) - Usual care only: 46 (23-116) Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: Manualised memory rehabilitation plus usual care Protocol intervention group: Interventions to improve memory and learning (3) Delivery setting: Community Number/ frequency of sessions: 10x 1.5h weekly sessions Duration: 10 weeks Practitioner(s): Clinical psychologist Sessions followed a treatment manual provided by a facilitator. Strategies included restitution, strategies to improve encoding and retrieval, and compensation strategies. Each session started with a review of the previous session followed by teaching new strategies. **Control** Name: Usual care only Protocol description: Control (usual care) Delivery setting: Not reported Number/ frequency of sessions: Not reported Duration: Not reported Practitioner(s): Not reported

	No further details provided
Duration of follow-up	12 months
Sources of funding	Not industry funded
Sample size	N=328 - Manualised memory rehabilitation plus usual care: n=171 - Usual care alone: n=157

IQR: interquartile range; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (6-months from baseline)
- 6 months from post-intervention

Manualised memory rehabilitation plus usual care versus Usual care only: Physical and mental health related quality of life and social care related quality of life

Physical and mental health related quality of life and social care related quality of life as measured by General Health Questionnaire - Polarity - Lower values are better

Outcome	Manualised memory rehabilitation plus usual care vs Usual care only, Post-intervention,N2 = 110, N1 = 124	Manualised memory rehabilitation plus usual care vs Usual care only, 6 months, N2 = 102, N1 = 119
General Health Questionnaire Mean scores at follow-up.	-1.6 (1.87)	-0.2 (2.18)

Outcome	Manualised memory rehabilitation plus usual care vs Usual care only, Post-intervention,N2 = 110, N1 = 124	Manualised memory rehabilitation plus usual care vs Usual care only, 6 months, N2 = 102, N1 = 119
Mean (SE)		

N/n: number of participants; SE: standard error

Manualised memory rehabilitation plus usual care versus Usual care only: Global memory

Global memory as measured by RBMT - Polarity - Higher values are better

Global memory as measured by Everyday Memory Questionnaire - Polarity - Lower values are better

Outcome	Manualised memory rehabilitation plus usual care vs Usual care only, Post-intervention , N2 = 122, N1 = 129	Manualised memory rehabilitation plus usual care vs Usual care only, 6 months, N2 = 107, N1 = 124
RBMT Mean scores at follow-up. Mean (SE)	2.5 (1.19)	0.5 (1.57)
Everyday Memory Questionnaire Mean scores at follow-up. Mean (SE)	-2.1 (2.34)	-4.8 (2.44)

N/n: number of participants; RBMT: Rivermead behavioural memory test general memory index; SE: standard error

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation process occurred via a computer-generated pseudo-random and was concealed with no baseline differences found.)*

Section	Question	Answer
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Non-blinded trial however appropriate analysis used and no deviations from the intended interventions occurred.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data only available for 71% of participants in the control group and 74% of participants in the intervention group at 12 months; however sensitivity analysis was performed and showed no differences.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(Some outcomes (Global memory and Quality of Life) involved self-assessment with the potential that knowing that an intervention was received influencing the outcome. Rating is low for Global memory – Rivermead test as objective measure unlikely to have influenced the results.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to a pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to lack of blinding.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	*Some outcomes (Global memory and Quality of Life) involved self-assessment with the potential that knowing that an intervention was received influencing the outcome. Rating is low for Global memory – Rivermead test as objective measure unlikely to have influenced the results*

N/A: not applicable

De Giglio, 2016

Bibliographic Reference	De Giglio, L.; Tona, F.; De Luca, F.; Petsas, N.; Prosperini, L.; Bianchi, V.; Pozzilli, C.; Pantano, P.; Multiple sclerosis: Changes in thalamic resting-State functional connectivity induced by A homebased cognitive rehabilitation program; Radiology; 2016; vol. 280 (no. 1); 202-211

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Multiple sclerosis diagnosed according to revised McDonald criteria, - RRMS, - Aged 18–50 years, - Right-handed, - Cognitive impairment with specific deficits in working memory, information processing speed, or sustained attention. Cognitive impairment defined as failure on at least one of the following: PASAT 3 second presentation rate, SDMT, or ST. Failure on PASAT and SDMT was defined as a score lower than 10th percentile of normative data from Italian population and failure on the ST as a score less than 3.
Exclusion criteria	- Disease exacerbation in previous 3 months, - Any motor or visual condition that could interfere with performance of training, - History of seizures, - Depression (score of ≥7 on Hamilton Depression Scale) and/or anxiety (≥9 Hamilton Anxiety Scale), - Severe cognitive impairment (score of ≤24 on MMSE),

	- Willing not to change or start any new medication during study period (except for steroids used to treat multiple sclerosis exacerbations).
Patient characteristics	N=24 adults with multiple sclerosis (RRMS) and cognitive impairment with specific deficits in working memory, information processing speed, or sustained attention. - Video-game based cognitive rehabilitation: n=12 - Waitlist control: n=12 Age in years [Mean (SD)]: - Video-game based cognitive rehabilitation: 43.7 (7.6) - Waitlist control: 40.2 (10.1) Sex (M/F): - Video-game based cognitive rehabilitation: n=4/n=8 - Waitlist control: n=6/ n=6 Time since diagnosis or injury in years [Mean (SD)]: - Video-game based cognitive rehabilitation: 12.9 (3.5) - Waitlist control: 13.0 (7.9) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention**

	Name: Video-game based cognitive rehabilitation Protocol intervention group (1-7): Interventions to improve memory and learning (3); visual, spatial and perceptual functions (5); and attention (7) Delivery setting: Outpatient/patient's home Number/ frequency of sessions: 1x 30-minutes per day/5 days per week Duration: 8 weeks Practitioner(s): Patients initially instructed on using the game by a psychologist, however each session was patient directed. Patients were visited 2 weeks after baseline to ensure that they were using the game correctly. Adherence was evaluated by checking data recorded on device (for example, completing all puzzles required). Video game training focusing on memory, attention, visual spatial processing, and calculation. **Control** Name: Waitlist control Protocol description: Control (waitlist) Delivery setting: Not applicable Number/ frequency of sessions: Not applicable Duration: Not applicable Practitioner(s): Not applicable
Duration of follow-up	8 weeks (immediately after end of intervention programme)
Sources of funding	Not reported
Sample size	N=24 - Video-game based cognitive rehabilitation: n=12

	- Waitlist control: n=12

MMSE: mini mental state examination; N/n: number of participants; PASAT: paced auditory serial addition test; RRMS: relapsing-remitting multiple sclerosis; SD: standard deviation; SDMT: symbol digit modalities test; ST: Stroop test

Outcomes

Study timepoints

- Post-intervention (8 weeks from baseline)

Video-game based cognitive rehabilitation versus Waitlist control: Processing speed

Processing speed as measured by Symbol digit modalities test - Polarity - Higher values are better; Stroop Test - Polarity - Higher values are better

Outcome	Video-game based cognitive rehabilitation, post-intervention, N = 12	Waitlist control, post-intervention, N = 12
Symbol digit modalities test Mean scores at follow-up. Mean (SD)	50.5 (17.9)	39 (12.6)
Stroop Test Mean scores at follow-up. Mean (SD)	28.8 (4.9)	24.9 (8.1)

N/n: number of participants; SD: standard deviation

Video-game based cognitive rehabilitation versus Waitlist control: Working memory, processing speed, and attention composite

Working memory, processing speed, and attention composite as measured by Paced auditory serial addition test-3 - Polarity - Higher values are better

Outcome	Video-game based cognitive rehabilitation, post-intervention, N = 12	Waitlist control, post-intervention, N = 12
Paced auditory serial addition test-3 Mean scores at follow-up. Mean (SD)	46.4 (7.2)	37 (10.9)

N/n: number of participants; SD: standard deviation

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation was concealed and no baseline differences found)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants aware of intervention received however appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Number of participants available for analysis not reported and assumed that all participants available for analysis.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to a pre-specified protocol.)*

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

De Luca, 2019a

Bibliographic Reference	De Luca, R.; Latella, D.; Maggio, M.G.; Di Lorenzo, G.; Maresca, G.; Sciarrone, F.; Militi, D.; Bramanti, P.; Calabro, R.S.; Computer assisted cognitive rehabilitation improves visuospatial and executive functions in Parkinson's disease: Preliminary results; NeuroRehabilitation; 2019; vol. 45 (no. 2); 285-290

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Diagnosis of Parkinson's disease according to the Movement Disorder Society Clinical Diagnostic Criteria for - Parkinson’s disease, - Hoehn and Yahr Scale of less than 3, - Presence of mild-to moderate cognitive impairment (Montreal Cognitive Assessment from 18 to 24), - Absence of disabling sensory alterations.

Exclusion criteria	- Age 85 years and older, - Presence of severe medical and psychiatric illness potentially interfering with the trial.
Patient characteristics	N=60 adults with Parkinson's disease - COCR: n=30 - Standard cognitive training: n=30 Age in years [Mean (SD)]: - COCR: 61.9 (11.5) - Standard cognitive training: 63.2 (7.3) Sex (M/F): - COCR: n=16/n=14 - Standard cognitive training: n=15/n=15 Time since diagnosis or injury: Not reported Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: COCR Protocol intervention group: Virtual interventions to improve and maintain executive function (1), memory and learning (3), visual, spatial and perceptual functions (5), and attention (7)

	Delivery setting: Inpatient (Rehabilitation clinic) Number/ frequency of sessions: 3x 60 minutes sessions per week Duration: 8 weeks Practitioner(s): Sessions were led by a therapist Specific exercises to improve cognitive domains, adapted to the patient's abilities on a computerised cognitive tool. Specific exercises aimed at improving cognitive domains were completed. Tasks had playful interactions to promote patient's motivation while audio-video feedback encouraged awareness of performance. **Control** Name: Standard cognitive training (face-to-face with paper and pencil activities) Protocol description: Face-to-face interventions to improve and maintain executive function (1), Memory and learning (3), Visual, spatial and perceptual functions (5), Attention (7) Delivery setting: Inpatient (Rehabilitation clinic) Number/ frequency of sessions: 3x 60 minute sessions per week Duration: 8 weeks Practitioner(s): Sessions were led by a therapist
Duration of follow-up	8-weeks
Sources of funding	Not reported
Sample size	N=60 - COCR: n=30 - Standard cognitive training: n=30

COCR: computerised cognitive rehabilitation; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (8 weeks from baseline)

COCR versus Standard cognitive training: Executive function

Executive function as measured by Weigls test - Polarity - Higher values are better

Executive function as measured by Frontal Battery Assessment - Polarity - Higher values are better

Outcome	COCR, post-intervention, N = 30	Standard cognitive training, post-intervention, N = 30
Weigls test Median scores at follow-up. Median (IQR)	11.5 (8.4 to 13.7)	12.4 (9.8 to 13.4)
FAB Median scores at follow-up. Median (IQR)	17.4 (15.3 to 18.3)	14.5 (13.2 to 15.9)

COCR: computerised cognitive rehabilitation; FAB: frontal battery assessment; IQR: interquartile range; N/n: number of participants

COCR versus Standard cognitive rehabilitation: Global memory

Global memory as measured by Addenbrooke's Cognitive Examination-Revised Memory - Polarity - Higher values are better

Outcome	COCR, post-intervention, N = 30	Standard cognitive training, post-intervention, N = 30
Addenbrooke's Cognitive Examination-Revised Memory Median scores at follow-up. Median (IQR)	21 (20 to 24)	15 (11 to 20)

COCR: computerised cognitive rehabilitation; IQR: interquartile range; N/n: number of participants

COCR versus Standard cognitive training: Perceptual function

Perceptual function as measured by Addenbrooke's Cognitive Examination-Revised Visuo Spatial - Polarity - Higher values are better

Outcome	COCR, post-intervention, N = 30	Standard cognitive training, post-intervention, N = 30
Addenbrooke's Cognitive Examination-Revised Visuo Spatial Median scores at follow-up. Median (IQR)	16 (15 to 16)	12 (10.2 to 15)

COCR: computerised cognitive rehabilitation; IQR: interquartile range; N/n: number of participants

COCR versus Standard cognitive training: Attention and orientation composite

Attention and orientation as measured by Addenbrooke's Cognitive Examination-Revised Attention and Orientation - Polarity - Higher values are better

Outcome	COCR, post-intervention, N = 30	Standard cognitive training, post-intervention, N = 30
Addenbrooke's Cognitive Examination-Revised Attention and Orientation Median scores at follow-up. Median (IQR)	18 (15.5 to 18)	12.5 (11 to 18)

COCR: computerised cognitive rehabilitation; IQR: interquartile range; N/n: number of participants

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation was performed in 2x2 blocks via a software and process was concealed and no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention assignment; however no deviations occurred.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for all participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No protocol trial available.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns as no trial protocol available)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

De Luca, 2019b

Bibliographic Reference	De Luca, R.; Maggio, M.G.; Maresca, G.; Latella, D.; Cannavo, A.; Sciarrone, F.; Lo Voi, E.; Accorinti, M.; Bramanti, P.; Calabro, R.S.; Improving Cognitive Function after Traumatic Brain Injury: A Clinical Trial on the Potential Use of the Semi-Immersive Virtual Reality; Behavioural Neurology; 2019; vol. 2019; 9268179

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	January 2016 to December 2018
Inclusion criteria	- Neurological diagnosis of mild to moderate traumatic brain injury in the post-acute phase (that is, 3 to 6 months from the acute event), - Ability to sit for at least 20-minutes (including at least 1 minute without support), - Presence of mild to moderate cognitive impairment (Montreal Cognitive Assessment from 18 to 25).
Exclusion criteria	- Age 85 years and older, - Presence of disabling sensory alterations and frequent episodes of recurrent epilepsy (especially positive symptoms such as audio-video hallucination), - Concomitant medical and psychiatric illness possibly interfering with the VRT.
Patient characteristics	N=100 adults with traumatic brain injury - VRT (BTS-Nirvana): n=50 - Traditional cognitive rehabilitation: n=50

	Age in years [Mean (SD)]: - VRT (BTS-Nirvana): 38.7 (9.3) - Traditional cognitive rehabilitation: 41.1 (10.8) Sex (M/F): - VRT (BTS-Nirvana): n=29/n=21 - Traditional cognitive rehabilitation: n=26/n=24 Time since injury in months [Mean (SD)]: - VRT (BTS-Nirvana): 4.5 (1.5) - Traditional cognitive rehabilitation: 4 (2) Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: VRT (BTS-Nirvana) Protocol intervention group: Virtual interventions to improve and maintain executive function (1), Visual, spatial and perceptual functions (5), Attention (7) Delivery setting: Inpatient (rehabilitation clinic) Number/frequency of sessions: 3x 1-hour sessions per week Duration: 8 weeks Practitioner(s): Sessions led by a therapist

	Semi-immersive program for motor and cognitive rehabilitation with training under guidance of a therapist. Participants used movements to interact with virtual environments and audio-visual stimuli, thereby achieving complete sensory engagement that aids in the rehabilitation of attention, visual-spatial, and executive functions. Participants performed ideomotor sequences, calculation, numerical processing, inhibitory control, arithmetic operations, estimated numerical quantities and categorisation and performed deductive logical reasoning. **Control** Name: Traditional cognitive rehabilitation Protocol description: Control (standard rehabilitation care alone) Delivery setting: Inpatient (rehabilitation clinic) Number/frequency of sessions: 3x 1-hour sessions per week Duration: 8 weeks Practitioner(s): Sessions led by a therapist Participants underwent training targeted at executive function, attention and visual-spatial cognition similar to the VRT group but used face-to-face interactions with pen and paper activities. Exercises included tasks of simple association (letter-colour), inhibitory control, arithmetic operations, estimating numerical quantity, categorisation and deductive logical reasoning, and exercises targeting attention processes and visual-spatial cognition.
Duration of follow-up	8 weeks
Sources of funding	Not reported
Sample size	N=100 - VRT (BTS-Nirvana): n=50 - Traditional cognitive rehabilitation: n=50

N/n: number of participants; SD: standard deviation; VRT: virtual reality training

Outcomes

Study timepoints

- Post-intervention (8 weeks from baseline)

VRT (BTS-Nirvana) versus Traditional cognitive rehabilitation: Executive function
Executive function as measured by Frontal Assessment Battery - Polarity - Higher values are better
Executive function as measured by Weigls test - Polarity - Higher values are better

Outcome	VRT (BTS-Nirvana), post-intervention, N = 50	Traditional cognitive rehabilitation, post-intervention, N = 50
FAB Median scores at follow-up. Median (IQR)	17.2 (15.2 to 18)	14.9 (14 to 16.4)
Weigls test Median scores at follow-up. Median (IQR)	12.1 (10.1 to 14)	8.2 (5.8 to 11.5)

FAB: frontal assessment battery; IQR: interquartile range; N/n: number of participants; VRT: virtual reality training

VRT (BTS-Nirvana) versus Traditional cognitive rehabilitation: Attention
Attention as measured by Trail Making Test Part A - Polarity - Lower values are better
Attention as measured by Trail Making Test Part B - Polarity - Lower values are better

Outcome	VRT (BTS-Nirvana), post-intervention, N = 50	Traditional cognitive rehabilitation, post-intervention, N = 50
Trail Making Test Part A Median scores at follow-up. Median (IQR)	57 (35 to 88)	74.5 (44 to 160.75)
Trail Making Test Part B Median scores at follow-up.	145.5 (92 to 200)	174 (140 to 237.5)

Outcome	VRT (BTS-Nirvana), post-intervention, N = 50	Traditional cognitive rehabilitation, post-intervention, N = 50
Median (IQR)		

IQR: interquartile range; N/n: number of participants; VRT: virtual reality training

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(Lack of information regarding the randomisation process)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention assignment however no deviations arose.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for all participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol available.)*

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to lack of information regarding the randomisation process and trial protocol.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

De Luca, 2022

Bibliographic Reference	De Luca, R.; Bonanno, M.; Rifici, C.; Pollicino, P.; Caminiti, A.; Morone, G.; Calabro, R.S.; Does Non-Immersive Virtual Reality Improve Attention Processes in Severe Traumatic Brain Injury? Encouraging Data from a Pilot Study; Brain Sciences; 2022; vol. 12 (no. 9); 1211

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	April 2021 to September 2021
Inclusion criteria	- Diagnosis of first ever severe traumatic brain injury in the post-acute/chronic phase, that is, ≥3 months from the traumatic event, - Presence of moderate cognitive alterations following TBI, MoCA ≥16, - Absence of disabling sensory alterations (that is, hearing and visual deficit), severe psychiatric, and medical illness.

Exclusion criteria	- Severe cognitive and behavioural deficits potentially interfering with the training.
Patient characteristics	N=30 adults with traumatic brain injury - VRB-APT: n=15 - CAP-T: n=15 Age in years [Mean (SD)]: - VRB-APT: 44.6 (14.44) - CAP-T: 42.53 (17.95) Sex (M/F): - VRB-APT: n=7/n=8 - CAP-T: n=7/n=8 Time since diagnosis or injury: Not reported Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: VRB-APT Protocol intervention group: Virtual Interventions to improve attention (7) Delivery setting: Outpatient

	Number/frequency of sessions: 3x 45-minunte sessions per week Duration: 8 weeks Practitioner: Psychiatric therapist VRB-APT involved participants using the device which has a large range interactive activities for attention rehabilitation, some specific oculo-motor coordination tasks, using virtual touch modality. The cognitive training was based on a game interaction using augmented feedback. The therapist planned and organised all virtual exercises increasing the difficulty. **Others in the same protocol group** Name: CAP-T Protocol description: Face-to-face interventions to improve attention (7) Delivery setting: Outpatient Number/frequency of sessions: 3x 45minute sessions per week Duration: 8 weeks Practitioner: Cognitive therapist Attention focussed programme consisting of pen and paper exercises. with a face-to-face approach. The programme is based on meta-cognitive strategy and psychoeducational interventions.
Duration of follow-up	8 weeks
Sources of funding	Not industry funded
Sample size	N=30 - VRB-APT: n=15 - CAP-T: n=15

CAP-T: conventional attention processes training; MoCA: Montreal cognitive assessment test; N/n: number of participants; SD: standard deviation; TBI: traumatic brain injury; VRB-APT: virtual reality based-attention processes training

Outcomes

Study timepoints

- Post-intervention (8 weeks from baseline)

VRB-APT versus CAP-T: Attention

Attention as measured by Attentive Matrices - Polarity - Higher values are better

Attention as measured by Trail Making Test Part A - Polarity - Lower values are better

Attention as measured by Trail Making Test Part B - Polarity - Lower values are better

Outcome	VRB-APT, post-intervention, N = 15	CAP-T, post-intervention, N = 15
Attentive Matrices Median scores at follow-up. Median (IQR)	34 (29 to 42.62)	43.25 (41.37 to 49.12)
Trail Making Test Part A Median scores at follow-up. Median (IQR)	76 (56.5 to 139.5)	55 (30.5 to 64.5)
Trail Making Test Part B Median scores at follow-up. Median (IQR)	152 (82 to 215)	189 (155 to 257.5)

CAP-T: conventional attention process training; IQR: interquartile range; N/n: number of participants; VRB-APT: virtual-reality based attention processes training

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation occurred via a web-based application for block randomisation. Process was concealed and no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention assignment however no deviations occurred and appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for all participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol available.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns as no trial protocol reported.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

De Ruiter, 2016

Bibliographic Reference	De Ruiter, M.A.; Oosterlaan, J.; Schouten-Van Meeteren, A.Y.N.; Maurice-Stam, H.; Van Vuurden, D.G.; Gidding, C.; Beek, L.R.; Granzen, B.; Caron, H.N.; Grootenhuis, M.A.; Neurofeedback ineffective in paediatric brain tumour survivors: Results of a double-blind randomised placebo-controlled trial; European Journal of Cancer; 2016; vol. 64; 62-73

Study details

Country/ies where study was carried out	The Netherlands
Study type	Randomised controlled trial (RCT)
Study dates	2009 - 2012
Inclusion criteria	- Treated for a brain tumour more than 2 years prior to enrolment, - Aged 8 to18 years, - Suffered from parent-reported neurocognitive complaints.
Exclusion criteria	- Premorbid diagnosis of ADHD, - A mental or physical condition that restricted neurocognitive assessment, - Insufficient mastery of the Dutch language.
Patient characteristics	N=80 children and young people who were survivors of brain tumour - Neurofeedback training: n=40 - Placebo: n=40 Age in years [Mean (SD)]:

	- Neurofeedback training: 14.45 (2.99) - Placebo: 13.45 (3.28) Sex (M/F): - Neurofeedback training: n=16/n=18 - Placebo: n=19/n=18 Time since diagnosis or injury in years [Mean (SD)]: - Neurofeedback training: 7.64 (4.04) - Placebo: 6.03 (2.99) Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: Neurofeedback training Protocol intervention group: Interventions to improve processing speed (2), memory and learning (3), and attention (7) Delivery setting: Community Number/ frequency of sessions: 2x 30-minute sessions weekly Duration: 15 weeks Practitioner(s): Trained trainers Each session consisted of 10x 3-minute mini-sessions with 1 minute rest breaks in between. All modules were set to provide 80% positive reinforcement training and 20% negative reinforcement training. Reinforcement was based on

	individually determined thresholds which were adjusted automatically during sessions. Following each session the trainer filled out a checklist detailing the quality of the training, duration, time, movie used, alertness and anything else that may have arisen. The effects on neurocognitive functioning (attention, processing speed, memory, executive functioning, visuomotor integration, and intellectual functioning) were investigated.* *No information was provided about how different cognitive domains were targeted; protocol group was inferred based on trial name. **Control** Name: Placebo (no further information provided) Protocol description: Control (placebo) Delivery setting: Not reported Number/ frequency of sessions: Not reported Duration: Not reported Practitioner(s): Not reported No further details reported
Duration of follow-up	6 months
Sources of funding	Not industry funded
Sample size	N=80 - Neurofeedback training: n=40 - Placebo: n=40

ADHD: attention deficit hyperactivity disorder; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (15 weeks from baseline)

- 6 months from post-intervention

Neurofeedback training versus Placebo: Processing speed

Processing speed as measured by Baseline Speed Attention Network Task - Polarity - Lower values are better

Outcome	Neurofeedback training, Post-intervention ,N = 34	Neurofeedback training, 6-months , N = 33	Placebo, Post-intervention , N = 37	Placebo,6-months , N = 35
Baseline Speed Attention Network Task Mean scores at follow-up. Mean (SD)	368.51 (99.83)	338.24 (87.73)	386.79 (106.18)	359.23 (95.89)

N/n: number of participants; SD: standard deviation

Neurofeedback training versus Placebo: Short-term memory

Short-term memory as measured by Visual Sequencing Task - Polarity - Higher values are better

Outcome	Neurofeedback training, Post-intervention, N = 34	Neurofeedback training, 6-months, N = 33	Placebo, Post-intervention , N = 37	Placebo, 6-months , N = 35
Visual Sequencing Task Mean scores at follow-up. Mean (SD)	14.76 (4.78)	15.79 (4.93)	14.35 (4.1)	14.54 (4.11)

N/n: number of participants; SD: standard deviation

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation was performed using a computer software SPSS. Allocation sequence concealed and no baseline differences found .)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Carers were aware of intervention assignment however no deviations arose and appropriate analysis was performed.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(Data available for 90% of participants and no sensitivity analysis was performed. Missing data likely based on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	High *(High risk of bias due to missing outcome data.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; SPSS: statistical package for the social sciences

Emmanouel, 2020

Bibliographic Reference	Emmanouel, A.; Kontrafouri, E.; Nikolaos, P.; Kessels, R.P.C.; Fasotti, L.; Incorporation of a working memory strategy in GMT to facilitate serial-order behaviour in brain-injured patients; Neuropsychological rehabilitation; 2020; vol. 30 (no. 5); 888-914

Study details

Country/ies where study was carried out	Greece
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Acquired brain injury (traumatic brain injury, stroke or post-tumour surgery) documented by CT and/or MRI; at least 4 months since onset, - Difficulties in everyday activities during sessions of physiotherapy and speech therapy, as observed by therapists using a Greek-language version of Spikman's Checklist of Executive Disorders, - Baseline 'score' of less than 6 correct sequential steps in each of two multistep everyday tasks (for example, buying tickets online).
Exclusion criteria	- Severe aphasia, - Visual neglect, - Severe psychiatric problems, - Neurodegenerative disorders, - History of substance abuse, - Sudden seizures and loss of consciousness prior to surgery (if treated surgically).

Patient characteristics	N=18 adults with acquired brain injury - GMT plus WMT: n=9 - WMT only: n=9 Age in years [Mean (SD)]: - GMT plus WMT: 33.6 (7.9) - WMT only: 36.0 (10.1) Sex (M/F): - GMT plus WMT: n=5/n=4 - WMT only: n=7/n=2 Time since diagnosis or injury in months [Mean (SD) for all participants]: 12.1 (10.2) Chronic neurological disorder category: Acquired brain injury Note: Included 1 patient who had experienced a haemorrhagic stroke, and 1 patient who had undergone surgery for an aneurysm of the middle cerebral artery.
Intervention(s)/control	**Intervention** Name: GMT plus WMT Protocol intervention group: Interventions to improve and maintain executive function (1)

	Delivery setting: Outpatient rehabilitation centres and participants homes Number/ frequency of sessions: 3-4x 30-minute sessions per week (11 sessions in total) Duration: Not reported Practitioner(s): Neuropsychologist Training session 1 discussed executive function deficits using everyday examples and introduced the goal management training algorithm. The trainer coached participants to follow the instructions in the algorithm, which including orienting, defining the main goal, listing the steps, learning the steps and monitoring and checking, using simple catchphrases, verbal instructions and visual cue cards. In the second session, a working memory strategy that is incorporated into the overall goal management 'algorithm' (learning the steps) was introduced. This is presented as a metaphor (steps of a ladder) with a visual image of a ladder with key-words written on each step; participants practiced how to internalise the algorithm and working memory 'ladder' and visual cues are gradually withdrawn. At the end of each session, patients are asked to recall the steps learnt in previous sessions, and additional steps were taught in each session. Later sessions used the same process to teach a second goal. **Others in the same protocol group** Name: WMT only Protocol description: Interventions to improve and maintain executive function (1) Delivery setting: Outpatient rehabilitation centres and participants homes Number/ frequency of sessions: 3-4x 30-minute sessions per week (11 sessions in total) Duration: Not reported Practitioner(s): Neuropsychologist Aimed at improving performance in two real-life scenarios that engage working memory skills - handling money in sequential daily transactions; distributing supplies to different cities. 9 step training technique: 1. Repeat the current information; 2. Keep it in mind; 3. Go 1 activity back; 4. Repeat together the previous and current information; 5. Hold them in mind and 6. Decide what to do; 7. Say the outcome and 8. Repeat it internally; 9. Keep it until the next action.

	From the 3rd session onwards, the sessions focused on internalising the technique through practice. Note: WMT differed between the 2 conditions in terms of structure, formulation of training instructions and goals.
Duration of follow-up	Directly after treatment; assumed to be 3-4 weeks based on frequency and number of sessions.
Sources of funding	Not reported
Sample size	N=18 - GMT plus WMT: n=9 - WMT only: n=9
Other information	Study also included healthy controls in order to verify pre-treatment cognitive functioning deficits; data on healthy controls was not of interest for current review so was not extracted.

CT: computed tomography; GMT: goal management training; N/n: number of participants; MRI: magnetic resonance imaging; SD: standard deviation; WMT: working memory training

Outcomes

GMT plus WMT versus WMT only: Executive function
Executive function as measured by Executive Observation scale total score - Polarity - Higher values are better
Executive function as measured by Role Resumption List total score - Polarity - Lower values are better
Executive function as measured by Wechsler Intelligence Scale Number of categories completed - Polarity - Higher values are better
Executive function as measured by Wechsler Intelligence Scale Number of preservative answers - Polarity - Lower values are better
Executive function as measured by Rule shifting (BADS) - Polarity - Higher values are better
Executive function as measured by Action programme (BADS) - Polarity - Higher values are better
Executive function as measured by Key Search (BADS) - Polarity - Higher values are better
Executive function as measured by Zoo Map test (BADS) - Polarity - Higher values are better
Executive function as measured by Modified Six Element test (BADS) - Polarity - Higher values are better

Outcome	GMT plus WMTpost-intervention, N = 9	WMT only, post-intervention, N = 9
Executive Observation scale total score	21.67 (2.95)	17.67 (2)

Outcome	GMT plus WMTpost-intervention, N = 9	WMT only, post-intervention, N = 9
Mean score at follow-up. Mean (SD)		
Role Resumption List total score Mean score at follow-up. Mean (SD)	14.22 (0.83)	13.33 (1.5)
Wechsler Intelligence Scale Number of categories completed Mean score at follow-up. Mean (SD)	3.56 (1.33)	2.78 (0.66)
Wechsler Intelligence Scale Number of preservative answers Mean score at follow-up. Mean (SD)	52.22 (20.9)	63 (10.9)
Rule shifting (BADS) Mean score at follow-up. Mean (SD)	1.56 (1.33)	1.89 (1.27)
Action programme (BADS) Mean score at follow-up. Mean (SD)	3.78 (0.83)	3 (0.5)

Outcome	GMT plus WMTpost-intervention, N = 9	WMT only, post-intervention, N = 9
Key Search (BADS) Mean score at follow-up. Mean (SD)	13.33 (2.34)	13.67 (2.5)
Zoo Map test (BADS) Mean score at follow-up. Mean (SD)	11.89 (1.96)	11.56 (1.8)
Modified Six Element test (BADS) Mean score at follow-up. Mean (SD)	4.33 (0.5)	3.33 (0.5)

BADS: behavioural assessment of the dysexecutive syndrome battery; GMT: goal management training; N/n: number of participants; SD: standard deviation; WMT: working memory training

GMT plus WMT versus WMT only: Processing speed

Processing speed as measured by Stroop Test - Polarity - Higher values are better

Outcome	GMT plus WMT, post-intervention, N = 9	WMT only, post-intervention, N = 9
Stroop Test Mean scores at follow-up. Mean (SD)	0.48 (0.12)	0.42 (0.09)

GMT: goal management training; N/n: number of participants; SD: standard deviation; WMT: working memory training

GMT plus WMT versus WMT only: Working memory

Working memory as measured by Corsi's block tapping test - Polarity - Higher values are better

Working memory as measured by 2-back task - Polarity - Higher values are better;
Working memory as measured by Letter Number Sequencing subtest of the WAIS III - Polarity - Higher values are better

Outcome	GMT plus WMT, post-intervention, N = 9	WMT only, post-intervention, N = 9
Corsi's block tapping test Mean scores at follow-up. Mean (SD)	20.66 (2.34)	19.88 (2.66)
2-back task Mean scores at follow-up. Mean (SD)	11.68 (1.32)	11.67 (1.22)
Letter Number Sequencing subtest of the WAIS III Mean scores at follow-up. Mean (SD)	10.56 (1.59)	10.78 (1.2)

GMT: goal management training; N/n: number of participants; SD: standard deviation; WAIS-III: Wechsler Adult Intelligence Scale Third Edition ; WMT: working memory training

GMT plus WMT versus WMT only: Attention

Attention as measured by Trail Making Test Part B and A ratio - Polarity - Lower values are better

Outcome	GMT plus WMT, post-intervention,N = 9	WMT only, post-intervention, N = 9
Trail Making Test Part B and A ratio Mean scores at follow-up. Mean (SD)	3.02 (0.99)	2.72 (0.66)

GMT: goal management training; N/n: number of participants; SD: standard deviation; WMT: working memory training

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation by drawing lots or coin toss. This was done blindly by a physiotherapist not involved in the study for the first 16 patients (drawing lots); the last 2 patients were randomised using a coin toss but it wasn't explicitly stated if these were also done by an independent person. No significant baseline differences between groups.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants would have been aware of assignment and deviations from intended intervention (non-adherence) could occur outside of the trial context. Appears to have used ITT analysis.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Outcome data available for all participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No details if protocol published.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns of risk of bias due to selection of the reported results.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

ITT: intention-to- treat

Fleming, 2022

Bibliographic Reference	Fleming, J.; Ownsworth, T.; Doig, E.; Hogan, C.; Hamilton, C.; Swan, S.; Griffin, J.; Kendall, M.; Shum, D.; Efficacy of Prospective Memory Rehabilitation Plus Metacognitive Skills Training for Adults With Traumatic Brain Injury: A Randomized Controlled Trial; Neurorehabilitation and Neural Repair; 2022; vol. 36 (no. 8); 487-499

Study details

Country/ies where study was carried out	Australia
Study type	Randomised controlled trial (RCT)
Study dates	2015 - 2019
Inclusion criteria	- Diagnosis of moderate to severe TBI (as determined by Glasgow Coma Scale score and/or duration of post-traumatic amnesia]), - Working age range adults, - Had a significant other available to participate in the study, - Scored within the impaired range on baseline PM test performance or PM problems reported on the Brief Assessment of Prospective Memory by the participant or their significant other, - >1 month post discharge from hospital, - No prior brain injury or hypoxic injury, - Adequate receptive and expressive English communication skills, - Ambulant or independently mobile in manual or electric wheelchair, - Able to attend the hospital for the 6-week intervention.
Exclusion criteria	- Unable to provide informed consent,

	- Had not emerged from post-traumatic amnesia, - Confused or disoriented, - Had communication difficulties limiting their comprehension of written or spoken language and/or were assessed by their treating occupational therapist as having very severe global cognitive impairment.
Patient characteristics	N=52 adults with moderate to severe traumatic brain injury - COMP: n=17 - COMP-MST: 17 - Waitlist control: 18 Age in years [Mean (SD)]: - COMP: 40.24 (14.02) - COMP-MST: 37.35 (13.38) - Waitlist control: 39.44 (14.11) Sex (M/F): - COMP: n=13/n=4 - COMP-MST: n=16/n=1 - Waitlist control: n=11/n=7 Time since injury in days [Mean (SD)]: - COMP: 1470.71 (1861.71)

	- COMP-MST: 1273.35 (1334.59) - Waitlist control: 1572.33 (2773.53) Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: COMP Protocol intervention group: Interventions to improve memory and learning (3) Delivery setting: Outpatient clinic Number/ frequency of sessions: 0.5-hour active control plus 1.5-hour compensatory training (6 sessions in total) Duration: 6 weeks Practitioner: Delivered by a therapist one-to-one 0.5-hour active control plus 1.5-hour compensatory training delivered by a therapist in outpatient clinic. Education on prospective memory and the impact of traumatic brain injury on this, and appropriate assistive technologies to compensate for prospective memory impairment (for example, smart phone or electronic calendar). **Intervention** Name: COMP-MST Protocol intervention group: Interventions to improve and maintain executive function (1) and memory and learning (3) Delivery setting: Outpatient clinic Number/ frequency of sessions: 0.5-hour metacognitive skills training plus 1.5-hour compensatory training (6 sessions in total)

	Duration: 6 weeks Practitioner: Delivered by a therapist one-to-one 0.5-hour metacognitive skills training plus 1.5-hour compensatory training delivered by a therapist in outpatient clinic. Included COMP with an incorporation of metacognitive skills training within each prospective memory training session. **Control** Name: Waitlist control Protocol description: Control (waitlist) Delivery setting: Not reported Number/ frequency of sessions: Not reported Duration: Not reported Practitioner(s): Not reported
Duration of follow-up	3 months
Sources of funding	Not industry funded
Sample size	N=52 - COMP: n=17 - COMP-MST: n=17 - Waitlist control: n=18

COMP: compensatory strategy training; COMP-MST: compensatory strategy training plus metacognitive skills training; N/n: number of participants; PM: prospective memory; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (6 weeks from baseline)
- 3-months from post-intervention

COMP versus COMP-MST versus Waitlist control: Independence in Activities of Daily Life

Independence in Activities of Daily Life as measured by Sydney Psychosocial Reintegration Scale version 2 - Polarity - Higher values are better

Outcome	Waitlist control, Post-intervention, N = 18	Waitlist control, 3-months, N = 18	COMP-MST, Post-intervention, N = 17	COMP-MST, 3-months, N = 17	COMP, Post-intervention , N = 17	COMP,3-months, N = 17
Sydney Psychosocial Reintegration Scale version 2 Mean scores at follow-up. Mean (SD)	27.82 (9.51)	28 (8)	29.35 (9.41)	29.76 (9.22)	35.5 (7.68)	36.69 (7.04)

COMP: compensatory strategy training; COMP-MST: compensatory strategy training plus metacognitive skills training; N/n: number of participants; SD: standard deviation

COMP versus COMP-MST versus Waitlist control: Prospective memory

Prospective memory as measured by Brief Assessment of Prospective Memory - Polarity - Lower values are better

Prospective memory as measured byCambridge Prospective Memory - Polarity - Higher values are better

Outcome	Waitlist control, Post-intervention , N = 18	Waitlist control, 3-months, N = 18	COMP-MST, Post-intervention , N = 17	COMP-MST, 3-months, N = 17	COMP, Post-intervention, N = 17	COMP,3-months, N = 17
Brief Assessment of Prospective Memory	1.99 (0.71)	1.86 (0.62)	2.02 (0.75)	1.91 (0.71)	0.82 (0.45)	1.74 (0.45)

Outcome	Waitlist control, Post-intervention , N = 18	Waitlist control, 3-months, N = 18	COMP-MST, Post-intervention , N = 17	COMP-MST, 3-months, N = 17	COMP, Post-intervention, N = 17	COMP,3-months, N = 17
Mean scores at follow-up. Mean (SD)						
Cambridge Prospective Memory Mean scores at follow-up. Mean (SD)	24 (6.62)	25.72 (6.76)	21.12 (8.78)	25 (7.42)	25.82 (7.8)	28.65 (5.95)

COMP: compensatory strategy training; COMP-MST: compensatory strategy training plus metacognitive skills training; N/n: number of participants; SD: standard deviation

Critical appraisal – Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Permuted block randomisation was performed and process was concealed with no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Double-blinded trial with appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for 95% of participants randomised.)*

Section	Question	Answer
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation but knowledge could have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to missing outcome data and lack of blinding for outcome assessments.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Gich, 2015

Bibliographic Reference	Gich, J.; Freixanet, J.; Garcia, R.; Vilanova, J.C.; Genis, D.; Silva, Y.; Montalban, X.; Ramio-Torrenta, L.; A randomized, controlled, single-blind, 6-month pilot study to evaluate the efficacy of MS-Line!: A cognitive rehabilitation programme for patients with multiple sclerosis; Multiple Sclerosis; 2015; vol. 21 (no. 10); 1332-1343

Study details

Country/ies where study was carried out	Spain
Study type	Randomised controlled trial (RCT)

Study dates	Not reported
Inclusion criteria	- Aged 20–60 years, - Clinically defined multiple sclerosis according to Poser criteria, - At least a primary education, - Mild cognitive impairment (as determined by neuropsychological assessment).
Exclusion criteria	- Severe psychiatric disorders, - History of traumatic brain injury, - Use of steroid or immunosuppressor medications during previous month, - Received other cognitive rehabilitation, - Treatment during previous 6 months.
Patient characteristics	N=43 adults with multiple sclerosis - MS-Line! cognitive rehabilitation: n=22 - No intervention: n=21 Age in years [Mean (SD)]: - MS-Line! cognitive rehabilitation: 45.5 (9.6) - No intervention: 44.0 (8.3) Sex (M/F): - MS-Line! cognitive rehabilitation: n=6/n=16

	- No intervention: n=8/n=13 Time since diagnosis or injury in years [Mean (SD)]: - MS-Line! cognitive rehabilitation: 9.8 (6.2) - No intervention: 10.7 (6.8) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: MS-Line! cognitive rehabilitation Patients and family members were also asked to do a short daily cognitive exercise together at home lasting no more than 5 minutes Protocol intervention group (1-7): Interventions to improve and maintain executive function (1), processing speed (2), memory and learning (3) Delivery setting: Outpatient (hospital) Number/ frequency of sessions: 2x 75-minute sessions per week Duration: 6 months Practitioner(s): Not reported Each session combined 25-minutes of written, manipulative and computer-based materials/games, for example, crosswords, maths problems, spatial games, origami, computer based logic/reasoning games). All materials had different levels of difficulty, and clues to resolve the problems were provided. **Control** Name: No intervention

	Protocol description: Not applicable Delivery setting: Not applicable Number/ frequency of sessions: Not applicable Duration: Not applicable Practitioner(s): Not applicable
Duration of follow-up	6 months
Sources of funding	Industry funded
Sample size	N=43 - MS-Line! cognitive rehabilitation: n=22 - No intervention: n=21
Other information	Randomisation was stratified to avoid possible confounding variables, using level of cognitive impairment as strata.

N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (6 months from baseline)

MS-Line! cognitive rehabilitation versus No intervention: Executive function
Executive function as measured by Word list generator - Polarity - Higher values are better
Executive function as measured by Phonological fluency (FAS) - Polarity - Higher values are better

Outcome	MS-Line! cognitive rehabilitation, Post-intervention , N = 21	No intervention, Post-intervention , N = 20
Word list generator Change from baseline Mean (SD)	4.73 (0.96)	1.13 (0.98)
Phonological fluency (FAS) Change from baseline Mean (SD)	7.09 (1.71)	5.54 (1.79)

FAS: Phonological fluency; MS: multiple sclerosis; N/n: number of participants; SD: standard deviation

MS-Line! cognitive rehabilitation versus No intervention: Processing speed

Processing speed as measured by Symbol digit modalities test - Polarity - Higher values are better

Outcome	MS-Line! cognitive rehabilitation, Post-intervention, N = 21	No intervention, Post-intervention , N = 20
Symbol digit modalities test Change from baseline Mean (SD)	3.09 (2.01)	-0.19 (2.01)

MS: multiple sclerosis; N/n: number of participants; SD: standard deviation

MS-Line! cognitive rehabilitation versus No intervention: Working memory

Working memory as measured by Letter-number sequencing subtest of the WAIS-III - Polarity - Higher values are better

Outcome	MS-Line! cognitive rehabilitation, Post-intervention , N = 21	No intervention, Post-intervention , N = 20
Letter-number sequencing subtest of the WAIS-III Change from baseline Mean (SD)	1.63 (0.48)	0.15 (0.51)

MS: multiple sclerosis; N/n: number of participants; SD: standard deviation; WAIS-III: Wechsler Adult Intelligence Scale Third Edition

MS-Line! cognitive rehabilitation versus No intervention: Long-term declarative memory
Long-term declarative memory as measured by Battery of Neuropsychological Test Selective reminding test long term storage - Polarity - Higher values are better
Long-term declarative memory as measured by Battery of Neuropsychological Test Selective reminding test Consistent long-term retrieval - Polarity - Higher values are better
Long-term declarative memory as measured by Battery of Neuropsychological Test selective Reminding Test-D - Polarity - Higher values are better
Long-term declarative memory as measured by Battery of Neuropsychological Test Spatial Delayed Recall Test - Polarity - Higher values are better

Outcome	MS-Line! cognitive rehabilitation, Post-intervention, N = 21	No intervention, Post-intervention , N = 20
Battery of Neuropsychological Test Selective reminding test long term storage Change from baseline Mean (SD)	-0.75 (2.79)	-0.05 (2.79)
Battery of Neuropsychological Test Selective reminding test Consistent long-term retrieval Change from baseline Mean (SD)	1.93 (0.9)	0.23 (0.92)
Battery of Neuropsychological Test selective Reminding Test-D Change from baseline Mean (SD)	0.86 (0.42)	0.2 (0.43)
Battery of Neuropsychological Test Spatial Delayed Recall Test Change from baseline Mean (SD)	1.98 (0.46)	-0.23 (0.47)

MS: multiple sclerosis; N/n: number of participants; SD: standard deviation

MS-Line! cognitive rehabilitation versus No intervention: Attention
Attention as measured by Trail Making Test Part A - Polarity - Lower values are better
Attention as measured by Trail Making Test Part B - Polarity - Lower values are better

Outcome	MS-Line! cognitive rehabilitation, Post-intervention , N = 21	No intervention, Post-intervention , N = 20
Trail Making Test Part A Change from baseline Mean (SD)	-13.97 (3.48)	0.01 (3.76)
Trail Making Test Part B Change from baseline Mean (SD)	-14.8 (7.01)	-0.83 (7.01)

MS: multiple sclerosis; N/n: number of participants; SD: standard deviation

MS-Line! cognitive rehabilitation versus No intervention: Working memory and attention composite

Working memory and attention as measured by Backward and forward digit span - Polarity - Higher values are better

Outcome	MS-Line! cognitive rehabilitation, Post-intervention , N = 21	No intervention, Post-intervention , N = 20
Backward and forward digit span Change from baseline Mean (SD)	1.78 (0.5)	0.54 (0.51)

MS: multiple sclerosis; N/n: number of participants; SD: standard deviation

MS-Line! cognitive rehabilitation versus No intervention: Working memory, processing speed, and attention composite

Working memory, processing speed, and attention composite as measured by Battery of Neuropsychological Test symbol digit modalities test - Polarity - Higher values are better

Outcome	MS-Line! cognitive rehabilitation, Post-intervention , N = 21	No intervention, Post-intervention , N = 20
Battery of Neuropsychological Test symbol digit modalities test Change from baseline Mean (SD)	3.36 (1.77)	0.35 (1.63)

MS: multiple sclerosis; N/n: number of participants; SD: standard deviation

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information regarding randomisation process provided.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carer aware of intervention assignment however no deviations arose.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for 95% of participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*

Section	Question	Answer
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns as no trial protocol provided.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Hanssen, 2016

Bibliographic Reference	Hanssen, K.T.; Beiske, A.G.; Landro N., I.; Hofoss, D.; Hessen, E.; Cognitive rehabilitation in multiple sclerosis: A randomized controlled trial; Acta Neurologica Scandinavica; 2016; vol. 133 (no. 1); 30-40

Study details

Country/ies where study was carried out	Norway
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Subjective complaints about cognitive problems, - Motivation for working with cognitive problems to increase coping in everyday life, - Adequate language skills to participate in group discussions without any need for an interpreter,

	- No central nervous system injury or disease other than multiple sclerosis, - No psychopathology that would negatively interfere with participation in the cognitive rehabilitation, - No general cognitive impairment defined as a scores from 24 and below on the Mini Mental State Examination
Exclusion criteria	Not reported
Patient characteristics	N=120 adults with multiple sclerosis - Cognitive rehabilitation plus standard rehabilitation: n=60 - Standard rehabilitation only: n=60 Age in years [Mean (SD)]: Not reported, Mean (range): - Cognitive rehabilitation plus standard rehabilitation: 53.9 (33-70) - Standard rehabilitation only: 52.5 (32-71) Sex (M/F): - Cognitive rehabilitation plus standard rehabilitation: n=20/n=40 - Standard rehabilitation only: n=12/n=48 Time since diagnosis or injury in years [Mean (SD)]: - Cognitive rehabilitation plus standard rehabilitation: 10.6 (7.7) - Standard rehabilitation only: 12.0 (9.7)

	Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Cognitive rehabilitation plus standard rehabilitation Protocol intervention group: Interventions to improve and maintain executive function (1) Delivery setting: Inpatient and outpatient Number/ frequency of sessions: 3x 2-hour sessions inpatient and 6x bi-weekly 10-minute telephone sessions Duration: 4 months Practitioner(s): Neuropsychologist and occupational therapist Sessions were performed in groups of 3-6 patients and included lectures, practical exercises and discussions during the first week and individual sessions during the 2nd and 3rd week. To support the goal setting process, techniques from motivational interviewing and cognitive behavioural therapy were used. **Control** Name: Standard rehabilitation only Protocol description: Control (standard rehabilitation care alone) Delivery setting: Not reported Number/ frequency of sessions: Not reported Duration: 4 weeks Practitioner(s): Multidisciplinary team Participants received neuropsychological assessment (including feedback) and participated in the standard 4-week rehabilitation program of individual follow-up with a multidisciplinary team, with an opportunity to consult a clinical psychologist and attend lectures on cognitive and psychological aspects of multiple sclerosis.
Duration of follow-up	7 months

Sources of funding	Industry funding unclear
Sample size	N=120 - Cognitive rehabilitation plus standard rehabilitation: n=60 - Standard rehabilitation only: n=60

N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (4 months from baseline)
- 7 months from post-intervention

Cognitive rehabilitation plus standard rehabilitation versus Standard rehabilitation only: Physical and mental health related quality of life and social care related quality of life

Physical and mental health related quality of life and social care related quality of life as measured by MS Impact Scale - Polarity - Lower values are better

Physical and mental health related quality of life and social care related quality of life as measured by Hopkins Symptom Checklist-25 - Polarity - Lower values are better

Outcome	Cognitive rehabilitation plus standard rehabilitation, Post-intervention , N = 51	Cognitive rehabilitation plus standard rehabilitation, (7 months, N = 54	Standard rehabilitation only, Post-intervention , N = 51	Standard rehabilitation only, 7 months, N = 48
The MS Impact Scale Mean score at follow-up. Mean (SD)	18.3 (6.9)	18.3 (7.2)	19.9 (7.7)	20.6 (8)

Outcome	Cognitive rehabilitation plus standard rehabilitation, Post-intervention , N = 51	Cognitive rehabilitation plus standard rehabilitation, (7 months, N = 54	Standard rehabilitation only, Post-intervention , N = 51	Standard rehabilitation only, 7 months, N = 48
Hopkins Symptom Checklist-25 Mean score at follow-up. Mean (SD)	1.6 (0.49)	1.62 (0.47)	1.74 (0.5)	1.65 (0.53)

MS: multiple sclerosis; N/n: number of participants; SD: standard deviation

Cognitive rehabilitation plus standard rehabilitation versus Standard rehabilitation only: Executive function

Executive function as measured by Behaviour Rating Inventory of Executive Functioning - Polarity - Lower values are better

Outcome	Cognitive rehabilitation plus standard rehabilitation, Post-intervention , N = 51	Cognitive rehabilitation plus standard rehabilitation, 7 months, N = 54	Standard rehabilitation only, Post-intervention , N = 51	Standard rehabilitation only, 7 months, N = 48
Behaviour Rating Inventory of Executive Functioning Mean score at follow-up. Mean (SD)	56.4 (11.7)	56.3 (11.8)	56.7 (11.7)	55.2 (11.5)

N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(Randomisation process occurred via lottery. Lack of information regarding allocation concealment.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(No deviations from interventions occurred however some concerns due to the lack of blinding and no intention-to-treat analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(High risk of bias as data only available for 85% of participants and no sensitivity analysis performed.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(Some concerns as no trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	High *(High risk of bias due to lack of blinding, lack of information regarding randomisation concealment, lack of information regarding trial protocol and inappropriate analysis used.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Jones, 2021

Bibliographic Reference	Jones, C.; Richard, N.; Thaut, M.; Investigating music-based cognitive rehabilitation for individuals with moderate to severe chronic acquired brain injury: A feasibility experiment; NeuroRehabilitation; 2021; vol. 48 (no. 2); 209-220

Study details

Country/ies where study was carried out	Canada
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Aged 18 years and older, - Acquired brain injury rated as moderate or severe according to Glasgow Coma Scale, National Institute of Health scale, or physician's report, - Identified as having a cognitive impairment with no known pre-existing (pre-injury) cognitive deficits, - Being able to complete the pre- and post- tests independently.
Exclusion criteria	- Hearing impairment or central auditory processing disorder, - Clinical diagnosis of depression, - Motor impairment to preclude execution of treatment exercises.
Patient characteristics	N=15 adults with acquired brain injury - MACT: n=7 - APT: n=8

	Age in years [Mean (SD)]: - MACT: 51.9 (11.02) - APT: 55.4 (10.54) Sex (M/F): - MACT: n=7/n=8 - APT: n=6/n=1 Time since diagnosis or injury in years [Mean (SD)]: - MACT: 9 (7.48) - APT: 11.5 (6.21) Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: MACT Protocol intervention group (1-7): Interventions to improve and maintain executive function (1), and attention (7) Delivery setting: Community Number/ frequency of sessions: 1x 45-minute session per week Duration: 3 weeks Practitioner(s): On site researcher

	Modelled according to the APT with exercises translated to live musical instruments. Eight exercises were included per session. **Intervention** Name: APT Protocol intervention group (1-7): Interventions to improve and maintain executive function (1), Interventions to improve and maintain attention (7) Delivery setting: Community Number/ frequency of sessions: 1x 45-minute sessions per week Duration: 3 weeks Practitioner(s): On site researcher Computerised version of APT. Tasks included sustained and selective attention control, and cognitive control with increasing difficulty. Eight exercises were included per session.
Duration of follow-up	3 weeks
Sources of funding	Not reported
Sample size	N=15 - MACT: n=7 - APT: n=8

APT: attention process training; MACT: music attention control training; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (3-weeks from baseline)

MACT versus APT: Attention
Attention as measured by Trail Making Test Part A - Polarity - Lower values are better
Attention as measured by Trail Making Test Part B - Polarity - Lower values are better

Outcome	MACT, Post-intervention , N = 7	APT, Post-intervention, N = 8
Trail Making Test Part A Mean scores at follow-up. Mean (SD)	46.29 (20.85)	55.25 (31.69)
Trail Making Test Part B Mean scores at follow-up. Mean (SD)	137.17 (78.03)	160 (91.34)

APT: attention process training; MACT: music attention control training; N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation was performed via sealed opaque envelopes by blinded individuals and process was concealed with no baseline differences.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention received however no deviations arose.)*

Section	Question	Answer
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(Data available for 92% of participants and no sensitivity analysis performed)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns as data not available for all participants and no trial protocol was provided.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Leonardi, 2021

Bibliographic Reference	Leonardi, S.; Maggio, M.G.; Russo, M.; Bramanti, A.; Arcadi, F.A.; Naro, A.; Calabro, R.S.; De Luca, R.; Cognitive recovery in people with relapsing/remitting multiple sclerosis: A randomized clinical trial on virtual reality-based neurorehabilitation; Clinical Neurology and Neurosurgery; 2021; vol. 208; 106828

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	Not reported, recruitment February - October 2019
Inclusion criteria	- Diagnosis of multiple sclerosis based on the latest reviews of McDonald's criteria, - Stable on therapy for at least 6 months before entering the study, - Presence of mild to moderate cognitive impairment (Montreal Cognitive Assessment range 18–27).
Exclusion criteria	- Severe medical and psychiatric illness potentially interfering with the training, - Disabling sensory alterations (that is, auditory and visual disturbances), - Aged 75 or older or younger than 18 years, - Clinical and/or neuroradiological relapse of multiple sclerosis in the 6 months preceding the enrolment, - Expanded disability status scale >7.
Patient characteristics	N=30 adults with multiple sclerosis - Virtual reality cognitive rehabilitation: n=15 - Conventional cognitive rehabilitation: n=15 Age in years [Mean (SD)]: - Virtual reality cognitive rehabilitation: 57.4 (7.9) - Conventional cognitive rehabilitation: 51.8 (1.0)

	Sex (M/F): - Virtual reality cognitive rehabilitation: n=7/n=8 - Conventional cognitive rehabilitation: n=5/n=10 Time since diagnosis or injury: Not reported Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Virtual reality cognitive rehabilitation. Protocol intervention group (1-7): Interventions to improve and maintain executive function (1), memory and learning (3), visual, spatial and perceptual functions (5), and attention (7) Delivery setting: Outpatient (Rehabilitation clinic) Number/ frequency of sessions: 3x 45-minute sessions per week Duration: 8 weeks Practitioner(s): Not reported Each session involved stimulation of specific cognitive domains and increasing difficulty. Participants used a VR medical device, with exercises focusing on 2D exercises, whereby participants used a touchscreen or magnetic tracking sensor, and exercising focusing on 3D exercises whereby participants interact with 3D on immersive scenarios and virtual objects. **Control** Name: Conventional cognitive rehabilitation

	Protocol description (1-7): Interventions to improve and maintain executive function (1), Interventions to improve and maintain memory and learning (3), Interventions to improve and maintain visual, spatial and perceptual functions (5), Interventions to improve and maintain attention (7). Delivery setting: Outpatient (Rehabilitation clinic) Number/ frequency of sessions: 3x 45-minute sessions per week Duration: 8 weeks Practitioner(s): Not reported Traditional cognitive rehabilitation with face-to-face approach. Sessions involved stimulation of specific cognitive domains (attention, verbal and visuo-spatial memory and executive function training) in increasing difficulty.
Duration of follow-up	8 weeks
Sources of funding	Not reported
Sample size	N=30 - Virtual reality cognitive rehabilitation: n=15 - Conventional cognitive rehabilitation: n=15
Other information	Quality of life outcomes not extracted as MSQOL reported 2 subscales not overall score.

2D: 2 dimensional; 3D: 3 dimensional; MSQOL: multiple sclerosis quality of life; N/n: number of participants; SD: standard deviation; VR: virtual reality

Outcomes

Study timepoints

- Post-intervention (8-weeks from baseline)

Virtual reality cognitive rehabilitation versus Conventional cognitive rehabilitation: Executive function

Executive function was measured by World List Generation Test - Polarity - Higher values are better

Outcome	Virtual reality cognitive rehabilitation , Post-intervention, N = 15	Conventional cognitive rehabilitation, Post-intervention , N = 15
World List Generation Test Median scores at follow-up. Median (IQR)	17.8 (14.1 to 20.1)	16.1 (12.5 to 18)

IQR: interquartile range; N/n: number of participants

Virtual reality cognitive rehabilitation versus Conventional cognitive rehabilitation: Processing speed

Processing speed as measured by Battery of Neuropsychological Test symbol digit modalities test - Polarity - Higher values are better

Outcome	Virtual reality cognitive rehabilitation , Post-intervention , N = 15	Conventional cognitive rehabilitation, Post-intervention , N = 15
Battery of Neuropsychological Test symbol digit modalities test Median scores at follow-up. Median (IQR)	24.3 (20.3 to 34.8)	20.5 (17.3 to 34.8)

IQR: interquartile range; N/n: number of participants

Virtual reality cognitive rehabilitation versus Conventional cognitive rehabilitation: Long-term declarative memory

Long-term declarative memory as measured by Battery of Neuropsychological Test Selective reminding test long term storage - Polarity - Higher values are better

Long-term declarative memory as measured by Battery of Neuropsychological Test Selective reminding test Consistent long-term retrieval - Polarity - Higher values are better

Long-term declarative memory as measured by Battery of Neuropsychological Test selective Reminding Test-D - Polarity - Higher values are better

Long-term declarative memory as measured by Battery of Neuropsychological Test Spatial Delayed Recall Test - Polarity - Higher values are better

Outcome	Virtual reality cognitive rehabilitation , Post-intervention , N = 15	Conventional cognitive rehabilitation, Post-intervention , N = 15
Battery of Neuropsychological Test Selective reminding test long term storage Median scores at follow-up. Median (IQR)	44.1 (26.1 to 48.1)	30.1 (25.1 to 40.1)
Battery of Neuropsychological Test Selective reminding test Consistent long-term retrieval Median scores at follow-up. Median (IQR)	22.7 (16.4 to 32.7)	21.7 (15.6 to 29.5)
Battery of Neuropsychological Test selective Reminding Test-D Median scores at follow-up. Median (IQR)	7.8 (5.6 to 9.3)	6.8 (4.8 to 7.8)
Battery of Neuropsychological Test Spatial Delayed Recall Test Median scores at follow-up. Median (IQR)	14.8 (11 to 18.1)	8 (5 to 10)

IQR: interquartile range; N/n: number of participants

Virtual reality cognitive rehabilitation versus Conventional cognitive rehabilitation: Working memory, processing speed, and attention composite

Working memory, processing speed, and attention composite as measured by Battery of Neuropsychological Test symbol digit modalities test (PASAT 3) - Polarity - Higher values are better

Working memory, processing speed, and attention composite as measured by Battery of Neuropsychological Test symbol digit modalities test (PASAT 2) - Polarity - Higher values are better

Outcome	Virtual reality cognitive rehabilitation , Post-intervention , N = 15	Conventional cognitive rehabilitation, Post-intervention , N = 15
Battery of Neuropsychological Test symbol digit modalities test (PASAT 3) Median scores at follow-up. Median (IQR)	27.4 (22.7 to 35.9)	26.9 (21.7 to 29.4)
Battery of Neuropsychological Test symbol digit modalities test (PASAT 2) Median scores at follow-up. Median (IQR)	20.3 (4.9 to 25.9)	13.3 (4.9 to 23.1)

IQR: interquartile range; N/n: number of participants; PASAT: paced auditory serial addition test

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information regarding randomisation process.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention assignment however no deviations arose.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for all participants.)*

Section	Question	Answer
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Knowledge could have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns as lack of information regarding randomisation process and trial protocol. Some outcomes may have been influence by knowledge of intervention received.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Lesniak, 2014

Bibliographic Reference	Lesniak, M.; Polanowska, K.; Seniow, J.; Czlonkowska, A.; Effects of repeated anodal tDCS coupled with cognitive training for patients with severe traumatic brain injury: A pilot randomized controlled trial; Journal of Head Trauma Rehabilitation; 2014; vol. 29 (no. 3); e20-e29

Study details

Country/ies where study was carried out	Poland

Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- History of severe traumatic brain injury (classified based on the Glasgow Coma Scale, duration of a loss of consciousness and/or posttraumatic amnesia at least 4 months prior to enrolment in the study, and subsequent memory impairment, - Age 18 to 45 years, - No history of previous neurological/psychiatric diseases or substance abuse, - No history of postinjury seizures, - No skull fractures or skull plates in the site of electrode placement, - Informed consent to participate.
Exclusion criteria	Not reported
Patient characteristics	N=26 adults with a history of severe traumatic brain injury and subsequent memory impairment. - a-tDCS plus cognitive rehabilitation programme: n=14 - Sham a-tDCS plus cognitive rehabilitation programme: n=12 Age in years, mean (SD): a-tDCS plus cognitive rehabilitation programme: 28.3 (9) Sham a-tDCS plus cognitive rehabilitation programme: 29.3 (7.7) Sex (M/F)*: n=17/n=6

	Time since diagnosis or injury in months*: Mean (SD) not reported, range: 4 – 92 Chronic neurological disorder category: Acquired brain injury * Data only reported for whole study population, not by allocation group
Intervention(s)/control	**Intervention** Name: a-tDCS plus cognitive rehabilitation Protocol intervention group (1-7): Interventions to improve memory and learning (3) Delivery setting: Inpatient and outpatient neurorehabilitation unit Number/ frequency of sessions: Five 10-minute simulation sessions per week Duration: 3 weeks Practitioner(s): Not reported Cumulative anodal transcranial direct current stimulation of the left dorsolateral prefrontal cortex (1 mA for 10 minutes; current density 0.028 mA/cm2) delivered prior to a cognitive rehabilitation session. The current intensity was gradually increased at the beginning of the session and gradually decreased at the end of the session to diminish the perception of current. **Control** Name: Sham a-tDCS plus cognitive rehabilitation Protocol description: Interventions to improve memory and learning placebo (sham) (3) Delivery setting: Inpatient and outpatient neurorehabilitation unit Number/ frequency of sessions: Five 10-minute simulation sessions per week

	Duration: 3 weeks Practitioner(s): Not reported Sham transcranial direct current stimulation (1 mA for the first 25 seconds of a 10-minute stimulation period) delivered prior to a cognitive rehabilitation session Both groups received cognitive rehabilitation sessions after real or A-tDCS or sham A-tDCS. The rehabilitation programme was computer based and focused on internal memory strategies, such as rehearsal, using visual imagery, mental retracing, loci method, errorless learning). Patients completed exercises in which they practiced these techniques (difficulty levels were adjusted to each participant's capabilities).
Duration of follow-up	4 months
Sources of funding	Not industry funded
Sample size	N=26 - a-tDCS plus cognitive rehabilitation programme: n=14 - Sham a-tDCS plus cognitive rehabilitation programme: n=12
Other information	The assignment was based on a minimalization procedure to ensure that both groups would be balanced in terms of age, time since injury and severity of symptoms (based on admission assessment results). A total of 23 patients (17 men and 6 women) received the allocated intervention. Researchers were able to blind participants to treatment allocation by using equipment that looked similar and temporarily subjecting participants to current-induced sensations.

a-tDCS: anodal transcranial direct current stimulation; cm: centimetre; mA: millampere; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (3-weeks from baseline)
- 4-months from post-intervention

a-tDCS plus cognitive rehabilitation versus Sham a-tDCS plus cognitive rehabilitation: Working memory

Working memory as measured by Pattern recognition test (immediate recall) - Polarity - Higher values are better

Working memory as measured by Spatial span test - Polarity - Higher values are better

Outcome	a-tDCS plus cognitive rehabilitation, Post-intervention, N = 12	a-tDCS plus cognitive rehabilitation, 4-months, N = 11	Sham a-tDCS plus cognitive rehabilitation, Post-intervention, N = 11	Sham a-tDCS plus cognitive rehabilitation, 4-months, N = 10
Pattern recognition test (immediate recall) Median score at follow-up. Median (IQR)	11 (9 to 11.8)	9 (7 to 11)	11 (10 to 12)	8 (7.8 to 10)
Spatial span test Median score at follow-up. Median (IQR)	5 (5 to 7)	6 (5 to 6)	5 (5 to 7)	6 (4.8 to 7)

a-tDCS: anodal transcranial direct current stimulation; IQR: interquartile range; N/n: number of participants

a-tDCS plus cognitive rehabilitation versus Sham a-tDCS plus cognitive rehabilitation: Long-term declarative memory

Long-term declarative memory as measured by Pattern recognition test (delayed recognition) - Polarity - Higher values are better

Outcome	a-tDCS plus cognitive rehabilitation, Post-intervention , N = 12	a-tDCS plus cognitive rehabilitation, 4-months, N = 11	Sham a-tDCS plus cognitive rehabilitation, Post-intervention , N = 11	Sham a-tDCS plus cognitive rehabilitation, 4-months, N = 10
Pattern recognition test (delayed recognition)	9.5 (6.3 to 11)	10 (7 to 12)	8 (7 to 10)	9 (8 to 11)

Outcome	a-tDCS plus cognitive rehabilitation, Post-intervention , N = 12	a-tDCS plus cognitive rehabilitation, 4-months, N = 11	Sham a-tDCS plus cognitive rehabilitation, Post-intervention , N = 11	Sham a-tDCS plus cognitive rehabilitation, 4-months, N = 10
Median score at follow-up. Median (IQR)				

a-tDCS: anodal transcranial direct current stimulation; IQR: interquartile range; N/n: number of participants

a-tDCS plus cognitive rehabilitation versus Sham a-tDCS plus cognitive rehabilitation: Attention

Attention as measured by Rapid visual information processing - Polarity - Higher values are better

Outcome	a-tDCS plus cognitive rehabilitation, Post-intervention , N = 12	a-tDCS plus cognitive rehabilitation, 4-months, N = 11	Sham a-tDCS plus cognitive rehabilitation, Post-intervention , N = 11	Sham a-tDCS plus cognitive rehabilitation, 4-months, N = 10
Rapid visual information processing Mean score at follow-up. Mean (SD)	0.86 (0.05)	0.87 (0.05)	0.87 (0.06)	0.88 (0.06)

a-tDCS: anodal transcranial direct current stimulation; N/n: number of participants; SD: standard deviation

a-tDCS plus cognitive rehabilitation versus Sham a-tDCS plus cognitive rehabilitation: Working memory, processing speed and attention composite

Working memory, processing speed, and attention composite as measured by Battery of Neuropsychological Test symbol digit modalities test (PASAT) - Polarity - Higher values are better

Outcome	a-tDCS plus cognitive rehabilitation, Post-intervention , N = 12	a-tDCS plus cognitive rehabilitation, 4-months, N = 11	Sham a-tDCS plus cognitive rehabilitation, Post-intervention , N = 11	Sham a-tDCS plus cognitive rehabilitation, 4-months, N = 10
Battery of Neuropsychological Test symbol digit modalities test (PASAT) Mean score at follow-up. Mean (SD)	60.7 (35.3)	69 (33)	60.1 (36.9)	67.5 (34.5)

a-tDCS: anodal transcranial direct current stimulation; N/n: number of participants; PASAT: paced auditory serial addition test; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(Minimisation process performed, however no information regarding allocation concealment. No baseline differences were found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants were blinded to the intervention and no deviations arose.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for 95% of participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by*

Section	Question	Answer
		researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to lack of information regarding minimisation process)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Lesniak, 2018

Bibliographic Reference	Lesniak, M.M.; Mazurkiewicz, P.; Iwanski, S.; Szutkowska-Hoser, J.; Seniow, J.; Effects of group versus individual therapy for patients with memory disorder after an acquired brain injury: A randomized, controlled study; Journal of clinical and experimental neuropsychology; 2018; vol. 40 (no. 9); 853-864

Study details

Country/ies where study was carried out	Poland
Study type	Randomised controlled trial (RCT)
Study dates	Not reported

Inclusion criteria	- History of acquired brain injury (traumatic brain injury, stroke, encephalitis) and subsequent memory impairment diagnosed by a professional, observed by family members, or reported by the patient, - Stable medical state, - Aged 18–75 years, - No previous history of neurological/psychiatric disease or heavy substance abuse, - Informed consent granted prior to participation in the study.
Exclusion criteria	- Reduced ability to participate in therapy due to agitated behaviour, depression, aphasia, or severely impaired alertness.
Patient characteristics	N=65 adults with acquired brain injury - Individual memory rehabilitation: n=23 - Group memory rehabilitation: n=22 (n=18 analysed) - No intervention: n=20 Age in years [Mean (SD)]: - Individual memory rehabilitation: 39.6 (15) - Group memory rehabilitation: 41.3 (15) - No intervention: 42.2 (14) Sex (n/N): - Individual memory rehabilitation: Female=6/23, Male=17/23 - Group memory rehabilitation: Female=7/18, Male=11/18 - No intervention: Female=7/20, Male=13/20

	Time since diagnosis or injury in months [Mean (SD)]: - Individual memory rehabilitation: 11.6 (14) - Group memory rehabilitation: 15.2 (17) - No intervention: 10 (11) Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: Individual memory rehabilitation Protocol intervention group: Interventions to improve and maintain executive function (1), memory and learning (3), attention (7) Delivery setting: Not reported Number/ frequency of sessions: 15x 60-minute sessions held over 3 weeks Duration: 3 weeks Practitioner(s): Psychologist Same internal memory strategies were taught as those in the group sessions; however memory exercises were taught by employing a professional computer software. The therapy involved increasing awareness and teaching memory strategies such as mind mapping, active reading and imagination to improve everyday memory. Exercises ranged in difficulties adjusting to the individual. Exercises were supervised by a psychologist. Participants were encouraged to complete homework where they used newly learned strategies. **Intervention** Name: Group memory rehabilitation Protocol description: Interventions to improve and maintain executive function (1), Interventions to improve and maintain memory and learning (3), Interventions to improve and maintain attention (7).

	Delivery setting: Not reported Number/ frequency of sessions: 15x 60-minute sessions Duration: 3 weeks Practitioner(s): Psychologist Group therapy was structured covering various aspects of rehabilitation after traumatic brain injury. Groups consisted of 3-6 participants and run by a facilitator. The therapy involved increasing awareness and teaching memory strategies such as mind mapping, active reading and imagination to improve everyday memory, as well as grouping strategies and were taught using questionnaires and quizzes, interactive multimedia presentations, discussions and brainstorming. Patients were asked to share their memory problems and coping methods. Participants were encouraged to complete homework where they used newly learned strategies. Both therapies had the aims of increasing participant's awareness of their memory and to teach strategies to improve their memory. Patients were also given frequent homework. **Control** Name: No intervention Protocol description: Control (no intervention) Delivery setting: Not applicable Number/ frequency of sessions: Not applicable Duration: Not applicable Practitioner(s): Not applicable
Duration of follow-up	4-months post treatment
Sources of funding	Not industry funded
Sample size	N=65 - Individual memory rehabilitation: n=23

	- Group memory rehabilitation: n=22 (n=18 analysed) - No intervention: n=20

N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (3-weeks from baseline)
- 4-months from post-intervention

Individual memory rehabilitation versus Group memory rehabilitation versus No intervention: Global memory
Global memory as measured by RBMT - Polarity - Higher values are better
Global memory as measured by Everyday Memory Questionnaire - Polarity - Lower values are better

Outcome	Individual memory rehabilitation, Post-intervention , N = 23	Individual memory rehabilitation, 4-months, N = 23	Group memory rehabilitation therapy, Post-intervention , N = 20	Group memory rehabilitation therapy, 4-months, N = 18	No intervention, Post-intervention, N = 20	No intervention, 4-months, N = NR
RBMT Mean scores at follow-up. Mean (SD)	8.53 (2.18)	8.91 (2.15)	7.99 (2.57)	8.67 (2.16)	8.8 (2.3)	NR (NR)
Everyday Memory Questionnaire Mean scores at follow-up. Mean (SD)	NR (NR)	90.1 (46.6)	NR (NR)	53 (45.3)	NR (NR)	NR (NR)

N/n: number of participants; NR: not reported; RBMT: Rivermead behavioural memory test general memory index SD: standard deviation

Individual memory rehabilitation versus Group memory rehabilitation versus Control: Working memory
Working memory as measured by Pattern Recognition Memory (immediate recall) - Polarity - Higher values are better;
Working memory as measured by Spatial span test - Polarity - Higher values are better

Outcome	Individual memory rehabilitation, Post-intervention , N = 23	Individual memory rehabilitation, 4-months, N = 23	Group memory rehabilitation, Post-intervention , N = 20	Group memory rehabilitation, 4-months, N = 18	No intervention, Post-intervention, N = 20	No intervention, 4-months, N = NR
Pattern Recognition Memory (immediate recall) Median scores at follow-up. Median (IQR)	87.5 (8.3 to NR)	87.5 (8.3 to NR)	83.3 (25 to NR)	87.5 (20.3 to NR)	83.3 (14.6 to NR)	NR (NR to NR)
Spatial span test Median scores at follow-up. Median (IQR)	5 (1 to NR)	5 (2 to NR)	5 (1 to NR)	5 (1 to NR)	5 (0.5 to NR)	NR (NR to NR)

IQR: interquartile range; N/n: number of participants; NR: not reported

Individual memory rehabilitation versus Group memory rehabilitation versus Control: Long-term declarative memory

Pattern recognition test (delayed recall) - Polarity - Higher values are better

Outcome	Individual memory rehabilitation, Post-intervention , N = 23	Individual memory rehabilitation, 4-months, N = 23	Group memory rehabilitation therapy, Post-intervention , N = 20	Group memory rehabilitation therapy,4-months, N = 18	No intervention, Post-intervention , N = 20	No intervention, 4-months, N = NR
Pattern recognition test (delayed recall) Mean scores at follow-up. Mean (SD)	83.3 (12.4)	70.2 (18.4)	66.1 (19.4)	69.8 (20.3)	76.3 (14.9)	NR (NR)

N/n: number of participants; NR: not reported; SD: standard deviation

Individual memory rehabilitation versus Group memory rehabilitation versus Control: Attention

Attention as measured by Rapid visual information processing - Polarity - Higher values are better

Outcome	Individual memory rehabilitation, Post-intervention, N = 23	Individual memory rehabilitation, 4-months, N = 23	Group memory rehabilitation therapy, Post-intervention , N = 20	Group memory rehabilitation therapy, 4-months, N = 18	No intervention, Post-intervention , N = 20	No intervention, 4-months, N = NR
Rapid visual information processing Mean scores at follow-up. Mean (SD)	0.86 (0.06)	0.87 (0.06)	0.85 (0.08)	0.86 (0.07)	0.83 (0.07)	NR (NR)

N/n: number of participants; NR: not reported; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information regarding randomisation process provided.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Non-blinded study however no deviations arose and appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for 97.7% of participants randomised.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No study protocol provided.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to lack of information regarding randomisation process or trial protocol.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Lincoln, 2020

Bibliographic Reference	Lincoln, N.B.; Bradshaw, L.E.; Constantinescu, C.S.; Day, F.; Drummond, A.E.; Fitzsimmons, D.; Harris, S.; Montgomery, A.A.; das Nair, R.; Cognitive rehabilitation for attention and memory in people with multiple sclerosis: a randomized controlled trial (CRAMMS); Clinical rehabilitation; 2020; vol. 34 (no. 2); 229-241

Study details

Country/ies where study was carried out	UK
Study type	Randomised controlled trial (RCT)
Study dates	2015 - 2017
Inclusion criteria	- Aged 18–69 years, - Diagnosed with relapsing–remitting or progressive multiple sclerosis, - Diagnosed at least 3 months prior to the screening assessment, - Reported having cognitive problems defined as a score of > 27 on the patient version of the Multiple Sclerosis Neuropsychological Screening Questionnaire, - Impaired on at least one of the Brief Repeatable Battery of Neuropsychological tests, defined as performance >1 SD below the mean of healthy controls, corrected for age and education, - Able to attend group sessions, - Able to speak English sufficiently to complete the cognitive assessments, - Gave written informed consent.
Exclusion criteria	- Vision or hearing problems, preventing completion of the cognitive assessments, - Concurrent severe medical or psychiatric conditions, preventing engagement in treatment, - Involved in other psychological intervention trials.

Patient characteristics	N=449 adults with relapsing–remitting or progressive multiple sclerosis and cognitive problems (a score of > 27 on the patient version of the Multiple Sclerosis Neuropsychological Screening Questionnaire; and impaired on at least one of the Brief Repeatable Battery of Neuropsychological tests, defined as performance >1 SD below the mean of healthy controls, corrected for age and education). - Cognitive rehabilitation plus usual care: n=245 - Usual care only: n=204 Age in years [Mean (SD)]: - Cognitive rehabilitation plus usual care: 49.9 (9.8) - Usual care only: 48.9 (10.0) Sex (M/F): - Cognitive rehabilitation plus usual care: n=67/n=178 - Usual care only: n=56/n=148 Time since diagnosis or injury in years [Mean (SD)]: - Cognitive rehabilitation plus usual care: 12.1 (8.0) - Usual care only: 11.1 (8.7) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Cognitive rehabilitation plus usual care

	Protocol intervention group: Interventions to improve and maintain memory and learning (3), and attention (7) Delivery setting: Groups of 4 – 6. No further details reported Number/ frequency of sessions: 1 x per week for 10 sessions Duration: 10 weeks Practitioner(s): Assistant psychologist (using a treatment manual) The intervention was comprised of restitution strategies designed to retrain attention and memory functions and encoding and retrieval. This included the use of internal mnemonics (such as chunking) and external devices (such as diaries and mobile phones). Attendance was recorded and if participants missed a session, they were able to attend the next session early to catch up on the content they had missed. 'Homework' was completed with the intention of generalising the techniques to daily life. **Control** Name: Usual care only Protocol description: Control (usual care) Delivery setting: Not applicable Number/ frequency of sessions: Not applicable Duration: Not applicable Practitioner(s): Not applicable Comprised of general advice from multiple sclerosis nurse specialists and occupational therapists on how to manage cognitive difficulties. Signposting to multiple sclerosis specific information online relating to cognition (such as webpages of multiple sclerosis charities).

	All other clinical services, and support from specialist charities, were available as part of usual care. The usual care that participants received was recorded on the Use of health and Social Services questionnaire.
Duration of follow-up	12 months
Sources of funding	Not industry funded
Sample size	N=449 - Cognitive rehabilitation plus usual care: n=245 - Usual care only: n=204
Other information	Of the 245 allocated to cognitive rehabilitation, 208 (85%) attended at least three sessions, the minimum number considered likely to effect a change. The mean attendance was 7.7 sessions (SD = 3.5, range = 0–10). Based on the Use of Health and Social Services questionnaire and feedback interviews, participants in the usual care group received no cognitive rehabilitation.

N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (10 weeks from baseline)
- 12 months (after randomisation)

Cognitive rehabilitation plus usual care versus Usual care only: Processing speed

Processing speed as measured by Symbol digit modalities test - Polarity - Higher values are better

Outcome	Cognitive rehabilitation plus usual care, Post-intervention, N = 217	Cognitive rehabilitation plus usual care, 12 months, N = 214	Usual care only, Post-intervention, N = 187	Usual care only, 12 months, N = 173
Symbol digit modalities test Mean scores at follow-up. Mean (SD)	41.4 (12.1)	39.9 (11.9)	40.7 (12.7)	39.9 (12.8)

N/n: number of participants; SD: standard deviation

Cognitive rehabilitation plus usual care versus Usual care only: Global memory
Global memory as measured by Everyday Memory Questionnaire– participant reported - Polarity - Lower values are better
Global memory as measured by Everyday Memory Questionnaire– relative reported - Polarity - Lower values are better

Outcome	Cognitive rehabilitation plus usual care, post-intervention, N = 214	Usual care only, post-intervention, N = 181	Cognitive rehabilitation plus usual care, 12 months, N = 210	Usual care only, 12 months, N = 168
Everyday Memory Questionnaire– participant reported Mean scores at follow-up. Mean (SD)	37.6 (23.4)	44.5 (23.5)	37.9 (22.9)	43.1 (24)
Everyday Memory Questionnaire– relative reported At post-intervention, Intervention group n=184, control group n=152. At 12 months, intervention group n=164, control group n=142. Mean scores at follow-up.	31.3 (22.7)	38.6 (25.7)	30.5 (23.3)	38.5 (26.4)

Outcome	Cognitive rehabilitation plus usual care, post-intervention, N = 214	Usual care only, post-intervention, N = 181	Cognitive rehabilitation plus usual care, 12 months, N = 210	Usual care only, 12 months, N = 168
Mean (SD)				

N/n: number of participants; SD: standard deviation

Cognitive rehabilitation plus usual care versus Usual care only: Working memory
Working memory as measured by Select Reminding Test- Total - Polarity - Higher values are better
Working memory as measured by Spatial Recall Test- Total - Polarity - Higher values are better

Outcome	Cognitive rehabilitation plus usual care, Post-intervention, N = 217	Cognitive rehabilitation plus usual care, 12 months, N = 214	Usual care only, Post-intervention, N = 187	Usual care only, 12 months, N = 173
Select Reminding Test- Total Mean scores at follow-up. Mean (SD)	45.6 (10.5)	47.5 (10.9)	43.5 (10.4)	46.5 (11.3)
Spatial Recall Test- Total Mean scores at follow-up. Mean (SD)	19.1 (5.3)	20.1 (4.9)	19.8 (5.4)	20.4 (5.4)

N/n: number of participants; SD: standard deviation

Cognitive rehabilitation plus usual care versus Usual care only: Long-term declarative memory
Long-term declarative memory as measured by Select Reminding Test-Delayed Recall - Polarity - Higher values are better
Long-term declarative memory as measured by Spatial Recall Test-Delayed Recall - Polarity - Higher values are better
Long-term declarative memory as measured by Doors and people test (overall age scaled score) - Polarity - Higher values are better

Outcome	Cognitive rehabilitation plus usual care, Post-intervention, N = 217	Cognitive rehabilitation plus usual care, 12 months, N = 214	Usual care only, Post-intervention, N = 187	Usual care only, 12 months, N = 173
Select Reminding Test-Delayed Recall Mean scores at follow-up. Mean (SD)	6.7 (2.9)	7.5 (2.8)	6.5 (2.9)	7.1 (2.9)
Spatial Recall Test-Delayed Recall Mean scores at follow-up. Mean (SD)	6.6 (2.3)	6.8 (2.2)	6.6 (2.3)	7 (2.3)
Doors and people test (overall age scaled score) Mean scores at follow-up. Mean (SD)	9.5 (4.2)	10.5 (4.1)	9.1 (4.4)	9.9 (4.4)

N/n: number of participants; SD: standard deviation

Cognitive rehabilitation plus usual care versus Usual care only: Attention

Attention as measured by Trail Making (B-A) - Polarity - Lower values are better

Outcome	Cognitive rehabilitation plus usual care, Post-intervention, N = 217	Cognitive rehabilitation plus usual care, 12 months, N = 214	Usual care only, Post-intervention, N = 187	Usual care only, 12 months, N = 173
Trail Making Test Part B and A ratio	63 (39.1)	61.3 (39.7)	62.3 (38.3)	63 (40.3)

Outcome	Cognitive rehabilitation plus usual care, Post-intervention, N = 217	Cognitive rehabilitation plus usual care, 12 months, N = 214	Usual care only, Post-intervention, N = 187	Usual care only, 12 months, N = 173
Mean scores at follow-up. Mean (SD)				

N/n: number of participants; SD: standard deviation

Cognitive rehabilitation plus usual care versus Usual care only: Working memory, processing speed and attention composite
Working memory, processing speed and attention composite as measured by Paced Auditory Serial Addition Test- Easy - Polarity - Higher values are better
Working memory, processing speed and attention composite as measured Paced Auditory Serial Addition Test- Hard - Polarity - Higher values are better

Outcome	Cognitive rehabilitation plus usual care, Post-intervention, N = 217	Cognitive rehabilitation plus usual care, 12 months, N = 214	Usual care only, Post-intervention, N = 187	Usual care only, 12 months, N = 173
Paced Auditory Serial Addition Test- Easy Mean scores at follow-up. Mean (SD)	36.6 (16.1)	36.4 (17.8)	35.7 (17.6)	36.5 (17.7)
Paced Auditory Serial Addition Test- Hard Mean scores at follow-up. Mean (SD)	20.7 (17.5)	18.5 (19.2)	19.3 (17.7)	19.2 (18.9)

N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(No information on randomisation method provided, however random allocation sequence was concealed and no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers were aware of intervention received; however no deviations found and modified intention-to-treat analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(Data available for 92% of participants in the intervention group and 87% in the control group; no sensitivity analysis was performed and differences between intervention groups in the proportion of missing outcome data found.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to pre-specified protocol .)*
Overall bias and Directness	Risk of bias judgement	High *(High risk of bias due to missing outcome data.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Maggio, 2018

Bibliographic Reference	Maggio, M.G.; De Cola, M.C.; Latella, D.; Maresca, G.; Finocchiaro, C.; La Rosa, G.; Cimino, V.; Sorbera, C.; Bramanti, P.; De Luca, R.; Calabro, R.S.; What About the Role of Virtual Reality in Parkinson Disease's Cognitive Rehabilitation? Preliminary Findings From a Randomized Clinical Trial; Journal of Geriatric Psychiatry and Neurology; 2018; vol. 31 (no. 6); 312-318

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	June to November 2017
Inclusion criteria	- Diagnosis of Parkinson’s disease according to the Movement Disorder Society Clinical Diagnostic Criteria for Parkinson’s disease, - Hoehn & Yahr Scale <3, - Presence of mild-to-moderate cognitive impairment (Mini-Mental State Examination 11-26), - Absence of disabling sensory alterations (for example, auditory and visual loss).
Exclusion criteria	- Aged 85 years or over, - Presence of severe medical and psychiatric illness potentially interfering with the VR training.
Patient characteristics	N=20 adults with Parkinson's disease - Virtual reality cognitive and motor rehabilitation (BTS-Nirvana): n=10 - Standard cognitive rehabilitation: n=10

	Age in years [Mean (SD)]: - Virtual reality cognitive and motor rehabilitation (BTS-Nirvana): 69.9 (6.3) - Standard cognitive rehabilitation: 68.9 (10.05) Sex (M/F: - Virtual reality cognitive and motor rehabilitation (BTS-Nirvana): n=6/n=4 - Standard cognitive rehabilitation: n=4/n=6 Time since diagnosis or injury in years [Mean (SD)]: - Virtual reality cognitive and motor rehabilitation (BTS-Nirvana): 9.8 (3.4) - Standard cognitive rehabilitation: 8.9 (3.4) Chronic neurological disorder category: Progressive neurological disease
Intervention(s)/control	**Intervention** Name: Virtual reality cognitive and motor rehabilitation (BTS-Nirvana) Protocol intervention group: Interventions to improve and maintain executive function (1), memory and learning (3), visual, spatial and perceptual functions (5), and attention (7) Delivery setting: Outpatient Number/ frequency of sessions: 3x 60-minute sessions per week Duration: 8 weeks Practitioner(s): Therapists (no further information provided)

	Recreated events were generally 3-dimensional re-producing real live events and objects. The virtual reality device uses infrared sensors, a projector, and large screen to recreate an interactive series of exercises, whereby participants use their movements to engage with virtual scenarios and audio-visual stimuli, leading to a sensory involvement that particularly aids rehabilitation of executive function, attention and visuospatial skills. Exercises were standardised with increasing difficulty tailored to individuals.* **Control** Name: Standard cognitive rehabilitation Protocol description: Face-to-face interventions to improve and maintain executive function (1), Interventions to improve and maintain memory and learning (3), Interventions to improve and maintain visual, spatial and perceptual functions (5), Interventions to improve and maintain attention (7). Delivery setting: Outpatient Number/ frequency of sessions: 3x 60-minute sessions per week Duration: 8 weeks Practitioner(s): Therapists (no further information provided) Face-to-face cognitive rehabilitation targeting the same domains as the intervention group using pen and paper activities.* *No information was provided about how different cognitive domains were targeted; protocol group was inferred based on trial name.
Duration of follow-up	8-weeks
Sources of funding	No funding received
Sample size	N=20 - Virtual reality cognitive and motor rehabilitation (BTS-Nirvana): n=10 - Standard cognitive rehabilitation: n=10

N/n: number of participants; SD: standard deviation; VR: virtual reality

Outcomes

Study timepoints

- Post-intervention (8 weeks from baseline)

Virtual reality cognitive and motor rehabilitation (BTS-Nirvana) versus Standard cognitive rehabilitation: Executive function
Executive function as measured by Frontal Assessment Battery - Polarity - Higher values are better
Executive function as measured by Weigls test - Polarity - Higher values are better

Outcome	Virtual reality cognitive and motor rehabilitation (BTS-Nirvana), Post-intervention , N = 10	Standard cognitive rehabilitation, Post-intervention , N = 10
Frontal Assessment Battery Median scores at follow-up. Median (IQR)	15.3 (11.8 to 15.9)	13.9 (12.3 to 15)
Weigls test Median scores at follow-up. Median (IQR)	9.5 (7.7 to 11.7)	4.5 (4.1 to 5.9)

IQR: interquartile range; N/n: number of participants

Virtual reality cognitive and motor rehabilitation (BTS-Nirvana) versus Standard cognitive rehabilitation: Global memory

Global memory as measured by Addenbrooke's Cognitive Examination- Revised Memory - Polarity - Higher values are better

Outcome	Virtual reality cognitive and motor rehabilitation (BTS-Nirvana), Post-intervention , N = 10	Standard cognitive rehabilitation , Post-intervention , N = 10
Addenbrooke's Cognitive Examination- Revised Memory Median scores at follow-up. Median (IQR)	15.5 (13.3 to 20.5)	17.5 (12.8 to 18.8)

IQR: interquartile range; N/n: number of participants

Virtual reality cognitive and motor rehabilitation (BTS-Nirvana) versus Standard cognitive rehabilitation: Perceptual function

Perceptual function as measured by Addenbrooke's Cognitive Examination- Revised Visuo Spatial - Polarity - Higher values are better

Outcome	Virtual reality cognitive and motor rehabilitation (BTS-Nirvana), Post-intervention , N = 10	Standard cognitive rehabilitation , Post-intervention , N = 10
Addenbrooke's Cognitive Examination-Revised Visuo Spatial Median scores at follow-up. Median (IQR)	14 (11 to 14.8)	9.5 (6 to 10)

IQR: interquartile range; N/n: number of participants

Virtual reality cognitive and motor rehabilitation (BTS-Nirvana) versus Standard cognitive rehabilitation: Attention and orientation composite

Attention and orientation composite as measured by Addenbrooke's Cognitive Examination- Revised Attention and Orientation - Polarity - Higher values are better

Outcome	Virtual reality cognitive and motor rehabilitation (BTS-Nirvana), Post-intervention , N = 10	Standrard cognitive rehabilitation , Post-intervention, N = 10
Addenbrooke's Cognitive Examination-Revised Attention and Orientation	16 (15.3 to 18)	14.5 (12 to 16.8)

Outcome	Virtual reality cognitive and motor rehabilitation (BTS-Nirvana), Post-intervention , N = 10	Standrard cognitive rehabilitation , Post-intervention, N = 10
Median scores at follow-up. Median (IQR)		

IQR: interquartile range; N/n: number of participants

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(Some concerns due to lack of information regarding randomisation process and concealment. No baseline difference were found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention assignment; however no deviations arose with appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for all participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*

Section	Question	Answer
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to lack of information regarding randomisation process and no trial protocol provided.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Maggio, 2022

Bibliographic Reference	Maggio, M.G.; De Luca, R.; Manuli, A.; Buda, A.; Foti Cuzzola, M.; Leonardi, S.; D'Aleo, G.; Bramanti, P.; Russo, M.; Calabro, R.S.; Do patients with multiple sclerosis benefit from semi-immersive virtual reality? A randomized clinical trial on cognitive and motor outcomes; Applied neuropsychology. Adult; 2022; vol. 29 (no. 1); 59-65

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	November 2017 to November 2018
Inclusion criteria	- Multiple sclerosis diagnosis according to the last revisions of the McDonald criteria, - Patients that are stable in therapy least for at least 6 months before the study entry, - Presence of mild/moderate cognitive impairment (Montreal Cognitive Assessment >18), - Absence of severe medical and psychiatric illness potentially interfering with the virtual reality training, - Absence disabling sensory alterations (that is, auditory and visual disturbances).

Exclusion criteria	- Aged 75 or older or younger than 18 years, - Presence of severe medical and psychiatric illness according to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition and International Classification of Disease, - Multiple sclerosis clinical and/or neuroradiological relapse in the 6 months before enrolment, - Expanded Disability Status Scale >7.
Patient characteristics	N=60 adults with secondary progressive multiple sclerosis - Semi-immersive virtual reality cognitive rehabilitation: n=30 - Traditional cognitive rehabilitation: n=30 Age in years [Mean (SD)]: - Semi-immersive virtual reality cognitive rehabilitation: 51.9 (9.9) - Traditional cognitive rehabilitation: 48.2 (12.2) Sex (M/F): - Semi-immersive virtual reality cognitive rehabilitation: n=18/n=12 - Traditional cognitive rehabilitation: n=13/n=17 Time since diagnosis or injury: Not reported Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention**

	Name: Semi-immersive virtual reality cognitive rehabilitation Protocol intervention group: Interventions to improve and maintain executive function (1), memory and learning (3), visual, spatial and perceptual functions (5), and attention (7) Delivery setting: Outpatient Number/ frequency of sessions: 3x 60-minute sessions per week Duration: 8 weeks Practitioner(s): Therapist (no further information provided) Intervention involved using virtual reality to provide participants with cognitive rehabilitation training, whereby participants are presented with real-life scenarios. The intervention was aimed to provide a motivating environment with interactive stimulation.* **Control** Name: Traditional cognitive rehabilitation Protocol description: Face-to-face interventions to improve and maintain executive function (1), memory and learning (3), visual, spatial and perceptual functions (5), attention (7). Delivery setting: Outpatient Number/ frequency of sessions: 3x 60-minute sessions per week Duration: 8 weeks Practitioner(s): Not reported All basic cognitive rehabilitation exercises followed a pre-determined protocol, with progression depending on individual's level. The traditional cognitive rehabilitation (control group) followed a face-to-face format with pen and paper method with the aim to stimulate cognitive skills.* * No information was provided about how different cognitive domains were targeted; protocol group was inferred based on trial name.
Duration of follow-up	8 weeks

Sources of funding	Not reported
Sample size	N=60 - Semi-immersive virtual reality cognitive rehabilitation: n=30 - Traditional cognitive rehabilitation: n=30

N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (8 weeks from baseline)

Semi-immersive virtual reality cognitive rehabilitation versus Traditional cognitive rehabilitation: Working memory

Working memory as measured by Spatial recall test - Polarity - Higher values are better

Outcome	Semi-immersive virtual reality cognitive rehabilitation, Post-intervention , N = 30	Traditional cognitive rehabilitation, Post-intervention , N = 30
Spatial recall test Median scores at follow-up. Median (IQR)	16.6 (12.7 to 22.5)	11.7 (9.7 to 15.6)

IQR: interquartile range; N/n: number of participants

Semi-immersive virtual reality cognitive rehabilitation versus Traditional cognitive rehabilitation: Short-term memory

Short-term memory as measured by Rey–Osterrieth complex figure test- Immediate recall - Polarity - Higher values are better

Outcome	Semi-immersive virtual reality cognitive rehabilitation, Post-intervention , N = 30	Traditional cognitive rehabilitation, Post-intervention , N = 30
Rey–Osterrieth complex figure test- Immediate recall Median scores at follow-up. Median (IQR)	16.1 (13.8 to 17)	13.3 (11 to 16.5)

IQR: interquartile range; N/n: number of participants

Semi-immersive virtual reality cognitive rehabilitation versus Traditional cognitive rehabilitation: Long-term declarative memory

Long-term declarative memory as measured by Rey-Osterrieth complex figure test- delayed recall - Polarity - Higher values are better

Outcome	Semi-immersive virtual reality cognitive rehabilitation, Post-intervention, N = 30	Traditional cognitive rehabilitation, Post-intervention, N = 30
Rey-Osterrieth complex figure test- delayed recall Median scores at follow-up. Median (IQR)	14.3 (9.1 to 16)	10.6 (8 to 12.3)

IQR: interquartile range; N/n: number of participants

Semi-immersive virtual reality cognitive rehabilitation versus Traditional cognitive rehabilitation: Perceptual function

Perceptual function as measured by Rey–Osterrieth complex figure test- Copy - Polarity - Higher values are better

Outcome	Semi-immersive virtual reality cognitive rehabilitation, Post-intervention , N = 30	Traditional cognitive rehabilitation, Post-intervention , N = 30
Rey–Osterrieth complex figure test- Copy Median scores at follow-up.	28.9 (26.1 to 32.4)	25 (20.4 to 27.5)

Outcome	Semi-immersive virtual reality cognitive rehabilitation, Post-intervention , N = 30	Traditional cognitive rehabilitation, Post-intervention , N = 30
Median (IQR)		

IQR: interquartile range; N/n: number of participants

Semi-immersive virtual reality cognitive rehabilitation versus Traditional cognitive rehabilitation: Working memory, processing speed and attention composite

Working memory, processing speed and attention composite as measured by Paced Auditory Serial Addition Task 2" - Polarity - Higher values are better

Working memory, processing speed and attention composite as measured by Paced Auditory Serial Addition Task 3" - Polarity - Higher values are better

Outcome	Semi-immersive virtual reality cognitive rehabilitation, Post-intervention , N = 30	Traditional cognitive rehabilitation, Post-intervention , N = 30
PASAT 2 Median scores at follow-up. Median (IQR)	24.3 (15.8 to 32.3)	16 (4.8 to 17.8)
PASAT 3 Median scores at follow-up. Median (IQR)	27.9 (19.3 to 40.7)	20.3 (4.9 to 26.9)

IQR: interquartile range; N/n: number of participants; PASAT: Paced auditory addition task

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information regarding randomisation process provided.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and therapists aware of intervention received; however no deviations occurred and appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(No information regarding potential drop-outs reported. No indication of sensitivity analysis.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to lack of information regarding randomisation process, participant flow throughout the study and trial protocol.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Mantynen, 2014

Bibliographic Reference	Mantynen, A.; Rosti-Otajarvi, E.; Koivisto, K.; Lilja, A.; Huhtala, H.; Hamalainen, P.; Neuropsychological rehabilitation does not improve cognitive performance but reduces perceived cognitive deficits in patients with multiple sclerosis: A randomised, controlled, multi-centre trial; Multiple Sclerosis; 2014; vol. 20 (no. 1); 99-107

Study details

Country/ies where study was carried out	Finland
Study type	Randomised controlled trial (RCT)
Study dates	November 2010 - April 2011
Inclusion criteria	- Age 18–59 years, - Clinically definite relapsing–remitting multiple sclerosis, - Score <6 on the Expanded Disability Status Scale, - Subjective (total score of questions 1, 2, and 11 in the Multiple Sclerosis Neuropsychological Questionnaire ≥6) and objective (Symbol Digit Modalities Test total score ≤50) deficits in attention and processing speed.
Exclusion criteria	- History of alcohol or drug abuse, - History of psychiatric disorder, - Acute relapses, - Neurological disease other than multiple sclerosis, - Ongoing neuropsychological rehabilitation, - Overall cognitive impairment (performance on all tests of the Brief Repeatable Battery of Neuropsychological Tests under –1.5 standard deviation (SD) compared to norms of healthy controls).

Patient characteristics	N=102 adults with multiple sclerosis - Neuropsychological rehabilitation: n=60 - No intervention: n=42 Age in years [Mean (SD)]: - Neuropsychological rehabilitation: 43.5 (8.7) - No intervention: 44.1 (8.8) Sex (M/F)*: - Neuropsychological rehabilitation: n=13/n=45 - No intervention: n=9/n=31 Time since diagnosis or injury in years [Mean (SD)]: - Neuropsychological rehabilitation: 9.2 (6.6) - No intervention: 10.1 (7.1) Chronic neurological disorder category: Progressive neurological diseases *Data only available for participants analysed (n=98) rather than randomised.
Intervention(s)/control	**Intervention** Name: Neuropsychological rehabilitation Protocol intervention group: Interventions to improve and maintain executive function (1) and attention (7)

	Delivery setting: Outpatient Number/ frequency of sessions: 13x 1-hour sessions, once per week Duration: 13 weeks Practitioner(s): Not reported. Goals were set/evaluated by a neuropsychologist but unclear if they delivered the intervention. Described as attention retraining and teaching compensatory strategies plus psychological support to better cope with cognitive impairments. At the beginning of the intervention, patients set goals for the rehabilitation, together with the neuropsychologist, using the GAS. Every patient was asked to set one to three goals related to the attentional problems they faced in everyday life. **Control** Name: Control Protocol description: No intervention Delivery setting: Not applicable Number/ frequency of sessions: Not applicable Duration: Not applicable Practitioner(s): Not applicable No further details reported.
Duration of follow-up	Post-intervention and 6 months from baseline
Sources of funding	Not industry funded
Sample size	N=102 - Neuropsychological rehabilitation: n=60

	- No intervention n=42 Note: Only n=98 included in analysis (neuropsychological rehabilitation: n=58; no intervention: n=40).

GAS: Goal Attainment Scaling; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (3 months from baseline)
- 3 months from post-intervention

Neuropsychological rehabilitation versus No intervention: Processing speed
Processing speed as measured by Stroop Color Naming Time - Polarity - Lower values are better
Processing speed as measured by Stroop Color/Word Interference- Time - Polarity - Lower values are better

Outcome	Neuropsychological rehabilitation, Post-intervention , N = 58	Neuropsychological rehabilitation, 3 month2, N = 58	No intervention, Post-intervention , N = 40	No intervention, 3 months, N = 40
Stroop Color Naming Time Mean scores at follow-up. Mean (SD)	76.8 (18.7)	73.7 (17.7)	79.8 (19.5)	77 (17.8)
Stroop Color/Word Interference- Time Mean scores at follow-up. Mean (SD)	118.7 (33.2)	116.2 (36.2)	122.5 (36.7)	116 (30.3)

N/n: number of participants; SD: standard deviation

Neuropsychological rehabilitation versus No intervention: Working memory

Working memory as measured by Spatial Recall Test- Total - Polarity - Higher values are better

Outcome	Neuropsychological rehabilitation, Post-intervention , N = 58	Neuropsychological rehabilitation, 3 months, N = 58	No intervention, Post-intervention , N = 40	No intervention, 3 months, N = 40
Spatial Recall Test- Total Mean scores at follow-up. Mean (SD)	22.4 (4.9)	23.8 (4.5)	21.4 (4.4)	20.9 (4.8)

N/n: number of participants; SD: standard deviation

Neuropsychological rehabilitation versus No intervention: Long-term declarative memory
Long-term declarative memory as measured by Select Reminding Test- Consistent Long-Term Retrieval - Polarity - Higher values are better
Long-term declarative memory as measured by Select Reminding Test- Delayed Recall - Polarity - Higher values are better
Long-term declarative memory as measured by Select Reminding Test- Long-Term Storage - Polarity - Higher values are better

Long-term declarative memory as measured by Spatial Recall Test- Delayed recall - Polarity - Higher values are better

Outcome	Neuropsychological rehabilitation, Post-intervention , N = 58	Neuropsychological rehabilitation, 3 months, N = 58	No intervention, Post-intervention , N = 40	No intervention, 3 months, N = 40
Select Reminding Test- Consistent Long-Term Retrieval Mean scores at follow-up. Mean (SD)	45.1 (16.8)	50.2 (18.2)	41.1 (15.8)	45.7 (15.2)
Select Reminding Test- Delayed Recall Mean scores at follow-up.	10 (2.1)	10.4 (2.2)	9.5 (2.2)	10 (1.7)

Outcome	Neuropsychological rehabilitation, Post-intervention , N = 58	Neuropsychological rehabilitation, 3 months, N = 58	No intervention, Post-intervention , N = 40	No intervention, 3 months, N = 40
Mean (SD)				
Select Reminding Test-Long-Term Storage Mean scores at follow-up. Mean (SD)	54.3 (12.3)	56.7 (14.7)	49.8 (13.1)	53.9 (11.1)
Spatial Recall Test-Delayed recall Mean scores at follow-up. Mean (SD)	10 (2.1)	10.4 (2.2)	9.5 (2.2)	10 (1.7)

N/n: number of participants; SD: standard deviation

Neuropsychological rehabilitation versus No intervention: Attention
Attention as measured by Trail Making A (time) - Polarity - Lower values are better
Attention as measured by Trail Making B (time) - Polarity - Lower values are better

Outcome	Neuropsychological rehabilitation, Post-interventionN = 58	Neuropsychological rehabilitation, 3 months, N = 58	No intervention, Post-intervention N = 40	No intervention, 3 months, N = 40
Trail Making A (time) Mean scores at follow-up. Mean (SD)	32.8 (11.6)	32.1 (12.4)	36 (13)	31 (9.2)

Outcome	Neuropsychological rehabilitation, Post-interventionN = 58	Neuropsychological rehabilitation, 3 months, N = 58	No intervention, Post-intervention N = 40	No intervention, 3 months, N = 40
Trail Making B (time) Mean scores at follow-up. Mean (SD)	80 (37.5)	79.1 (36.4)	78.5 (37)	75.4 (35.6)

N/n: number of participants; SD: standard deviation

Neuropsychological rehabilitation versus No intervention: Working memory, processing speed and attention composite
Working memory, processing speed and attention composite as measured by Paced Auditory Serial Addition Task 2" - Polarity - Higher values are better
Working memory, processing speed and attention composite as measured by Paced Auditory Serial Addition Task 3" - Polarity - Higher values are better

Outcome	Neuropsychological rehabilitation, Post-intervention, N = 58	Neuropsychological rehabilitation, 3 months, N = 58	No intervention, Post-intervention), N = 40	No intervention, 3 months, N = 40
PASAT 2 Mean scores at follow-up. Mean (SD)	32.4 (12.7)	32.9 (12.1)	27.5 (10)	30.8 (10.3)
PASAT 3 Mean scores at follow-up. Mean (SD)	43.8 (14.3)	46.7 (11.8)	41 (12.5)	43.5 (11)

N/n: number of participants; SD: standard deviation; PASAT: Paced auditory serial addition task

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Computer-generated random number table; independent statistician with no information about participants. No significant differences between groups on background variables; intervention group had better delayed visuospatial recall and reported fewer cognitive symptoms than the control group, but compatible with chance.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants would have been aware of assignment and deviations from intended intervention (non-adherence) could occur outside of the trial context. Appears to have used ITT analysis.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Outcome data available for 96% of participants)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Measurement of outcomes appropriate and same across groups (with the exception of Goal Attainment Scaling which was only used in the intervention group as the control group did not set goals). Outcome assessors blind to intervention allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Published protocol available and consisted with reported outcomes.)*
Overall bias and Directness	Risk of bias judgement	Low
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; ITT: intention to treat

Martin, 2014

Bibliographic Reference	Martin, K J; Lincoln, N; das Nair, R; Group-based memory rehabilitation for people with multiple sclerosis: subgroup analysis of the ReMIND trial; Int j ther rehab; 2014; vol. 21 (no. 12); 590-596

Study details

Country/ies where study was carried out	UK
Study type	Randomised controlled trial (RCT)
Inclusion criteria	- Aged 18 years and over, - Reported memory problems, - Diagnosis of stroke, traumatic brain injury, or multiple sclerosis (verified by clinician).
Exclusion criteria	- Inability to speak English, - Not living within 50 miles of Nottingham or Derby, UK, - Uncorrected visual or hearing impairments which may prevent from partaking the assessment, - Overall score of more than 1 on the Rivermead Behavioural memory test.
Patient characteristics	N=39 adults with multiple sclerosis* - Compensation: n=12 - Restitution: n=17 - Self-help: n=10

	Age in years [Mean (SD)]: - Compensation: 48.3 (10.8) - Restitution: 45.2 (7.5) -Self-help: 47.7 (10.9) Sex (M/F): - Compensation: n=3/n=9 - Restitution: n=4/n=13 -Self-help: n=3/n=7 Time since diagnosis or injury in months [Mean (SD)]: - Compensation: 131.5 (98.2) - Restitution: 100.8 (93.6) Chronic neurological disorder category: Progressive neurological diseases Note: Data only analysed for participants randomised to ‘compensation’ and ‘restitution’ groups.
Intervention(s)/control	**Intervention** Name: Compensation Protocol intervention group: Interventions to improve memory and learning (3) Delivery setting: Inpatient/Community Number/ frequency of sessions: 1x 1.5-hour session per week

	Duration: 10 weeks Practitioner(s): Trained clinical psychologist Participants were taught to use internal memory aids and errorless learning techniques (a teaching technique where a skill is taught and immediately prompted, preventing the chance of incorrect responses). Participants in the compensation group learned how to use external memory aids such as diaries. **Others in the same protocol group** Name: Restitution Protocol description: Interventions to improve memory and learning (3) Delivery setting: Outpatient Number/ frequency of sessions: 1x 1.5-hour session per week Duration: 10 weeks Practitioner(s): Trained clinical psychologist Participants were taught to use internal memory aids and errorless learning techniques. Participants in the restitution group learned exercises for encoding and retrieval, attention-retraining exercises such as letter and number cancellation.
Duration of follow-up	7-months
Sources of funding	Not reported
Sample size	N=39 - Compensation: n=12 - Restitution: n=17 -Self-care: n=10 Note: Data only analysed for participants randomised to ‘compensation’ and ‘restitution’ groups.

Other information	Subset of Remind trial

MS: multiple sclerosis; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (7 months from baseline)

Compensation versus Restitution: Physical and mental health related quality of life and social care related quality of life

Physical and mental health related quality of life and social care related quality of life as measured by GHQ -12 item - Polarity - Lower values are better

Outcome	Compensation, post-intervention, N = 12	Restitution , post-intervention, N = 17
GHQ -12 item Mean score at follow-up reported Median (SD)	2.5 (3.6)	7 (4.4)

GHQ-12: general health questionnaire – 12 item; N/n: number of participants; SD: standard deviation

Compensation versus Restitution: Independence in activities of daily living

Independence in activities of daily living as measured by Nottingham EADL - Polarity - Higher values are better

Outcome	Compensation, post-intervention, N = 12	Restitution , post-intervention, N = 16
Nottingham EADL Median score at follow-up reported Median (SD)	54 (11.9)	48.5 (10.9)

EADL: extended activities of daily living scale; N/n: number of participants; SD: standard deviation

Compensation versus Restitution: Global memory

Global memory as measured by EMQ - Polarity - Lower values are better

Outcome	Compensation, post-intervention, N = 11	Restitution , post-intervention, N = 16
EMQ Median score at follow-up reported Median (SD)	39 (19.2)	30 (25.2)

EMQ: everyday memory questionnaire; N/n: number of participants; SD: standard deviation

Compensation versus Restitution: Global memory

Global memory as measured by RBMT - Polarity - Higher values are better

Outcome	Compensation, post-intervention, N = 12	Restitution , post-intervention, N = 17
RBMT Median score at follow-up reported Median (SD)	26.5 (6.1)	29 (7.9)

N/n: number of participants; RBMT: Rivermead behavioural memory test general memory index; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Cluster randomisation via a computer-generated random number sequence was performed. Process was concealed with no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention received however no deviations occurred and appropriate analysis used.)*

Section	Question	Answer
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(No information regarding participant flow through the trial was provided. No indication of sensitivity analysis performed.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to lack of information regarding participant flow through the trial and no intention to treat analysis used. No trial protocol provided.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Mattioli, 2016

Bibliographic Reference	Mattioli, F.; Bellomi, F.; Stampatori, C.; Capra, R.; Miniussi, C.; Neuroenhancement through cognitive training and anodal tDCS in multiple sclerosis; Multiple Sclerosis Journal; 2016; vol. 22 (no. 2); 222-230

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Aged 18–65 years, - Referred to the Brescia Multiple Sclerosis Center with a diagnosis of the relapsing–remitting type of multiple sclerosis, - Mild disability (Expanded Disability Status Scale score <5), - Impaired in attention/information processing (more than 2 SDs lower than that of healthy controls of the PASAT or SDMT of the BRB.
Exclusion criteria	- Any form dementia, - Any psychiatric disorders, - Free from any relapse requiring steroid therapy, - Previous brain surgery, - Presence of clips in the brain and seizures
Patient characteristics	N=20 adults with multiple sclerosis - a-tDCS plus cognitive training: n=10 - Sham a-tDCS plus cognitive training: n=10 Age in years [Mean (SD)]: - a-tDCS plus cognitive training: 38.2 (10.0) - Sham a-tDCS plus cognitive training: 47.4 (10.4)

	Sex (M/F): Intervention: - a-tDCS plus cognitive training: n=3/n=7 - Sham a-tDCS plus cognitive training: n=1/n=9 Time since diagnosis or injury in years [Mean (SD)]: - a-tDCS plus cognitive training: 6.6 (6.1) - Sham a-tDCS plus cognitive training: 11.0 (6.5) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: a-tDCS plus cognitive training Protocol intervention group: Interventions to improve processing speed (2), and attention (7) Delivery setting: Community Number/ frequency of sessions: 5 x 30-minute sessions per week Duration: 2 weeks Practitioner(s): Psychologists (no further information provided) Training consisted of modified PASAT tasks including months and words tasks. Months tasks included 60 randomly presented nouns with names and months being presented with participants then required to name which month of the last 2 presented is first in a calendar year. In the words task, 60 words were verbally presented to participants. After each word, participants were asked to create a new word starting with the 3rd letter of the previously presented word. Difficulty increased based on the speed of participants.

	Brain stimulation occurred with a current flow of 2mA via 2 conducting electrodes. **Others in the same protocol group** Name: Sham a-tDCS plus cognitive training Protocol description: Interventions to improve processing speed (2), Attention (7) Delivery setting: Community Number/ frequency of sessions: 5 x 30-minute sessions per week Duration: 2 weeks Practitioner(s): Psychologists (no further information provided) Participant received the same training as the intervention group with sham brain stimulation.
Duration of follow-up	Immediately after intervention (2 weeks from baseline) and 6 months post-intervention.
Sources of funding	Not industry funded
Sample size	N=20 - a-tDCS plus cognitive training: n=10 - Sham a-tDCS plus cognitive training: n=10

a-tDCS: anodal transcranial direct current stimulation; BRB: battery of neuropsychological test; PASAT: paced auditory serial addition test; mA: milliampere;; N/n: number of participants; SD: standard deviation; SDMT: symbol digit modalities test

Outcomes

Study timepoints

- Post-intervention (2 weeks from baseline)
- 6 months from post-intervention

a-tDCS plus cognitive training versus Sham a-tDCS plus cognitive training: Executive function

Executive function as measured by Wisconsin Card Sorting Test- total - Polarity - Higher values are better
Executive function as measured by Wisconsin Card Sorting Test- Perseverative responses - Polarity - Lower values are better
Executive function as measured by Wisconsin Card Sorting Test- Perseverative errors - Polarity - Lower values are better
Executive function as measured by Wisconsin Card Sorting Test- Non-perseverative errors - Polarity - Lower values are better
Executive function as measured by Word List Generation Task - Polarity - Lower values are better

Outcome	a-tDCS plus cognitive training, Post-intervention, N = 10	a-tDCS plus cognitive training, 6 months, N = 10	Sham a-tDCS plus cognitive training, Post-intervention, N = 10	Sham a-tDCS plus cognitive training, 6 months, N = 10
Wisconsin Card Sorting Test- total Change from baseline Mean (SD)	-11.8 (17.9)	-6.9 (14)	9.7 (14.7)	8.6 (15.4)
Wisconsin Card Sorting Test- Perseverative responses Change from baseline Mean (SD)	-8.7 (10.6)	-6.7 (11.4)	3.7 (14.2)	4.2 (14.1)
Wisconsin Card Sorting Test- Perseverative errors Change from baseline Mean (SD)	-8 (10.4)	-5.8 (8.7)	3.2 (9.7)	3.6 (9.8)
Wisconsin Card Sorting Test- Non-perseverative errors Change from baseline Mean (SD)	-4.1 (8.6)	-1.5 (5.6)	6.8 (8.2)	5.5 (8.5)

Outcome	a-tDCS plus cognitive training, Post-intervention, N = 10	a-tDCS plus cognitive training, 6 months, N = 10	Sham a-tDCS plus cognitive training, Post-intervention, N = 10	Sham a-tDCS plus cognitive training, 6 months, N = 10
Word List Generation Task Change from baseline (total numbers of errors) Mean (SD)	0.6 (4.4)	1.2 (4.9)	3 (10.1)	1.8 (8.9)

a-tDCS: anodal transcranial direct current stimulation; DLPFC: dorsolateral prefrontal cortex; N/n: number of participants; SD: standard deviation

a-tDCS plus cognitive training versus Sham a-tDCS plus cognitive training: Processing speed

Processing speed as measured by Symbol digit modalities test - Polarity - Higher values are better

Outcome	a-tDCS plus cognitive training, Post-intervention, N = 10	a-tDCS plus cognitive training, 6 months, N = 10	Sham a-tDCS plus cognitive training, Post-intervention, N = 10	Sham a-tDCS plus cognitive training, 6 months, N = 10
Symbol digit modalities test Change from baseline Mean (SD)	8.8 (8.6)	7.2 (10.4)	-0.1 (6.7)	1.6 (6)

a-tDCS: anodal transcranial direct current stimulation; DLPFC: dorsolateral prefrontal cortex; N/n: number of participants; SD: standard deviation

a-tDCS plus cognitive training versus Sham a-tDCS plus cognitive training: Long-term declarative memory

Long-term declarative memory as measured by Select Reminding Test-Consistent Long-Term Retrieval - Polarity - Higher values are better
Long-term declarative memory as measured by Select Reminding Test-Delayed Recall - Polarity - Higher values are better
Long-term declarative memory as measured by Select Reminding Test-Long-Term Storage - Polarity - Higher values are better
Long-term declarative memory as measured by Spatial Recall Test-Delayed Recall - Polarity - Higher values are better

Outcome	a-tDCS plus cognitive training, Post-intervention, N = 10	a-tDCS plus cognitive training, 6 months, N = 10	Sham a-tDCS plus cognitive training, Post-intervention, N = 10	Sham a-tDCS plus cognitive training, 6 months, N = 10
Select Reminding Test-Consistent Long-Term Retrieval Change from baseline Mean (SD)	1.5 (10)	4.7 (6.9)	-2.2 (7.9)	6.4 (8.4)
Select Reminding Test-Delayed Recall Change from baseline Mean (SD)	-0.7 (1.2)	0.8 (1.6)	-0.5 (1.3)	0.9 (1.2)
Select Reminding Test-Long-Term Storage Change from baseline Mean (SD)	1.8 (8.9)	8.1 (8.6)	-5.6 (10.9)	2.8 (10.5)
Spatial Recall Test-Delayed Recall Change from baseline Mean (SD)	0.9 (1.6)	0.7 (2.1)	1.9 (2.2)	0.4 (2.4)

a-tDCS: anodal transcranial direct current stimulation; DLPFC: dorsolateral prefrontal cortex; N/n: number of participants; SD: standard deviation

a-tDCS plus cognitive training versus Sham a-tDCS plus cognitive training: Working memory

Working memory as measured by Spatial recall test - Polarity - Higher values are better

Outcome	a-tDCS plus cognitive training, Post-intervention, N = 10	a-tDCS plus cognitive training, 6 months, N = 10	Sham a-tDCS plus cognitive training, Post-intervention, N = 10	Sham a-tDCS plus cognitive training, 6 months, N = 10
Spatial recall test Change from baseline Mean (SD)	2.9 (5)	3.2 (4.3)	1.2 (4.9)	1.2 (5.6)

a-tDCS: anodal transcranial direct current stimulation; DLPFC: dorsolateral prefrontal cortex; N/n: number of participants; SD: standard deviation

a-tDCS plus cognitive training versus Sham a-tDCS plus cognitive training: Working memory, processing speed and attention composite

Working memory, processing speed and attention composite as measured by Paced Auditory Serial Addition Task 2" - Polarity - Higher values are better

Working memory, processing speed and attention composite as measured by Paced Auditory Serial Addition Task 3" - Polarity - Higher values are better

Outcome	a-tDCS plus cognitive training, Post-intervention, N = 10	a-tDCS plus cognitive training, 6 months, N = 10	Sham a-tDCS plus cognitive training, Post-intervention, N = 10	Sham a-tDCS plus cognitive training, 6 months, N = 10
Paced Auditory Serial Addition Task 2" Change from baseline Mean (SD)	14.3 (9.7)	18.4 (7.8)	8.2 (10.7)	8.8 (7.7)
Paced Auditory Serial Addition Task 3" Change from baseline Mean (SD)	14.6 (8.3)	14.5 (5)	11.7 (10.1)	11.3 (10.4)

a-tDCS: anodal transcranial direct current stimulation; DLPFC: dorsolateral prefrontal cortex; N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information regarding randomisation process and concealment provided. No baseline differences were found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Double-blinded trial with appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for all participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns due to lack of information regarding randomisation process and no trial protocol was provided.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Messinis, 2017

Bibliographic Reference	Messinis, L.; Nasios, G.; Kosmidis, M.H.; Zampakis, P.; Malefaki, S.; Ntoskou, K.; Nousia, A.; Bakirtzis, C.; Grigoriadis, N.; Gourzis, P.; Papathanasopoulos, P.; Efficacy of a Computer-Assisted Cognitive Rehabilitation Intervention in Relapsing-Remitting Multiple Sclerosis Patients: A Multicenter Randomized Controlled Trial; Behavioural Neurology; 2017; vol. 2017; 5919841

Study details

Country/ies where study was carried out	Greece
Study type	Randomised controlled trial (RCT)
Study dates	March 2014 - December 2015
Inclusion criteria	- Diagnosed with multiple sclerosis according to McDonald criteria, - Aged 21 – 60, - Educational level of at least 6 years (primary school graduates in Greece), - Relapsing-remitting multiple sclerosis, - EDSS score 0–5, - Cognitive deficit on at least one domain of the Central Nervous System Vital Sign neuropsychological screening battery, - Native Greek speakers, - Provision of written informed consent, - IQ score of ≥80 on the Greek-validated WASI.
Exclusion criteria	- Ongoing major psychiatric disorders (for example, psychotic symptoms or disorders, illegal drugs, or alcohol abuse),

	- Presence of another neurological disorder (for example, dementia, stroke, epilepsy, and traumatic brain injury resulting in a loss of consciousness for more than 30 minutes), - MMSE ≥24, - One or more exacerbations in 3 months prior to enrolment and immunological or immunosuppressant treatment initiated within 4 months prior to enrolment or treated with cognitive rehabilitation in the 12 months prior to enrolment, - Initiation of psychotropic medications or medications for spasticity, tremor, bladder disturbances, and fatigue, if already taking such medications, doses and schedules had to be held constant during study period, - Abnormal or corrected hearing and vision.
Patient characteristics	N=58 adults with relapsing remitting multiple sclerosis, with mild to moderate cognitive impairment (on at least one domain of the Central Nervous System Vital Sign neuropsychological screening battery, MMSE score ≥24, IQ score of ≥80 on the Greek-validated WASI), and EDSS scores 0–5. - Computerised cognitive rehabilitation (RehaCom® modules): n=32 - Usual care: n=26 Age in years [Mean (SD)]: - Computerised cognitive rehabilitation (RehaCom® modules): 46.03 (7.97) - Usual care: 45.15 (9.65) Sex (M/F): - Computerised cognitive rehabilitation (RehaCom® modules): n=10/n=22 - Usual care: n=8/n=18 Time since diagnosis or injury in years [Mean (SD)]: Cognitive rehabilitation; usual care.

	- Computerised cognitive rehabilitation (RehaCom® modules): 13.31 (11.41 – 15.17) - Usual care: 11.27 (9.39-13.14) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Computerised cognitive rehabilitation (RehaCom® modules) Protocol intervention group: Interventions to improve and maintain executive function (1), processing speed (2), memory and learning (3), Aand attention (7) Delivery setting: Not reported Number/ frequency of sessions: 2 x 60-minute sessions per week (delivered on an individual basis) Duration: 10 weeks Practitioner(s): Speech and language therapists or psychologists, supervised by a clinical neuropsychologist Individualised and domain/task specific sessions, for example focusing on episodic memory, information processing speed/attention, and executive functions. Difficulty levels are automatically adjusted according to whether the patient successfully completes each task. **Control** Name: Usual care Protocol description: Not reported. Delivery setting: Not reported. Number/ frequency of sessions: Not reported.

	Duration: 10 weeks. Practitioner(s): Not reported.
Duration of follow-up	Post-treatment (10 weeks) and 6 month follow up
Sources of funding	Not reported
Sample size	N=58 - Computerised cognitive rehabilitation (RehaCom® modules): n=32 - Usual care: n=26
Other information	Follow-up data was not extracted as only reported for intervention and not comparator so no comparative data available.

EDSS: expanded disability status scale; IQ: intelligence quotient; MMSE: mini-mental state examination; N/n: number of participants; WASI: Wechsler Abbreviated scale of intelligence

Outcomes

Study timepoints

- Post-intervention (10 weeks from baseline)

Computerised cognitive rehabilitation (RehaCom® modules) versus Usual care: Executive function
Executive function as measured by Greek Verbal Fluency Test- Semantic Fluency - Polarity - Higher values are better
Executive function as measured by Greek Verbal Fluency Test-Phonemic Fluency - Polarity - Higher values are better

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 32	Usual care, Post-intervention, N = 26
Greek Verbal Fluency Test-Semantic Fluency Mean scores at follow-up.	43.56 (8.34)	39.58 (9.83)

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 32	Usual care, Post-intervention, N = 26
Mean (SD)		
Greek Verbal Fluency Test-Phonemic Fluency Mean scores at follow-up. Mean (SD)	33.13 (7.01)	29.95 (7.88)

N/n: number of participants; SD: standard deviation

Computerised cognitive rehabilitation (RehaCom® modules) versus Usual care: Processing speed
Processing speed as measured by Stroop Neuropsychological Screening Test - Polarity - Higher values are better
Processing speed as measured by Symbol digit modalities test - Polarity - Higher values are better

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 32	Usual care, Post-intervention, N = 26
Stroop Neuropsychological Screening Test Mean scores at follow-up. Mean (SD)	63.5 (13.25)	57.6 (14.2)
Symbol digit modalities test Mean scores at follow-up. Mean (SD)	40.03 (7.08)	37.43 (9.85)

N/n: number of participants; SD: standard deviation

Computerised cognitive rehabilitation (RehaCom® modules) versus Usual care: Working memory

Working memory as measured by Brief Visuospatial Memory Test-Revised Total Recall - Polarity - Higher values are better

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 32	Usual care, Post-intervention, N = 26
Brief Visuospatial Memory Test-Revised Total Recall Mean scores at follow-up. Mean (SD)	24.5 (6.02)	20.8 (6.85)

N/n: number of participants; SD: standard deviation

Computerised cognitive rehabilitation (RehaCom® modules) versus Usual care: Long-term declarative memory
Long-term memory as measure by Selective Reminding Test Long-Term Storage - Polarity - Higher values are better
Long-term memory as measure by Selective Reminding Test -Delayed Recall (SRTDR) - Polarity - Higher values are better

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 32	Usual care, Post-intervention, N = 26
Selective Reminding Test Long-Term Storage Mean scores at follow-up. Mean (SD)	43.47 (8.09)	36.38 (5.06)
Selective Reminding Test -Delayed Recall Mean scores at follow-up. Mean (SD)	8.22 (1.75)	7.12 (7.12)

N/n: number of participants; SD: standard deviation

Computerised cognitive rehabilitation (RehaCom® modules) versus Usual care: Attention
Attention as measured by Trail Making Test Part A - Polarity - Lower values are better
Attention as measured by Trail Making Test Part B - Polarity - Lower values are better

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 32	Usual care, Post-intervention, N = 26
Trail Making Test Part A Mean scores at follow-up. Mean (SD)	59.53 (18.49)	68.88 (20.32)
Trail Making Test Part B Mean scores at follow-up. Mean (SD)	113.28 (51.47)	110.96 (36.6)

N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation was performed via a computer-generated random sequence and allocation was concealed with no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention received; however no deviations arose and appropriate analysis used.)*

Section	Question	Answer
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for all participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns as no trial protocol provided.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Messinis, 2020

Bibliographic Reference	Messinis, L.; Kosmidis, M.H.; Nasios, G.; Konitsiotis, S.; Ntoskou, A.; Bakirtzis, C.; Grigoriadis, N.; Patrikelis, P.; Panagiotopoulos, E.; Gourzis, P.; Malefaki, S.; Papathanasopoulos, P.; Do Secondary Progressive Multiple Sclerosis patients benefit from Computer- based cognitive neurorehabilitation? A randomized sham controlled trial; Multiple Sclerosis and Related Disorders; 2020; vol. 39; 101932

Study details

Country/ies where study was carried out	Greece

Study type	Randomised controlled trial (RCT)
Study dates	January 2018 - February 2019
Inclusion criteria	- Diagnosed with multiple sclerosis according to 2010 Revised McDonald criteria, - Aged between 25 and 60 years, - Educational level of at least 6 years (primary school graduates in Greece), - Secondary progressive multiple sclerosis patients without any relapses or MRI activity at least 12 months prior to inclusion, - EDSS score of ≤7 (wheelchair dependent), - Cognitive deficit on at least two domains of the Central Nervous System Vital Signs battery at baseline evaluation, with performance 1.5 SD below healthy control group data, - Native Greek speakers, - Provision of written informed consent to take part in the study, - IQ score of ≥80 on the Greek validated Wechsler Abbreviated Scale of Intelligence or normal general intelligence as assessed by clinical evaluation, - Note: No patients were taking disease modifying treatments prior to or during the study and no relapses were observed during study duration.
Exclusion criteria	- Ongoing major psychiatric disorders (for example, psychotic symptoms or disorders, illegal drug or alcohol abuse), - Presence of another neurological disorder (for example, dementia, stroke, epilepsy, traumatic brain injury resulting in a loss of consciousness for more than 30 minutes), - Treatment with cognitive rehabilitation in the 12 months prior to enrolment, - Initiation of psychotropic medications. If already taking such medications, doses and schedules were held constant during the study period, - Normal or corrected hearing and vision (visual acuity of 20/70).

Patient characteristics	N=36 adults with multiple sclerosis (secondary progressive) - Computerised cognitive rehabilitation (RehaCom® modules): n=19 - Sham cognitive intervention: n=17 Age in years [Mean (SD)]: - Computerised cognitive rehabilitation (RehaCom® modules): 46.47 (4.1) - Sham cognitive intervention: 45.29 (3.9) Sex (M/F): - Computerised cognitive rehabilitation (RehaCom® modules): n=7/n=12 - Sham cognitive intervention: n=5/n=12 Time since diagnosis or injury in years [Mean (SD)]: - Computerised cognitive rehabilitation (RehaCom® modules): 21.15 (5.1) - Sham cognitive intervention: 20.76 (4.1) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Computerised cognitive rehabilitation (RehaCom® modules) Protocol intervention group: Interventions to improve and maintain executive function (1), processing speed (2), memory and learning (3), and attention (7)

	Delivery setting: Community (home-based) Number/ frequency of sessions: 3 x 45-minute session per week Duration: 8 weeks Practitioner(s): Not applicable – patient/caregiver directed Individualised and domain/task specific sessions, for example focusing on episodic memory, information processing speed/attention, and executive functions. Difficulty levels are automatically adjusted according to whether the patient successfully completes each task. Sessions were completed under 'supervision' of caregivers/relatives (able to help with accessing materials but instructed not to help with exercises/games). Patients and caregivers received training from psychologists initially and were contacted every week to encourage adherence and address any difficulties. All therapeutic data and scores obtained/time taken/number of mistakes are saved within the software. This allows therapists to tailor future sessions to these difficulties. **Control** Name: Sham cognitive intervention Protocol description: Placebo Delivery setting: Community (home-based) Number/ frequency of sessions: 3 x 45-minute session per week Duration: 8 weeks Practitioner(s): Not applicable – patient/caregiver directed Non-specific computerized activities such as solving puzzles, reading magazine/newspaper articles. Sessions were completed under 'supervision' of caregivers/relatives (able to help with accessing materials but instructed not to help with exercises/games).

	Psychologists visited during the first session to ensure PCs were functioning and showed patients/caregivers how to access materials. They also contacted the patient every week to encourage adherence and address any difficulties.
Duration of follow-up	Post-treatment (8 weeks)
Sources of funding	Not industry funded
Sample size	N=36 - Computerised cognitive rehabilitation (RehaCom® modules): n=19 - Sham cognitive intervention: n=17

EDSS: Expanded Disability Status Scale; IQ: intelligence quotient; MRI: magnetic resonance imaging; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (8 weeks from baseline)

Computerised cognitive rehabilitation (RehaCom® modules) versus Sham cognitive intervention: Physical and mental health related quality of life and social care related quality of life

Physical and mental health related quality of life and social care related quality of life as measured by EuroQOL 5D Visual Analogue Scale - Polarity - Higher values are better

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 19	Sham cognitive intervention, Post-intervention, N = 17
EuroQOL 5D Visual Analogue Scale Mean scores at follow-up.	60.21 (16.9)	54.11 (16.3)

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 19	Sham cognitive intervention, Post-intervention, N = 17
Mean (SD)		

EuroQOL 5D: European Quality of Life – 5 domain; N/n: number of participants; SD: standard deviation

Computerised cognitive rehabilitation (RehaCom® modules) versus Sham cognitive intervention: Processing speed

Processing speed as measured by Symbol digit modalities test - Polarity - Higher values are better

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 19	Sham cognitive intervention, Post-intervention, N = 17
Symbol digit modalities test Mean scores at follow-up. Mean (SD)	40.42 (7.3)	31.52 (9.5)

N/n: number of participants; SD: standard deviation

Computerised cognitive rehabilitation (RehaCom® modules) versus Sham cognitive intervention: Working memory

Working memory as measured by Brief Visuospatial Memory Test - Polarity - Higher values are better, Greek Verbal Learning Test - Polarity - Higher values are better

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 19	Sham cognitive intervention, Post-intervention, N = 17
Brief Visuospatial Memory Test Mean scores at follow-up. Mean (SD)	18.89 (4.7)	15.88 (5.4)

Outcome	Computerised cognitive rehabilitation (RehaCom® modules), Post-intervention, N = 19	Sham cognitive intervention, Post-intervention, N = 17
Greek Verbal Learning Test Mean scores at follow-up. Mean (SD)	58.1 (8.3)	47.35 (7.5)

N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation was performed via a computer-generated random sequence. Allocation was concealed and no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Carers and participants were aware of intervention assignment; however no deviations arose and appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for all participants.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*

Section	Question	Answer
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol was provided.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns as no trial protocol was provided.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Ophey, 2020

Bibliographic Reference	Ophey, A.; Giehl, K.; Rehberg, S.; Eggers, C.; Reker, P.; van Eimeren, T.; Kalbe, E.; Effects of working memory training in patients with Parkinson's disease without cognitive impairment: A randomized controlled trial; Parkinsonism and Related Disorders; 2020; vol. 72; 13-22

Study details

Country/ies where study was carried out	Germany
Study type	Randomised controlled trial (RCT)
Study dates	September 2016 - July 2018
Inclusion criteria	- Aged between 45 and 85 years, - Diagnosis of idiopathic Parkinson’s disease according to UK brain bank criteria, - Normal or corrected-to-normal vision and hearing.

Exclusion criteria	- Cognitive dysfunctions according to the Level-II diagnostic criteria for Parkinson's disease with mild cognitive impairment or PDD, - Severe depressive symptoms operationalized by the Geriatric Depression Scale (GDS ≥11), - Deep brain stimulation, and other reported psychiatric, neurological, and life-threatening diseases.
Patient characteristics	N=76 adults with idiopathic Parkinson's disease - Computerised working memory training: n=37 - Waitlist control: n=39 Age in years [Mean (SD)]: - Computerised working memory training: 64.09 (8.56) - Waitlist control: 63.88 (8.39) Sex (n/ N): Intervention: Female 18 Male 19, Control: Female 17 Male 21. - Computerised working memory training: n=19/n=18 - Waitlist control: n=21/n=17 Time since diagnosis or injury in years: Mean (SD not reported, Mean (range): - Computerised working memory training: 5.20 (0.47-22.05) - Waitlist control: 4.62 (0.35-27.04) Chronic neurological disorder category: Progressive neurological diseases

Intervention(s)/control	**Intervention** Name: Computerised working memory training Protocol intervention group: Interventions to improve and maintain executive function (1) Delivery setting: Community (home-based) Number/ frequency of sessions: 5x 30-minute sessions per week Duration: 5 weeks Practitioner(s): Not applicable (Training performed at home on computer) The computerise working memory training was based on the online cognitive training programme NeuroNation (Synaptikon GmbH, Berlin, Germany) and included 5 out 9 varying working memory tasks. Tasks were adapted according to user progression. Training was also accompanied with weekly telephone calls from the researcher in case of any issues or questions. No training occurred for between post-test and follow-up. **Control** Name: Waitlist control Protocol description: Control Delivery setting: Community (home-based) Number/ frequency of sessions: Not applicable Duration: Not applicable Practitioner(s): Not applicable
Duration of follow-up	3-months after intervention
Sources of funding	Not industry funded
Sample size	N=76

	- Computerised working memory training: n=37 - Waitlist control: n=39

N/n: number of participants; PDD: Parkinson's disease dementia; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (5 weeks from baseline)
- 3 months from post-intervention

Computerised working memory training versus Waitlist control: Processing speed
Processing speed as measured by Stroop Colour Naming - Polarity - Higher values are better
Processing speed as measured by Stroop interference - Polarity - Higher values are better
Processing speed as measured by Stroop Word Reading - Polarity - Higher values are better

Outcome	Computerised working memory training, post-intervention, N = 37	Computerised working memory training, 3 months, N = 35	Waitlist control, post-intervention, N = 38	Waitlist control, 3 months, N = 37
Stroop Colour Naming Mean scores at follow-up. Mean (SD)	0.64 (0.83)	0.7 (0.78)	0.82 (0.86)	0.76 (0.85)
Stroop interference Mean scores at follow-up.	1.08 (0.64)	1.07 (0.58)	1.15 (0.5)	1.22 (0.54)

Outcome	Computerised working memory training, post-intervention, N = 37	Computerised working memory training, 3 months, N = 35	Waitlist control, post-intervention, N = 38	Waitlist control, 3 months, N = 37
Mean (SD)				
Stroop Word Reading Mean scores at follow-up. Mean (SD)	0.44 (0.64)	0.49 (0.74)	0.54 (0.66)	0.58 (0.64)

N/n: number of participants; SD: standard deviation

Computerised working memory training versus Waitlist control: Working memory
Working memory as measured by N-back verbal - Polarity - Higher values are better
Working memory as measured by N-back non-verbal - Polarity - Higher values are better
Working memory as measured Corsi block span forward - Polarity - Higher values are better
Working memory as measured Corsi block span backward - Polarity - Higher values are better

Outcome	Computerised working memory training, Post-intervention, N = 35	Computerised working memory training, 3 months, N = 37	Waitlist control, Post-intervention, N = 38	Waitlist control, 3 months, N = 37
N-back verbal Mean scores at follow-up. Mean (SD)	0.01 (0.69)	0.21 (0.73)	0.16 (0.79)	0.2 (0.8)
N-back non-verbal Mean scores at follow-up.	0.12 (0.66)	0.12 (0.84)	0.33 (0.68)	0.3 (0.77)

Outcome	Computerised working memory training, Post-intervention, N = 35	Computerised working memory training, 3 months, N = 37	Waitlist control, Post-intervention, N = 38	Waitlist control, 3 months, N = 37
Mean (SD)				
Corsi block span forward Mean scores at follow-up. Mean (SD)	-0.08 (0.71)	-0.17 (0.7)	-0.04 (0.81)	0.03 (0.84)
Corsi block span backward Mean scores at follow-up. Mean (SD)	-0.08 (0.76)	0 (0.72)	-0.08 (0.77)	-0.1 (0.81)

N/n: number of participants; SD: standard deviation

Computerized working memory training versus Waitlist control: Attention
Attention as measured by Brief Test of Attention - Polarity - Higher values are better
Attention as measured by Trail Making Test Part A - Polarity - Lower values are better

Outcome	Computerised working memory training, Post-intervention, N = 35	Computerised working memory training, 3 months, N = 37	Waitlist control, Post-intervention, N = 38	Waitlist control, 3 months, N = 37
Brief Test of Attention Mean scores at follow-up. Mean (SD)	0.29 (0.84)	0.29 (0.82)	0.45 (0.76)	0.46 (0.73)

Outcome	Computerised working memory training, Post-intervention, N = 35	Computerised working memory training, 3 months, N = 37	Waitlist control, Post-intervention, N = 38	Waitlist control, 3 months, N = 37
Trail Making Test Part A Mean scores at follow-up. Mean (SD)	0.63 (1.27)	0.6 (1.14)	0.46 (1.23)	0.74 (1.02)

N/n: number of participants; SD: standard deviation

Computerised working memory training versus Waitlist control: Working memory and attention composite
Working memory and attention composite as measured by Digit Span (Forward) - Polarity - Higher values are better
Working memory and attention composite as measured by Digit span backwards - Polarity - Higher values are better

Outcome	Computerised working memory training, post-intervention, N = 35	Computerised working memory training, 3 months,N = 37	Waitlist control, post-intervention, N = 38	Waitlist control, 3 months, N = 37
Digit Span (Forward) Mean scores at follow-up. Mean (SD)	0.21 (0.82)	0.43 (0.8)	0.61 (0.74)	0.51 (0.8)
Digit span backwards Mean scores at follow-up. Mean (SD)	0.08 (0.82)	0.12 (0.9)	0.42 (0.75)	0.23 (0.83)

N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation was performed via the online tool Research Randomizer. Allocation sequence was concealed and no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers aware of intervention assignment; however no deviations arose and appropriate analysis used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for nearly all participants randomised (75 out of 76; 99%).)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to trial protocol.)*
Overall bias and Directness	Risk of bias judgement	Low *(Low risk of bias in all domains.)*
Overall bias and Directness	Overall Directness	Directly applicable

Section	Question	Answer
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Pedulla, 2016

Bibliographic Reference	Pedulla, L.; Brichetto, G.; Tacchino, A.; Vassallo, C.; Zaratin, P.; Battaglia, M.A.; Bonzano, L.; Bove, M.; Adaptive vs. non-adaptive cognitive training by means of a personalized App: a randomized trial in people with multiple sclerosis; Journal of NeuroEngineering and Rehabilitation; 2016; vol. 13 (no. 1); 1-10

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	Not reported
Inclusion criteria	- Outpatients referred to Italian Multiple Sclerosis Society (AISM) Rehabilitation Centre, Genoa, - Self-reported poor memory or attention, - Multiple sclerosis diagnosed according to McDonald criteria, - In a stable phase of disease (that is, no relapses in last 3 months), - Score of at least 1.5 SD below mean normative values on one or more components of the Rao's Brief Repeatable Battery of Neuropsychological Tests.
Exclusion criteria	- Aged <18 years, - One or more exacerbations in 3 months prior to enrolment,

	- Ongoing major psychiatric disorder, - Treatment with benzodiazepines or antidepressants, - Severe visual loss, - Dyscalculia or acalculia.
Patient characteristics	N=28 adults with multiple sclerosis and self-reported memory or attention problems, and a score of at least 1.5 SD below mean normative values on one or more components of the Rao's Brief Repeatable Battery of Neuropsychological Tests. - Adaptive working memory cognitive training (COGNI-TRAcK): n=14 - Non-adaptive working memory cognitive training (COGNI-TRAcK): n=14 Age in years [Mean (SD)]: - Adaptive working memory cognitive training (COGNI-TRAcK): 49.0 (7.1) - Non-adaptive working memory cognitive training (COGNI-TRAcK): 46.1 (11.2) Sex (M/F): - Adaptive working memory cognitive training (COGNI-TRAcK): n=5/n=9 - Non-adaptive working memory cognitive training (COGNI-TRAcK): n=3/n=11 Time since diagnosis or injury in years [Mean (SD)]: - Adaptive working memory cognitive training (COGNI-TRAcK): 16.6 (8.6) - Non-adaptive working memory cognitive training (COGNI-TRAcK): 10.4 (6.6)

	Chronic neurological disorder category: Progressive neurological disorder
Intervention(s)/control	**Intervention** Name: Adaptive working memory cognitive training (COGNI-TRAcK) Protocol intervention group (1-7): Interventions to improve and maintain executive function (1) Delivery setting: Community (home-based) Number/ frequency of sessions: 5 x 30 minutes per week Duration: 8 weeks Practitioner(s): Not applicable, self-administered COGNI-TRAcK sessions include 3 different types of exercises (each lasting around 10 minutes). These are: • a visuospatial working memory task • an “operation” N-back task • a “dual” N-back task. The difficulty level is automatically increased by 1 step every time an exercise is successfully completed and reduced by 1 step if a participant is unsuccessful 3 times in a row. **Others in the same protocol group** Name: Non-adaptive working memory cognitive training (COGNI-TRAcK) Protocol description: Lower intensity intervention to improve and maintain executive function (1) Delivery setting: Community (home-based) Number/ frequency of sessions: 5 x 30-minutes per week Duration: 8 weeks Practitioner(s): Not applicable, self-administered COGNI-TRAcK sessions include 3 different types of exercises (each lasting around 10-minutes). These are:

	• a visuospatial working memory task • an “operation” N-back task • a “dual” N-back task. One of 2 low difficulty levels are selected at random regardless of the participants performance.
Duration of follow-up	Post-intervention
Sources of funding	Not industry funded
Sample size	N=28 - Adaptive working memory cognitive training (COGNI-TRAcK): n=14 - Non-adaptive working memory cognitive training (COGNI-TRAcK): n=14

N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (8 weeks from baseline)

Adaptive working memory cognitive training (COGNI-TRAcK) versus Non-adaptive working memory cognitive training (COGNI-TRAcK): Executive function

Executive function as measured by Word list generation on semantic stimulus - Polarity - Higher values are better

Executive function as measured by Wisconsin card sorting test - Polarity - Higher values are better

Outcome	Adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14	Non-adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14
Word list generation on semantic stimulus	35.36 (12.73)	45.38 (7.37)

Outcome	Adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14	Non-adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14
Mean scores at follow-up. Mean (SD)		
Wisconsin card sorting test Mean scores at follow-up. Mean (SD)	3 (1.57)	4.23 (1.36)

N/n: number of participants; SD: standard deviation

Adaptive working memory cognitive training (COGNI-TRAcK) versus Non-adaptive working memory cognitive training (COGNI-TRAcK): Processing speed

Processing speed as measured by Symbol digit modalities test - Polarity - Higher values are better

Outcome	Adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14	Non-adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14
Symbol digit modalities test Mean scores at follow-up. Mean (SD)	38.08 (9.09)	46.03 (11.52)

N/n: number of participants; SD: standard deviation

Adaptive working memory cognitive training (COGNI-TRAcK) versus Non-adaptive working memory cognitive training (COGNI-TRAcK): Working memory

Working memory (immediate/total recall) as measured by spatial recall test - Polarity - Higher values are better

Outcome	Adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14	Non-adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14
Spatial recall test Mean scores at follow-up. Mean (SD)	15.99 (3.7)	19.13 (5.46)

N/n: number of participants; SD: standard deviation

Adaptive working memory cognitive training (COGNI-TRAcK) versus Non-adaptive working memory cognitive training (COGNI-TRAcK): Long-term declarative memory

Long-term declarative memory as measured by Spatial recall test-delayed - Polarity - Higher values are better
Long-term declarative memory as measured by Selective reminding test- consistent long term retrieval - Polarity - Higher values are better
Long-term declarative memory as measured by Selective reminding test-delayed - Polarity - Higher values are better
Long-term declarative memory as measured by Selective reminding test- long term storage - Polarity - Higher values are better

Outcome	Adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14	Non-adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14
Spatial recall test-delayed Mean scores at follow-up. Mean (SD)	5.3 (1.31)	6.15 (2.1)
Selective reminding test-consistent long term retrieval Mean scores at follow-up. Mean (SD)	23.5 (15.97)	31.08 (14)
Selective reminding test-delayed	6.71 (3.19)	8.96 (2.18)

Outcome	Adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14	Non-adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14
Mean scores at follow-up. Mean (SD)		
Selective reminding test- long term storage Mean scores at follow-up. Mean (SD)	38.33 (15.13)	39.79 (11.75)

N/n: number of participants; SD: standard deviation

Adaptive working memory cognitive training (COGNI-TRAcK) versus Non-adaptive working memory cognitive training (COGNI-TRAcK): Working memory, processing speed, and attention composite

Working memory, processing speed, and attention composite as measured by Paced auditory serial addition test-3 - Polarity - Higher values are better

Outcome	Adaptive working memory cognitive training (COGNI-TRAcK), Post-intervention, N = 14	Non-adaptive working memory cognitive training, (COGNI-TRAcK) Post-intervention, N = 14
PASAT 3 Mean scores at follow-up. Mean (SD)	32.99 (9.8)	44.63 (13.6)

N/n: number of participants; PASAT: Paced auditory serial addition test; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information on the randomisation method; however allocation sequence was concealed. The control group had a longer mean length of time since diagnosis/duration of illness, however this is not incompatible with chance.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants were aware of intervention assignment (self-directed) and no deviations arose.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(Data only available for 78% of participants and no indication of appropriate analysis.*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(Appropriate outcome measures used with no differences between groups. Lack of information regarding blinding of assessors, although unlikely that assessment of the outcomes was influenced by knowledge of intervention received)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	High *(High risk of bias due to missing outcome data and lack of information regarding randomisation process and no trial protocol provided.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Perez-Martin, 2017

Bibliographic Reference	Perez-Martin, M.Y.; Gonzalez-Platas, M.; Eguia-Del Rio, P.; Croissier-Elias, C.; Sosa, A.J.; Efficacy of a short cognitive training program in patients with multiple sclerosis; Neuropsychiatric Disease and Treatment; 2017; vol. 13; 245-252

Study details

Country/ies where study was carried out	Spain
Study type	Randomised controlled trial (RCT)
Study dates	October 2013 - June 2015
Inclusion criteria	- Multiple sclerosis diagnosis according to revised McDonald criteria, - Aged <18 years, - EDSS score ≤7.0, - Subjective complaints about cognitive problems, - Objective cognitive impairment defined as a performance of 1.5 SD lower than the mean in a control group in at least two cognitive tests (determined by the neuropsychological assessment).
Exclusion criteria	- Diagnosis of current or past severe psychiatric disorder, - Relapsed or taken steroids within the 3 months prior to inclusion based on their clinical history, - Previous participation in any cognitive rehabilitation programme, - Meet criteria for the diagnosis of dementia (as per DSM-IV-TR).
Patient characteristics	N=62 adults with multiple sclerosis, EDSS score ≤7, subjective cognitive complaints, and objective cognitive issues (at least 1.5 SD below a control groups mean in at least 2 cognitive tests at baseline). - Computer-assisted neuropsychological cognitive training programme: n=30

	- Waitlist control: n=32 Age in years [Mean (SD)]: - Computer-assisted neuropsychological cognitive training programme: 44.93 (9.89) - Waitlist control: 40.88 (8.50) Sex (M/F): - Computer-assisted neuropsychological cognitive training programme: n=12/n=18 - Waitlist control: n=18/n=14 Time since diagnosis or injury in years [Mean (SD)]: - Computer-assisted neuropsychological cognitive training programme: 11.50 (8.05) - Waitlist control: 9.59 (7.40) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Computer-assisted neuropsychological cognitive training programme Protocol description: Interventions to improve and maintain executive function (1), processing speed (2), memory and learning (3), and attention (7) Delivery setting: Outpatient (hospital clinic) Number/ frequency of sessions: 1 x 60 – 75-minute session per week

	Duration: 12 consecutive weeks Practitioner(s): Not reported The programme focused on attention, processing speed, memory and executive functions through computerised and paper and pencil tasks and was standardised. Patients were provided with a booklet after each session including exercises to practice at home. These were designed to reinforce the learning from each session and encourage cognitive activity between sessions. Each session included 10 minutes at the start to review the previous session, discuss how to apply the content to everyday life, and to go through the exercises patients had completed between sessions. The last 10–15-minutes of each session consisted of feedback on the difficulty and relevance of the session and an overview of the exercises to be completed at home during the week. The booklets/and patient feedback provided a means of monitoring compliance. Only patients with a level of compliance ≥80% were included. **Control** Name: Waitlist control Protocol description: No intervention Delivery setting: Not applicable Number/ frequency of sessions: Not applicable Duration: Not applicable Practitioner(s): Not applicable The control group received a booklet with guidelines and lifestyle advice relating to cognitive function as well as information about their own cognitive status. They were contacted once a week. Authors report assigning people to a waitlist control group which received no treatment, but do not report if people received the intervention after a period of waiting.

Duration of follow-up	3 months (after completion of intervention)
Sources of funding	Not industry funded
Sample size	N=62 - Computer-assisted neuropsychological cognitive training programme: n=30 - Waitlist control: n=32
Other information	Only patients with a level of compliance ≥80% were included in the analysis.

DSM-IV-TR: diagnostic and statistical manual of mental disorders, fourth edition, text revision; EDSS: expanded disability status scale; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (3 months from baseline)

Computer-assisted neuropsychological cognitive training programme versus Waitlist control: Processing speed

Processing speed as measured by Symbol digit modalities test - Polarity - Higher values are better

Outcome	Computer-assisted neuropsychological cognitive training programme, post-intervention, N = 30	Waitlist control, post-intervention, N = 32
Symbol digit modalities test Mean scores at follow-up. Mean (SD)	46.47 (13.3)	47.93 (10.34)

N/n: number of participants; SD: standard deviation

Computer-assisted neuropsychological cognitive training programme versus Waitlist control: Working memory

Working memory (immediate/total recall) as measured by spatial recall test - Polarity - Higher values are better

Outcome	Computer-assisted neuropsychological cognitive training programme, post-intervention, N = 30	Waitlist control, post-intervention, N = 32
Spatial recall test Mean scores at follow-up. Mean (SD)	22.77 (5.56)	21.38 (4.14)

N/n: number of participants; SD: standard deviation

Computer-assisted neuropsychological cognitive training programme versus Waitlist control: Long-term declarative memory
Long-term declarative memory as measured by Spatial Recall Test- Delayed recall - Polarity - Higher values are better
Long-term declarative memory as measured by Selective Reminding Test Long-Term Storage - Polarity - Higher values are better
Long-term declarative memory as measured by Selective Reminding Test- Consistent long-term retrieval - Polarity - Higher values are better
Long-term declarative memory as measured by Selective Reminding Test- Delayed recall - Polarity - Higher values are better

Outcome	Computer-assisted neuropsychological cognitive training programme, post-intervention, N = 30	Waitlist control, post-intervention, N = 32
Spatial Recall Test- Delayed recall Mean scores at follow-up. Mean (SD)	7.87 (2.21)	7.63 (1.81)
Selective Reminding Test Long-Term Storage Mean scores at follow-up. Mean (SD)	41.4 (14.91)	34 (16.26)
Selective Reminding Test- Consistent long-term retrieval	32.03 (18.26)	24.53 (16.28)

Outcome	Computer-assisted neuropsychological cognitive training programme, post-intervention, N = 30	Waitlist control, post-intervention, N = 32
Mean scores at follow-up. Mean (SD)		
Selective Reminding Test- Delayed recall Mean scores at follow-up. Mean (SD)	8.03 (2.79)	6.22 (2.86)

N/n: number of participants; SD: standard deviation

Computer-assisted neuropsychological cognitive training programme versus Waitlist control: Working memory, processing speed, and attention composite

Working memory, processing speed, and attention composite as measured by Paced auditory serial addition test-3 - Polarity - Higher values are better

Outcome	Computer-assisted neuropsychological cognitive training programme, post-intervention, N = 30	Waitlist control, post-intervention, N = 32
Paced auditory serial addition test-3 Mean scores at follow-up. Mean (SD)	29.7 (15.48)	30.44 (16.08)

N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(No information regarding randomisation process provided.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(Participants and carers aware of intervention received however no deviations arose. Only participants with compliance >80% were included in the analysis, suggesting that an inappropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(No information about missing outcome data reported.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(Appropriate outcome measures used and assessors were unaware of intervention assignment.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol provided.)*
Overall bias and Directness	Risk of bias judgement	High *(Some concerns due to deviations from the intended interventions. Some concerns due to missing information on the randomisation process and missing outcome data. No trial protocol reported.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Phillips, 2016

Bibliographic Reference	Phillips, N.L.; Mandalis, A.; Benson, S.; Parry, L.; Epps, A.; Morrow, A.; Lah, S.; Computerized working memory training for children with moderate to severe traumatic brain injury: A double-blind, randomized, placebo-controlled trial; Journal of Neurotrauma; 2016; vol. 33 (no. 23); 2097-2104

Study details

Country/ies where study was carried out	Australia
Study type	Randomised controlled trial (RCT)
Study dates	February 2013 to August 2014
Inclusion criteria	- Moderate to severe traumatic brain injury >12 months post-injury, - Aged 8 years, 0 months to 15 years, 11 months, - Fluent in English (parent and child), - Access to a personal computer with Internet.
Exclusion criteria	- Pre-existing developmental, behavioural, psychiatric, or neurological disorder, - Previous head injury, - Traumatic brain injury sustained due to non-accidental means (that is, child abuse), - General intelligence below the average range (Full Scale Intelligence Quotient <80), - Residual sensory and/or physical deficits that would interfere with participation in the programme.
Patient characteristics	N=27 children and young people with traumatic brain injury - Adaptive working memory cognitive training (Cogmed): n=13 - Non-adaptive working memory cognitive training: n=14

	Age in years [Mean (SD) not reported] [Median (IQR)]: - Adaptive working memory cognitive training (Cogmed): 11.82 (3.98) - Non-adaptive working memory cognitive training: 12.75 (2.62) Sex: Not reported Time since diagnosis or injury in years [Mean (SD) not reported] [Median (IQR)]: - Adaptive working memory cognitive training (Cogmed): 3.10 (2.38) - Non-adaptive working memory cognitive training: 9.25 (8.77) Chronic neurological disorder category: Acquired brain injury
Intervention(s)/control	**Intervention** Name: Adaptive working memory cognitive training (Cogmed) Protocol intervention group: Interventions to improve and maintain executive function (1) Delivery setting: Community Number/ frequency of sessions: 5x 30-40-minutes per week Duration: 5 weeks Practitioner(s): Weekly phone calls/check-ins by trained psychologist not involved in data collection

	The training involved a number of tasks that required storage and manipulation of verbal and/or visuospatial information. Each session included 8 from 12 possible pre-determined exercises, with difficulty level calculated on a trial-by-trial basis. **Control** Name: Non-adaptive working memory cognitive training Protocol description: Placebo Delivery setting: Community Number/ frequency of sessions: 5x 30-40-minute session per week Duration: 5 weeks Practitioner(s): Weekly phone calls/check-ins by trained psychologist not involved in data collection The training was identical to the Cogmed training except that the working memory load was low and was not calculated on trial-by-trial basis.
Duration of follow-up	3 months
Sources of funding	Not reported
Sample size	N=27 - Adaptive working memory cognitive training (Cogmed): n=13 - Non-adaptive working memory cognitive training: n=14

IQR: interquartile range; N/n: number of participants; TBI: traumatic brain injury

Outcomes

Study timepoints

- Post-intervention (5 weeks from baseline)

- 3 months from post-intervention

Adaptive working memory cognitive training (Cogmed) versus Non-adaptive working memory cognitive training: Attention

Attention as measured by Test of Everyday Attention for Children - Polarity - Higher values are better

Outcome	Adaptive working memory cognitive training (Cogmed), post-intervention, N = 13	Adaptive working memory cognitive training (Cogmed), 3 months, N = 13	Non-adaptive working memory cognitive training, post-intervention, N = 14	Non-adaptive working memory cognitive training, 3 months, N = 14
Selective Test of Everyday Attention for Children Median scores at follow-up. Median (IQR)	0 (3.3 to NR)	0 (2.23 to NR)	0 (2.25 to NR)	59 (2.25 to NR)
Sustained Test of Everyday Attention for Children Median scores at follow-up. Median (IQR)	-1 (5.19 to NR)	2 (4.97 to NR)	-0.5 (4.5 to NR)	-0.69 (3.5 to NR)
Divided Test of Everyday Attention for Children	1 (4.58 to NR)	1 (4.58 to NR)	1 (3.5 to NR)	0.5 (3.37 to NR)

Outcome	Adaptive working memory cognitive training (Cogmed), post-intervention, N = 13	Adaptive working memory cognitive training (Cogmed), 3 months, N = 13	Non-adaptive working memory cognitive training, post-intervention, N = 14	Non-adaptive working memory cognitive training, 3 months, N = 14
Median scores at follow-up. Median (IQR)				
Switching Test of Everyday Attention for Children Median scores at follow-up. Median (IQR)	2.29 (5.07 to NR)	3 (5.28 to NR)	0 (5.79 to NR)	1 (5.52 to NR)
Inhibition Test of Everyday Attention for Children Median scores at follow-up. Median (IQR)	3 (3.74 to NR)	2.8 (3.96 to NR)	3 (4.26 to NR)	2.58 (3.5 to NR)

IQR: interquartile range; N/n: number of participants; NR: not reported

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation by random number generator. Treatment allocation concealed and no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and carers were blinded to treatment allocation and appropriate analysis was used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(23% and 7% of participants in the intervention and control groups, respectively were lost to follow up (reasons for attrition: Reasons included child motivation (n=2), challenges with academic load in addition to training time (n=1), and finding the program too mentally taxing (n=1)). Loss to follow-up not balanced between groups so missingness may depend on true value. No sensitivity analyses reported.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(Some concerns as no trial protocol available.)*
Overall bias and Directness	Risk of bias judgement	High *(Some concerns as no trial protocol available and high attrition.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Piovesana, 2017

Bibliographic Reference	Piovesana, A.; Ross, S.; Lloyd, O.; Whittingham, K.; Ziviani, J.; Ware, R.S.; McKinlay, L.; Boyd, R.N.; A randomised controlled trial of a web-based multi-modal therapy program to improve executive functioning in children and adolescents with acquired brain injury; Clinical rehabilitation; 2017; vol. 31 (no. 10); 1351-1363

Study details

Country/ies where study was carried out	Australia
Study type	Randomised controlled trial (RCT)
Study dates	June 2013 to January 2015
Inclusion criteria	- Aged 8-16 years old, - Be functioning at an equivalent level of Gross Motor Function Classification Scale I or II, - Have Manual Abilities Classification Scale (I, II, III), - Have sufficient cognitive understanding, visual and verbal abilities and co-operation to participate and perform the required tasks, - Be medically diagnosed with an acquired brain injury and be classified with either mild, moderate or severe complicated brain injury, - Be able to access the internet at home (that is, phone line or internet access).
Exclusion criteria	- Unstable epilepsy (that is, frequent seizures not controlled by medication), - Degenerative or metabolic condition, - Undergone any surgical or medical intervention in the 6 months prior to starting the study.

Patient characteristics	N=60 children and young people with acquired brain injury - Move it to improve it (Mitii™): n=30 - Usual care: n=30 Age in years [Mean (SD)]: - Move it to improve it (Mitii™): 11.10 (1.6) - Usual care: 11.11 (2.6) Sex (M/F)*: - Move it to improve it (Mitii™): n=15/n=14 - Usual care: n=17/n=12 Age since injury in years [Mean (SD)]: - Move it to improve it (Mitii™): 5.9 (3.5) - Usual care: 5.2 (4) Chronic neurological disorder category: Acquired brain injury *Data only available for participants analysed (n=58) rather than randomised.
Intervention(s)/control	**Intervention** Name: Move it to improve it (Mitii™) Protocol intervention group: Interventions to improve and maintain executive function (1)

	Delivery setting: Community Number/ frequency of sessions: 6x 30-minute sessions per week Duration: 20 weeks Practitioner(s): Therapists (explained the programme; however the programme itself was performed at home without a practitioner). Participants received training and were provided with all material necessary to complete the Move it to improve it programme (including Microsoft Kinect to track body movement of children when completing training module, laptops, internet, step blocks, wobble discs, and weights). Families were provided with motivational strategies to keep their children motivated. The programme ranges in difficulties and can be delivered to left, right or bimanually impaired functions. Individualised programmes were designed according to the baseline assessment results. Modules were selected from 11 available and were targeted at gross motor or physical activity, combined cognitive and visual perception or upper limb modules for an individualised program time of 30 minutes.* **Control** Name: Usual care Protocol description: Usual care (physiotherapy and occupational therapy) received during 20-week waitlist period. Delivery setting: Community Number/ frequency of sessions: Not applicable Duration: Not applicable Practitioner(s): Not applicable * No information was provided about how executive function was targeted; protocol group was inferred from trial aim.
Duration of follow-up	20 weeks
Sources of funding	Not industry funded
Sample size	N=60

	Move it to improve it (Mitii™): n=30 Usual care: n=30 Note: n=58 continued to baseline assessment (1 participant from each group withdrew from the study before baseline assessments).

Mitii™: Move it to improve it; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (20 weeks from baseline)

Move it to improve it (Mitii™) versus Usual care: Executive function
Executive function as measured by Delis-Kaplan Executive Functioning System - Polarity - Higher values are better
Executive function as measured by Behaviour Rating Inventory of Executive Function (Global Executive Composite) - Polarity - Lower values are better

Outcome	Move it to improve it (Mitii™), post-intervention, N = 25	Usual care, post-intervention, N = 26
Colour naming Delis-Kaplan Executive Functioning System Mean scores at follow-up. Mean (SD)	7.08 (3.5)	6.92 (3.84)
Word reading Delis-Kaplan Executive Functioning System Mean scores at follow-up. Mean (SD)	6.92 (3.65)	6.52 (4.21)

Outcome	Move it to improve it (Mitii™), post-intervention, N = 25	Usual care, post-intervention, N = 26
Inhibition Delis-Kaplan Executive Functioning System Mean scores at follow-up. Mean (SD)	8.83 (3.38)	7.72 (3.47)
Behaviour Rating Inventory of Executive Function (Global Executive Composite) Mean scores at follow-up. Mean (SD)	65 (11.06)	65.96 (10.91)

N/n: number of participants; NR: not reported; SD: standard deviation

Move it to improve it (Mitii™) versus Usual care: Attention

Attention as measured by Test of Everyday Attention for Children - Polarity - Higher values are better

Outcome	Move it to improve it (Mitii™), post-intervention, N = 25	Usual care, post-intervention, N = 26
Sky Search Test of Everyday Attention for Children Mean scores at follow-up. Mean (SD)	7.24 (2.96)	7.65 (3.26)
Score Test of Everyday Attention for Children Mean scores at follow-up. Mean (SD)	8.38 (3.67)	7.56 (3.7)

Outcome	Move it to improve it (Mitii™), post-intervention, N = 25	Usual care, post-intervention, N = 26
SkySearch DT Test of Everyday Attention for Children Mean scores at follow-up. Mean (SD)	4.46 (2.99)	5.52 (3.27)

DT: divided attention; N/n: number of participants; NR: not reported; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation was done using a computer generated number table. Allocation sequence concealed and no baseline differences were found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Non-blinded intervention however no deviations arose and appropriate analysis was performed.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(14% and 10% of participants in the intervention and control groups, respectively were lost to follow up (reasons for withdrawal in intervention arm: inability to be contacted (n=1), declined to continue in the study (n=2), and medical reasons (n=1).).*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by*

Section	Question	Answer
		researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Results reported and analysed according to a pre-specified plan.)*
Overall bias and Directness	Risk of bias judgement	High *(Some concerns due to missing outcome data.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Rilo, 2018

Bibliographic Reference	Rilo, O.; Pena, J.; Ojeda, N.; Rodriguez-Antiguedad, A.; Mendibe-Bilbao, M.; Gomez-Gastiasoro, A.; DeLuca, J.; Chiaravalloti, N.; Ibarretxe-Bilbao, N.; Integrative group-based cognitive rehabilitation efficacy in multiple sclerosis: a randomized clinical trial; Disability and rehabilitation; 2018; vol. 40 (no. 2); 208-216

Study details

Country/ies where study was carried out	Spain
Study type	Randomised controlled trial (RCT)
Study dates	January 2013 - September 2015
Inclusion criteria	- Clinically definite multiple sclerosis diagnosed according to McDonald,

	- Aged between 20 and 60 years, - Relapsing-remitting, secondary progressive or primary progressive multiple sclerosis, - With or without cognitive deficits.
Exclusion criteria	- Presence of dementia as defined by a Mini Mental State Examination Test score <24, - Having suffered an exacerbation during the month prior to the cognitive assessment, - Being treated with corticosteroids during study participation, - Presence of another relevant neurological disorder, - History of stroke or traumatic brain injury resulting in a loss of consciousness for more than 30-minutes, - Presence of psychiatric disorders.
Patient characteristics	N=42 adults with relapsing-remitting, secondary progressive or primary progressive multiple sclerosis, with or without cognitive deficits. - Integrative cognitive rehabilitation programme (REHACOP): n=21 - Waitlist control: n=21 Age in years [Mean (SD)]: - Integrative cognitive rehabilitation programme (REHACOP): 43.90 (9.51) - Waitlist control: 43.67 (6.89) Sex (M/F): - Integrative cognitive rehabilitation programme (REHACOP): n=8/n=13 - Waitlist control: n=7/n=14

	Time since diagnosis or injury in years [Mean (SD)]: - Integrative cognitive rehabilitation programme (REHACOP): 9.95 (7.84) - Waitlist control: 10.67 (5.79) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: Integrative cognitive rehabilitation programme (REHACOP) Protocol intervention group: Interventions to improve and maintain executive function (1), memory and learning (3), social cognition (4), and attention (7) Delivery setting: Outpatient – multiple sclerosis association centre. Group format (5 – 8 patients). Patients also completed tasks at home during the learning and memory module to promote generalisation of the use of learning strategies to activities of daily living. Number/ frequency of sessions: Group sessions - 3 x 1-hour per week. Patients were instructed to complete tasks at home 3 x per week. Duration: 12 weeks Practitioner(s): Neuropsychologists (trained in administration of protocol) REHACOP is an integrative cognitive rehabilitation programme based on the principles of restoration, compensation and optimisation. Treatment begins with remediation of basic cognitive processes, gradually advancing to more complex cognitive domains, and finishes with daily living complex tasks. The programme is divided into eight consecutive modules: attention, learning and memory, language, executive functions, social cognition, social skills, activities of daily living, and psycho-education. Processing speed is also trained in the first four modules, because several tasks are timed. Tasks within each module are hierarchically arranged by ability subtypes and difficulty levels to ensure an increasing level of cognitive demand.

	The programme is composed of around 300 paper and pen tasks which patients complete individually (within the group setting). The solutions are discussed within the group on a collaborative basis. Patients were also instructed to complete exercises at home during the learning and memory module to promote the generalisation of the strategies learned to daily life activities; for example, writing a diary describing what they had done two days before, shopping without using a list. **Control** Name: Waitlist control Protocol description: No intervention Delivery setting: Not applicable Number/ frequency of sessions: Not applicable Duration: Not applicable Practitioner(s): Not applicable
Duration of follow-up	Post-intervention (within 1 week of completing intervention/12 weeks)
Sources of funding	Not industry funded
Sample size	N=42 - Integrative cognitive rehabilitation programme (REHACOP): n=21 - Waitlist control: n=21
Other information	5 patients from the REHACOP group also participated in private cognitive rehabilitation during their participation in the study, attending a mean of 10 sessions (45 min each) mainly focused on short-term memory.

N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (12 weeks from baseline)

Integrative cognitive rehabilitation programme (REHACOP) versus Waitlist control: Processing speed
Processing speed as measured by Salthouse Perceptual Comparison Test - Polarity - Higher values are better
Processing speed as measured by Stroop Color-Word Test - Polarity - Higher values are better
Processing speed as measured by The Symbol Digit Modalities Test - Polarity - Higher values are better

Outcome	Integrative cognitive rehabilitation programme (REHACOP), post-intervention, N = 21	Waitlist control, post-intervention, N = 21
Salthouse Perceptual Comparison Test Mean scores at follow-up. Mean (SD)	25.38 (7.21)	27.38 (9.29)
Stroop Color-Word Test Mean scores at follow-up. Mean (SD)	42.57 (11.6)	43.62 (11.36)
The Symbol Digit Modalities Test Mean scores at follow-up. Mean (SD)	42.62 (12.46)	47.52 (13)

N/n: number of participants; SD: standard deviation

Integrative cognitive rehabilitation programme (REHACOP) versus Waitlist control: Working memory

Working memory as measured by Hopkins Verbal Learning Test - Revised; Recall - Polarity - Higher values are better

Outcome	Integrative cognitive rehabilitation programme (REHACOP), post-intervention, N = 21	Waitlist control, post-intervention, N = 21
Hopkins Verbal Learning Test - Revised; Recall Mean scores at follow-up. Mean (SD)	8.71 (2.67)	9.48 (1.81)

N/n: number of participants; SD: standard deviation

Integrative cognitive rehabilitation programme (REHACOP) versus Waitlist control: Attention

Attention as measured by Brief Test of Attention - Polarity - Higher values are better

Attention as measured by Trail Making Test A - Polarity - Lower values are better

Outcome	Integrative cognitive rehabilitation programme (REHACOP), post-intervention, N = 21	Waitlist control, post-intervention, N = 21
Brief Test of Attention Mean scores at follow-up. Mean (SD)	12.81 (4.2)	15.1 (3.71)
Trail Making Test A Mean scores at follow-up. Mean (SD)	45.24 (16.63)	40.43 (18.23)

N/n: number of participants; SD: standard deviation

Integrative cognitive rehabilitation programme (REHACOP) versus Waitlist control: Working memory and attention composite

Working memory and attention composite as measured by Backward Digits subtest of the WAIS III; - Polarity - Higher values are better

Outcome	Integrative cognitive rehabilitation programme (REHACOP), post-intervention, N = 21	Waitlist control, post-intervention, N = 21
Backward Digits subtest of the WAIS III; Mean scores at follow-up. Mean (SD)	6.43 (1.75)	6.24 (1.73)

N/n: number of participants; SD: standard deviation; WAIS-III: Wechsler Adult Intelligence Scale Third Edition

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Participants randomly assigned using an online computer-generated random number. Allocation sequenced concealed and no baseline differences found.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(Non-blinded trial however no deviations arose and appropriate analysis used. 5 patients from the REHACOP group also participated in private cognitive rehabilitation during their participation in the study, and it is not clear whether the reported analyses include these patients..)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for nearly all participants randomised (42/44; 95%))*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by*

Section	Question	Answer
		researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to pre-specified protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for deviations from the intended interventions.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Siponkoski, 2020

Bibliographic Reference	Siponkoski, S.-T.; Martinez-Molina, N.; Kuusela, L.; Laitinen, S.; Holma, M.; Ahlfors, M.; Jordan-Kilkki, P.; Ala-Kauhaluoma, K.; Melkas, S.; Pekkola, J.; Rodriguez-Fornells, A.; Laine, M.; Ylinen, A.; Rantanen, P.; Koskinen, S.; Lipsanen, J.; Sarkamo, T.; Music Therapy Enhances Executive Functions and Prefrontal Structural Neuroplasticity after Traumatic Brain Injury: Evidence from a Randomized Controlled Trial; Journal of Neurotrauma; 2020; vol. 37 (no. 4); 618-634

Study details

Country/ies where study was carried out	Finland
Study type	Cross-over randomised controlled trial
Study dates	March 2014 - November 2017

Inclusion criteria	- Diagnosed (ICD-10) traumatic brain injury fulfilling the criteria of at least moderate severity (Glasgow Coma Scale ≤12 and/or posttraumatic amnesia ≥24 hours), - Cognitive symptoms caused by traumatic brain injury (attention, executive function, memory), - No previous neurological or severe psychiatric illnesses or substance abuse, - Aged 16-60 years, - Native Finnish speaking or bilingual with sufficient communication skills in Finnish, - Living in the Helsinki-Uusimaa area, - Understanding the purpose of the study and being able to give an informed consent.
Exclusion criteria	Not reported
Patient characteristics	N=40 adults with traumatic brain injury - Neurological musical therapy plus standard care: n=20 - Standard care only: n=20 Age in years [Mean (SD)]: - Neurological musical therapy plus standard care: 41.6 (14.7) - Standard care only: 40.9 (12.0) Sex (M/F)*: - Neurological musical therapy plus standard care: n=10/n=10 - Standard care only: n=13/n=6

	Time since diagnosis or injury in months [Mean (SD)]: - Neurological musical therapy plus standard care: 8.6 (6.7) - Standard care only: 9.2 (6.3) Chronic neurological disorder category: Acquired brain injury * Data only available for participants analysed (n=39) rather than randomised.
Intervention(s)/control	**Intervention** Name: Neurological musical therapy plus standard care Protocol intervention group: Interventions to improve and maintain executive function (1), and attention (7) Delivery setting: Community Number/ frequency of sessions: 2x 60-minute sessions per week Duration: 3 months Practitioner(s): Trained musical therapist During the first 3 months participants in the intervention received the intervention and standard care while the control group only received standard care. The control group received the intervention in the following 3 months. The intervention focussed on active musical production with different instruments. The intervention included rhythmical training, structured cognitive-motor training, and assisted music playing. All modules included different difficulty levels which were adjusted to the individual and raised for progression. Musical improvisation was included to facilitate creative expression. The intervention tapped into a number of executive (action planning and monitoring, inhibitory control, shifting), attentional (focused attention, spatial attention, vigilance), and working memory (updating) as well as motor (motor control, eye-movement coordination) and emotional (affect regulation, emotional expression) functions. **Control** Name: Standard care only Protocol description: Control (standard care only)

	Delivery setting: Not reported Number/frequency of sessions: Not reported Duration: Not reported Practitioner(s): Not reported Standard care was received during the 3 month waitlist period. No further information provided on standard care.
Duration of follow-up	6- months (3 months from baseline)
Sources of funding	Industry funding unclear
Sample size	N=40 - Neurological musical therapy plus standard care: n=20 - Standard care only: n=20 Note: One participant dropped out following randomisation, prior baseline assessments.

ICD-10: international classification of disease, 10th revision; N/n: number of participants; SD: standard deviation; TBI: traumatic brain injury

Outcomes

Study timepoints

- Post-intervention (3 months from baseline)

Neurological musical therapy plus standard care versus Standard care only: Executive function

Executive function as measured by Frontal Battery Assessment - Polarity - Higher values are better

Outcome	Neurological musical therapy plus standard care, post-intervention, N = 20	Standard care only, post-intervention, N = 19
FAB Mean scores at follow-up. Mean (SD)	95 (9.2)	93.07 (7.7)

FAB: frontal battery assessment; N/n: number of participants; SD: standard deviation

Neurological musical therapy plus standard care versus Standard care only: Working memory
Working memory as measured by N-back effect, reaction time (ms) - Polarity - Higher values are better
Working memory as measured by N-back effect, error rate (percent) - Polarity - Higher values are better

Outcome	Neurological musical therapy plus standard care, post-intervention, N = 20	Standard care only, post-intervention, N = 19
N-back effect, reaction time (ms) Mean (SD)	314.4 (316.8)	304 (191.7)
N-back effect, error rate (percent) Mean scores at follow-up. Mean (SD)	13.8 (8.5)	17.9 (10.3)

Ms: milliseconds; N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Randomisation was performed using an online random number generator by a person not involved in patient recruitment or assessments. Allocation sequence concealed. Baseline differences found only for causes leading to injury however this is not considered to be of clinical importance.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Non-blinded trial however no deviations arose. Larger number of drop-outs in the waitlist control however intention to treat analysis was performed.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(0% and 11% of participants in the intervention and control groups, respectively were lost to follow up (no reasons for attrition reported). Loss to follow-up not balanced between groups so missingness may depend on true value. No sensitivity analyses reported.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Data reported and analysed according to pre-specified trial protocol.)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Some concerns for missing outcome data.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Stubberud, 2013

Bibliographic Reference	Stubberud, J.; Langenbahn, D.; Levine, B.; Stanghelle, J.; Schanke, A.-K.; Goal management training of executive functions in patients with spina bifida: A randomized controlled trial; Journal of the International Neuropsychological Society; 2013; vol. 19 (no. 6); 672-685

Study details

Country/ies where study was carried out	Norway
Study type	Randomised controlled trial (RCT)
Study dates	2010
Inclusion criteria	- Diagnosed with spina bifida myelomeningocele, - Aged 19 - 45 years, - Registered in 2010 at TRS National Resource Centre for Rare Disorders, - Subjective complaints of executive dysfunction, - T >60 on at least one of the BRIEF-A subscales.
Exclusion criteria	- Impaired essential linguistic, perceptual, or motor function that would interfere with participating in training, - Axis I psychiatric disorders, - IQ <70.
Patient characteristics	N=38 adults with spina bifida myelomeningocele - GMT: n=24 - Waitlist control: n=14

	Age in years [Mean (SD)]: - GMT: 31.79 (8.38) - Waitlist control: 31.79 (8.50) Sex (M/F): - GMT: n=10/n=14 - Waitlist control: n=6/n=8 Time since diagnosis or injury: Not reported Chronic neurological disorder category: Progressive neurological disease
Intervention(s)/control	**Intervention** Name: GMT Protocol intervention group: Interventions to improve and maintain executive function (1) Delivery setting: Inpatient Number/frequency of sessions: 7 GMT modules, minimum of 3 hours per module completed in three 3-day sessions with one month interval after each 3-day session Duration: 3 months Practitioners: Clinical neuropsychologist and nurse/social worker

	Participants received a PowerPoint presentation and workbooks, and sessions involved interactive discussions and exercises to increase awareness of GMT. GMT consists of seven modules, with a minimum of three hours being necessary to complete each module. Throughout the intervention, participants were encouraged to discuss their real life executive problems, and how GMT strategies could be applied to these difficulties. Participants received training in stopping and orienting to relevant information, partitioning goals into subgoals, encoding and retaining goals, monitoring performance, and mindfulness. **Control** Name: Waitlist control Protocol description: Control [waitlist] Delivery setting: Not applicable Number/frequency of sessions: Not applicable Duration: 3 months (participants were told they would receive GMT one year later) Practitioner: Not applicable No other interventions were received during the study period.
Duration of follow-up	Immediately after intervention and 6-months post-intervention
Sources of funding	Not industry funded
Sample size	N=38 - GMT: n=24 - Waitlist control: n=14
Other information	Executive function outcomes were not extracted because they are reported in Stubberud 2014 with the same population.

BRIEF-A: behaviour rating inventory of executive functioning; GMT: goal management training; IQ: intelligence quotient; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (3 months from baseline)
- 6 months from post-intervention

GMT versus Waitlist control: Attention
Attention as measured by Conners' Continuous Performance Test II - Polarity - Lower values are better
Attention as measured by Conners' Continuous Performance Test II - Polarity - Lower values are better
Attention as measured by Conners' Continuous Performance Test II - Polarity - Higher values are better
Attention as measured by Trail Making Test (from D-KEFS battery of tests) - Polarity - Lower values are better

Outcome	GMT, post-intervention, N = 24	GMT, 6 months, N = 24	Waitlist control, post-intervention, N = 13	Waitlist control, 6 months, N = 13
Conners' Continuous Performance Test II Commission errors Mean scores at follow-up. Mean (SD)	14.26 (8.76)	7.09 (3.16)	16.23 (10.09)	15.46 (9.77)
Conners' Continuous Performance Test II Omission errors Mean scores at follow-up. Mean (SD)	3.74 (5.22)	1.43 (1.67)	4.31 (7.45)	2.15 (3)
Conners' Continuous Performance Test II Hit Reaction Time Mean scores at follow-up. Mean (SD)	373.11 (62.68)	392.06 (55.96)	369.22 (73.37)	362.75 (61.89)

Outcome	GMT, post-intervention, N = 24	GMT, 6 months, N = 24	Waitlist control, post-intervention, N = 13	Waitlist control, 6 months, N = 13
ATotal errors condition 4 Trail Making Test Mean scores at follow-up. Mean (SD)	1.25 (2.44)	0.38 (0.58)	0.46 (0.66)	0.77 (0.73)
Motor speed condition 5 (s) Trail Making Test Mean scores at follow-up. Mean (SD)	33.79 (NR)	33.63 (NR)	32.08 (NR)	33.31 (NR)

D-KEFS: Delis-Kaplan executive function system; GMT: goal management training; N/n: number of participants; NR: not reported; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(Block randomisation method used. Insufficient information about allocation concealment (investigator responsible for randomisation was not involved in training, but not clear if external/independent and no other mention of concealment; however, no evidence of imbalances at baseline.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Participants and personnel aware of allocated intervention but there was no deviation from allocated interventions)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Low *(Data available for nearly all participants (37/38; 97%))*

Section	Question	Answer
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(Outcome measures appropriate and same between groups. No information about whether outcome assessors were aware of the intervention, but unlikely assessment could be influenced by knowledge of intervention as standardised scales were used with objective outcomes (for example, time taken, number of errors))*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol or statistical analysis plan published)*
Overall bias and Directness	Risk of bias judgement	Some concerns *(Due to some concerns about the randomisation process, measurement of the outcome and selection of the reported results.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Stubberud, 2014

Bibliographic Reference	Stubberud, J.; Langenbahn, D.; Levine, B.; Stanghelle, J.; Schanke, A.-K.; Goal management training improves everyday executive functioning for persons with Spina bifida: Self-and informant reports six months post-training; Neuropsychological Rehabilitation; 2014; vol. 24 (no. 1); 26-60

Study details

Country/ies where study was carried out	See Stubberud 2013

Study type	See Stubberud 2013
Study dates	See Stubberud 2013
Inclusion criteria	See Stubberud 2013
Exclusion criteria	See Stubberud 2013
Patient characteristics	See Stubberud 2013
Intervention(s)/control	See Stubberud 2013
Duration of follow-up	6 months post-intervention
Sources of funding	See Stubberud 2013
Sample size	See Stubberud 2013

BRIEF-A: behaviour rating inventory of executive functioning; GMT: goal management training; IQ: intelligence quotient; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (3 months from baseline)
- 6 months from post-intervention

GMT versus Waitlist control: Executive function
Executive function as measured by Dysexecutive Questionnaire - self ratings - Polarity - Lower values are better
Executive function as measured by Behaviour Rating Inventory of Executive Functioning-Adult version (Global Executive Composite) - self ratings - Polarity - Lower values are better
Executive function as measured by Dysexecutive Questionnaire - informant ratings - Polarity - Lower values are better

Executive function as measured by Behaviour Rating Inventory of Executive Functioning-Adult version (Global Executive Composite) - informant ratings - Polarity - Lower values are better

Outcome	GMT, post-intervention, N = 24	GMT, 6 months, N = 24	Waitlist control, post-intervention, N = 13	Waitlist control, 6 months, N = 13
Dysexecutive Questionnaire - self ratings Mean scores at follow-up. Mean (SD)	24.29 (9.47)	19.38 (7.58)	28.69 (15.17)	27.85 (14.21)
Behaviour Rating Inventory of Executive Functioning-Adult version (Global Executive Composite) - self ratings Mean scores at follow-up. Mean (SD)	61.83 (12.3)	60.88 (11.45)	60.77 (11.17)	60.08 (12.86)
Dysexecutive Questionnaire - informant ratings Mean scores at follow-up. Mean (SD)	22.13 (9.49)	19.13 (13.53)	23.36 (16.71)	22.18 (17.57)
Behaviour Rating Inventory of Executive Functioning-Adult version (Global Executive Composite) - informant ratings Mean scores at follow-up. Mean (SD)	55.32 (11.02)	54.6 (12.83)	54.55 (13.84)	55 (13.53)

GMT: goal management training; N/n: number of participants; SD: standard deviation

GMT versus Waitlist control: Functioning

Functioning as measured by Cognitive Failure Questionnaire - Polarity - Lower values are better

Outcome	GMT, post-intervention, N = 24	GMT, 6 months, N = 24	Waitlist control, post-intervention, N = 13	Waitlist control, 6 months, N = 13
Cognitive Failure Questionnaire Mean scores at follow-up. Mean (SD)	42.04 (13.37)	36.96 (9.44)	49.77 (16.5)	50.15 (12.5)

GMT: goal management training; N/n: number of participants; SD: standard deviation

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(Block design randomisation. Allocation was not concealed. No significant differences between groups for any participant demographic characteristics at baseline)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(Although participants and personnel were aware of interventions allocated, there were no deviations from intended interventions. ITT analyses were not used.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	Some concerns *(0% and 7% of participants in the intervention and control groups, respectively were lost to follow-up (n=1 lost to follow up due to death) at the final assessment time-point; loss to follow-up not balanced between groups so missingness may depend on true value. No sensitivity analyses conducted.)*

Section	Question	Answer
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	High *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers aware of allocation. Outcomes are all objective and knowledge could not have influenced the outcome measure.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No details of published protocol)*
Overall bias and Directness	Risk of bias judgement	High *(Allocation concealment did not occur, no ITT analysis conducted, some attrition, some risk of bias in judgement for the measurement of the outcome, and no published protocol reported.)*
Overall bias and Directness	Overall Directness	Directly applicable
Overall bias and Directness	Risk of bias variation across outcomes	Not applicable

ITT: intention to treat

Svaerke, 2022

Bibliographic Reference	Svaerke, K.; Faerk, A.K.; Riis, A.; Von Ehrenfels, S.E.M.S.; Mogensen, J.; Lokkegaard, A.; Effects of Computer-Based Cognitive Rehabilitation on Attention, Executive Functions, and Quality of Life in Patients with Parkinson's Disease: A Randomized, Controlled, Single-Blinded Pilot Study; Dementia and Geriatric Cognitive Disorders; 2022; vol. 50 (no. 6); 519-528

Study details

Country/ies where study was carried out	Denmark

Study type	Randomised controlled trial (RCT)
Study dates	October 2017 - December 2020
Inclusion criteria	- Montreal Cognitive Assessment Test for Dementia* score between 22 - 28, *includes participants with close to normal cognitive function and mild cognitive impairment, but excludes participants with Parkinson dementia - Able to use a tablet and access Internet connection at home, - Not receiving dopamine receptor blocking agents, - No comorbid diseases known to affect cognition, - Cognitively fit to complete a computer-based cognitive rehabilitation.
Exclusion criteria	- Clear clinical signs of depression from the quality of life questionnaire, the depression and anxiety screening instrument, or the initial screening interview, - Unable to facilitate the intervention for individual reasons other than those listed above.
Patient characteristics	N=30 adults with Parkinson's disease - CBCR Professional Brain Training: n=10 - CBCR Brain + Parkinson Recover: n=10 - No intervention: n=10 Age in years [Mean (SD)]: - CBCR Professional Brain Training: 65.8 (9.9) - CBCR Brain + Parkinson Recover: 63.6 (8.2) - No intervention: 64.5 (11.0)

	Sex (M/F): - CBCR Professional Brain Training: n=3/n=5 - CBCR Brain + Parkinson Recover: n=8/n=0 - No intervention: n=3/n=5 Time since diagnosis or injury in years [Mean (SD)]: - CBCR Professional Brain Training: 5.5 (4.5) - CBCR Brain + Parkinson Recover: 6.1 (3.9) - No intervention: 5.6 (3.4) Chronic neurological disorder category: Progressive neurological diseases
Intervention(s)/control	**Intervention** Name: CBCR Professional Brain Training Protocol intervention group: Interventions to improve and maintain executive function (1) Delivery setting: Not reported Number/ frequency of sessions: 5 x per week for 18-24 minutes and follow up visit every second visit (follow up on visits 2 and 4) Duration: 8 weeks Practitioner(s): Neuropsychologist

	Eight computer-based exercises targeting executive function were chosen for this trial, which consisted of 9 levels of difficulty that encouraged advancing to the next level when a task was solved correctly (>75%) twice in a row. Performance feedback for each exercise and the user's progress can also be accessed. Participants had follow-up visits in clinic with a neuropsychologist every second week to address questions/problems with the programme. **Intervention** Name: CBCR Brain + Parkinson Recover Protocol intervention group: Interventions to improve and maintain executive function (1), processing speed (2), and memory and learning (3). Delivery setting: Not reported Number/ frequency of sessions: training 3 times a week for 30-40 minutes and follow up visit every second visit (follow up on visits 2 and 4) Duration: 8 weeks Practitioner(s): Not reported Participants used 4 available exercises in the programme: one exercise aimed at episodic memory and 3 different exercises aimed at processing speed, working memory, and strategic thinking. The "Brain+ Parkinson Recover" edition is a modified version of the original app designed for cognitive rehabilitation, which starts out less difficult, advances more slowly, and has a more simple and manageable design. Each time a user completed a game in the app, feedback about performance is provided, and the level of difficulty increases or decreases accordingly. **Control** Name: No intervention Protocol description: Control (no intervention) Delivery setting: Not applicable Number/ frequency of sessions: Not applicable Duration: Not applicable

	Practitioner(s): Not applicable Participants had follow up visits in clinic with a neuropsychologist every second week, which included completing a mental activity on a computer, which was non-demanding (for example, solitaire), and a general supportive conversation (non-therapeutic). Note: For all groups, if participants were logistically prevented from attending follow-up visits, the conversation took place on the telephone. All participants were tested at baseline and at the end of the intervention for quality of life.
Duration of follow-up	8 weeks
Sources of funding	Not industry funded
Sample size	N=30 - CBCR Professional Brain Training: n=10 - CBCR Brain + Parkinson Recover: n=10 - No intervention: n=10

CBCR: computer-based cognitive rehabilitation; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (8 weeks from baseline)

CBCR Professional Brain Training versus CBCR Brain + Parkinson Recover versus No intervention: Physical and mental health related quality of life and social care related quality of life

Physical and mental health related quality of life and social care related quality of life as measured by Parkinson's Disease Questionnaire, PDQ-39 - Polarity - Lower values are better

Outcome	CBCR Professional Brain Training, post-intervention, N = 8	CBCR Brain + Parkinson Recover, post-intervention, N = 8	No intervention, post-intervention, N = 8
Parkinson's Disease Questionnaire, PDQ-39 Mean scores at follow-up. Mean (SD)	9.12 (7.5)	17.75 (9.9)	26.38 (15.6)

CBCR: computer-based cognitive rehabilitation; N/n: number of participants; PDQ-39: Parkinson's disease questionnaire; SD: standard deviation

CBCR Professional Brain Training versus CBCR Brain + Parkinson Recover versus No intervention: Processing speed

Processing speed as measured by Symbol digit modalities test - Polarity - Higher values are better

Outcome	CBCR Professional Brain Training, post-intervention, N = 8	CBCR Brain + Parkinson Recover, post-intervention, N = 8	No intervention, post-intervention, N = 8
Symbol digit modalities test Mean scores at follow-up. Mean (SD)	42.5 (16.5)	39.25 (8)	45.38 (15.7)

CBCR: computer-based cognitive rehabilitation; N/n: number of participants; SD: standard deviation

CBCR Professional Brain Training versus CBCR Brain + Parkinson Recover versus No intervention: Attention

Attention as measured by Trail Making Test A - Polarity - Lower values are better

Attention as measured by Trail making test B - Polarity - Lower values are better

Outcome	CBCR Professional Brain Training, post-intervention, N = 8	CBCR Brain + Parkinson Recover, post-intervention, N = 8	No intervention, post-intervention, N = 8
Trail Making Test A	38 (17.1)	55.13 (31.4)	40.25 (17.2)

Outcome	CBCR Professional Brain Training, post-intervention, N = 8	CBCR Brain + Parkinson Recover, post-intervention, N = 8	No intervention, post-intervention, N = 8
Mean scores at follow-up. Mean (SD)			
Trail making test B Mean scores at follow-up. Mean (SD)	114.25 (65.3)	113 (71.6)	90.63 (59.7)

CBCR: Computer-based cognitive rehabilitation; N/n: number of participants; SD: standard deviation

CBCR Professional Brain Training versus CBCR Brain + Parkinson Recover versus No intervention: Working memory and attention

Working memory and attention as measured by Digit span test from WAIS-IV - Polarity - Higher values are better

Outcome	CBCR Professional Brain Training, post-intervention, N = 8	CBCR Brain + Parkinson Recover, post-intervention, N = 8	No intervention, post-intervention N = 8
Digit span test from WAIS-IV Mean scores at follow-up. Mean (SD)	10.25 (2.6)	9.63 (1.8)	11.25 (2.9)

CBCR: computer-based cognitive rehabilitation; N/n: number of participants; SD: standard deviation; WAIS-IV: Wechsler adult intelligence scale, fourth edition

Critical appraisal- Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Low *(Computer-generated randomisation list and random numbers were concealed in opaque envelopes. No statistical differences in baseline characteristics.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Some concerns *(Although personnel were aware of interventions allocated, there were no deviations from intended interventions. No information if ITT performed.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(20% of participants in both intervention groups and the control group dropped out during the intervention. Reasons for attrition were experiencing severe negative side-effects due to a shift in medication, which was not related to the study (n=1, group 1*), not having the time/energy to complete the study once enrolled (n=3, group 2*), misunderstanding of the premise of the study (n=1, group 1*), and dissatisfaction with the assigned CBCR programme (n=1, group 2*. No report of sensitivity analysis being conducted.)))*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Some concerns *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation, however outcomes were subjective.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Low *(Analysis in line with what was specified in the published protocol)*
Overall bias and Directness	Risk of bias judgement	High *(No information if ITT performed, high rate of attrition, and some concerns for risk of bias for measurement of the outcome (subjective outcomes).)*
Overall bias and Directness	Overall Directness	Directly applicable

Section	Question	Answer
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable; ITT: intention to treat

Tramontano, 2024

Bibliographic Reference	Tramontano, Marco; Argento, Ornella; Manocchio, Nicola; Piacentini, Chiara; Orejel Bustos, Amaranta Soledad; De Angelis, Sara; Bossa, Michela; Nocentini, Ugo; Dynamic Cognitive-Motor Training versus Cognitive Computer-Based Training in People with Multiple Sclerosis: A Preliminary Randomized Controlled Trial with 2-Month Follow-Up.; Journal of clinical medicine; 2024; vol. 13 (no. 9)

Study details

Country/ies where study was carried out	Italy
Study type	Randomised controlled trial (RCT)
Study dates	December 2020 - July 2023
Inclusion criteria	- Aged ≥18 years, - Diagnosis of relapsing–remitting or secondary progressive multiple sclerosis, - Mild to moderate difficulty in mobility, - Able to walk independently for at least 50 metres with/without an aid, - No exacerbation in previous 4 weeks.
Exclusion criteria	- Untreated psychiatric and neurological disorders (other than multiple sclerosis), - Other clinically significant disorders interfering with motor or cognitive tasks,

	- Steroid therapy within 4 weeks pre-enrolment, - Significant sensory impairment interfering with motor or cognitive tasks, - Lower limb fracture within 3 months pre-enrolment.
Patient characteristics	N=38 adults with multiple sclerosis - CMg: n=19 - CTg: n=19 Age in years [Mean (SD)]: - CMg: 48.92 (10.13) - CTg: 46.58 (11.13) Sex (M/F)*: - CMg: n=1/n=11 - CTg: n=5/n=7 Time since diagnosis or injury, years, [Mean (SD)]: - CMg: 12.08 (8.58) - CTg: 12.00 (8.71) Chronic neurological disorder category: Progressive neurological disease *Data only available for participants analysed (n=24) rather than randomised.

Intervention(s)/control	**Intervention** Name: CMg Protocol intervention group: Interventions to improve and maintain executive function and attention (1) Delivery setting: Not reported Number/frequency of sessions: 3 x 50-minute sessions per week for 4 weeks Duration: 4 weeks Practitioners: Physical therapists with 5 years' experience in neurorehabilitation In addition to conventional neuromotor therapy involving techniques such as muscle stretching, mobilisations, gait training, and balance exercises, cognitive motor therapy participants engaged in dual-task paradigm involving rotating their heads towards an auditory stimuli while identifying visual targets and walking on unstable surfaces and treadmill. **Others in the same protocol group** Name: CTg Protocol desciption: Interventions to improve and maintain executive function and attention (1) Delivery setting: Not reported Number/frequency of sessions: 3 x 50-minute sessions per week for 4 weeks Duration: 4 weeks Practitioners: Physical therapists with 5 years' experience in neurorehabilitation In addition to conventional neuromotor therapy involving techniques such as muscle stretching, mobilisations, gait training, and balance exercises, cognitive therapy participants focused on attention and executive functions using RehaCom® software such as memorising and identifying target stimuli among similar ones.
Duration of follow-up	2 months
Sources of funding	Partly industry-funded (Fondazione Baroni)

Sample size	N=38 - CMg: n=19 - CTg: n=19
Other information	Minimal Assessment of Cognitive function in MS measuring comprehensive cognitive assessment was not extracted as it measures overall cognitive impairment. MSQoL-54 outcomes not extracted as overall scores were not reported. Instead, 5 subscales reported.

CMg: Cognitive motor therapy; CTg: Cognitive therapy; MSQoL-54: multiple sclerosis quality of life; N/n: number of participants; SD: standard deviation

Outcomes

Study timepoints

- Post-intervention (4 weeks from baseline)
- 2 months from post-intervention

CMg versus CTg: Processing speed

Processing speed as measured by Stroop correct score - Interference errors - Polarity - Lower values are better

Outcome	CMg, post-intervention, N = 12	CMg, 2 months, N = 12	CTg, post-intervention, N = 12	CTg, 2 months, N = 12
Stroop correct score - Interference errors Mean scores at follow-up. Mean (SD)	0.81 (0.83)	1 (1.07)	1.79 (2.25)	0.6 (0.83)

CMg: Cognitive motor therapy; CTg: Cognitive therapy; N/n: number of participants; SD: standard deviation

Critical appraisal - Cochrane RoB 2

Section	Question	Answer
Domain 1: Bias arising from the randomisation process	Risk of bias judgement for the randomisation process	Some concerns *(Computer-generated permuted block randomization but insufficient information about allocation concealment (allocation concealment was maintained by staff responsible for the reassessments and outcome collection, and not involved in data collection) but not clear what method of allocation concealment was used or if this was by an external/independent unit.)*
Domain 2a: Risk of bias due to deviations from the intended interventions (effect of assignment to intervention)	Risk of bias for deviations from the intended interventions (effect of assignment to intervention)	Low *(Insufficient information about whether personnel delivering the intervention were aware of assigned interventions, but there were no deviations from intended interventions that were due to the trial context.)*
Domain 3. Bias due to missing outcome data	Risk-of-bias judgement for missing outcome data	High *(Data available for 24/38 randomised; 63%) and insufficient detail on reasons for missing outcome data. However, authors excluded multivariate outliers so likely that missingness in the outcome depended on its true value.)*
Domain 4. Bias in measurement of the outcome	Risk-of-bias judgement for measurement of the outcome	Low *(The questionnaires used were all validated and widely used tools. Standardised and validated measurement tools implemented by researchers blinded to allocation.)*
Domain 5. Bias in selection of the reported result	Risk-of-bias judgement for selection of the reported result	Some concerns *(No trial protocol or statistical analysis plan published)*
Overall bias and Directness	Risk of bias judgement	High *(Study is judged to be of high concerns due to serious concerns about missing outcome data and some concerns about the randomisation process and selection of reported results.)*
Overall bias and Directness	Overall Directness	Directly applicable

Section	Question	Answer
Overall bias and Directness	Risk of bias variation across outcomes	N/A

N/A: not applicable

Appendix E Forest plots

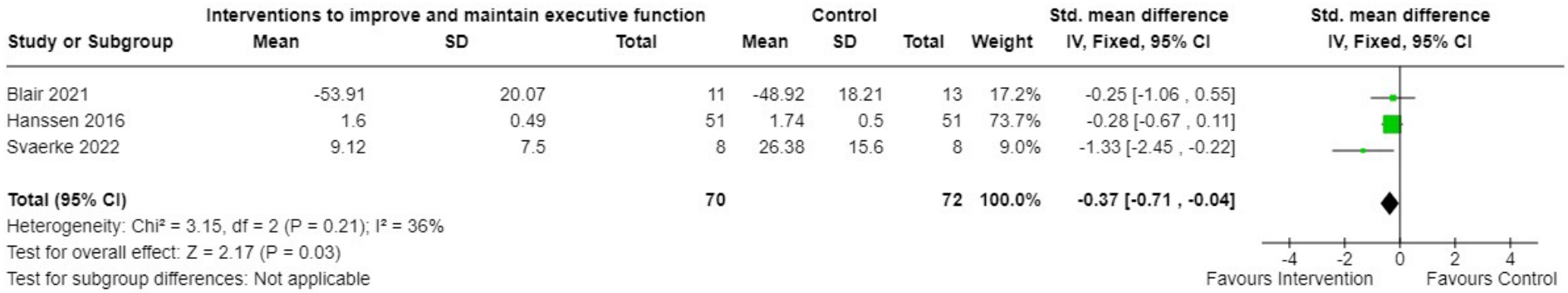
Forest plots for review question: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

This section includes forest plots only for outcomes that are meta-analysed. Outcomes from single studies are not presented here; the quality assessment for such outcomes is provided in the GRADE profiles in appendix F.

Interventions to improve and maintain executive function

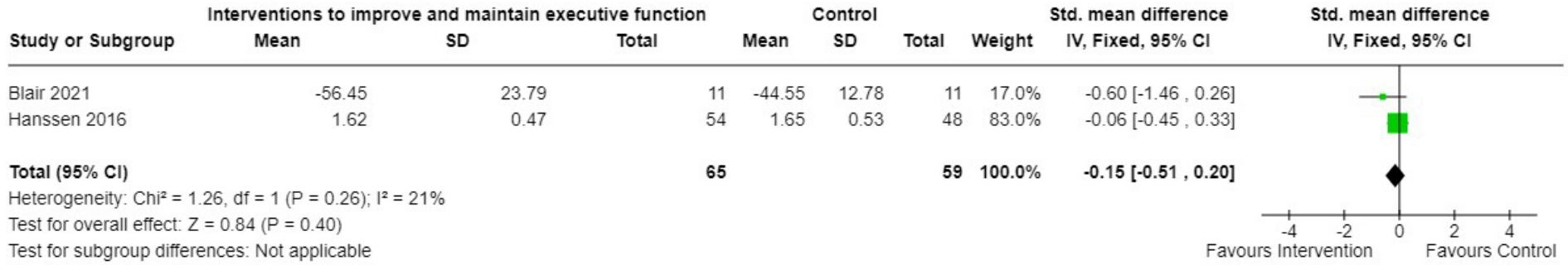
Interventions to improve and maintain executive function versus control in adults

Figure 2: Physical and mental health related quality of life and social care related quality of life as measured by a validated scale; scores at post-intervention (5 weeks to 4 months)



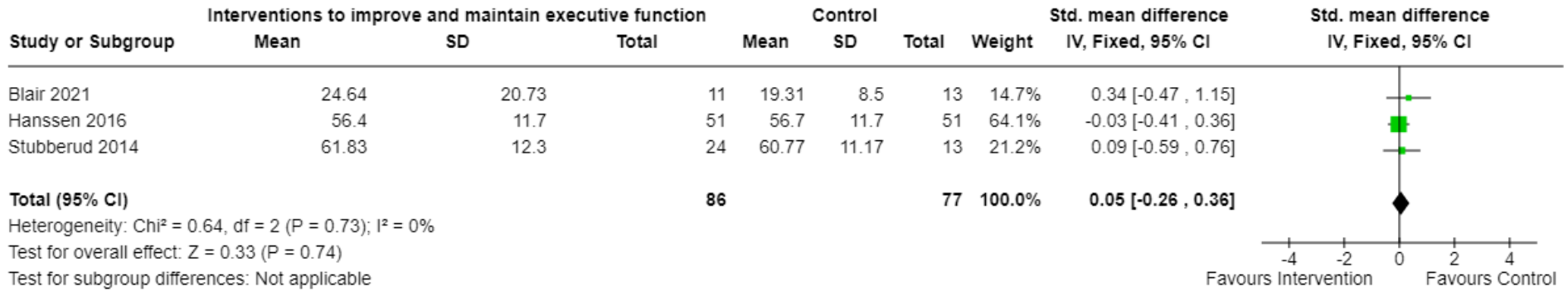
CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 3: Physical and mental health related quality of life and social care related quality of life as measured by a validated scale; scores at follow-up (6 to 7 months)



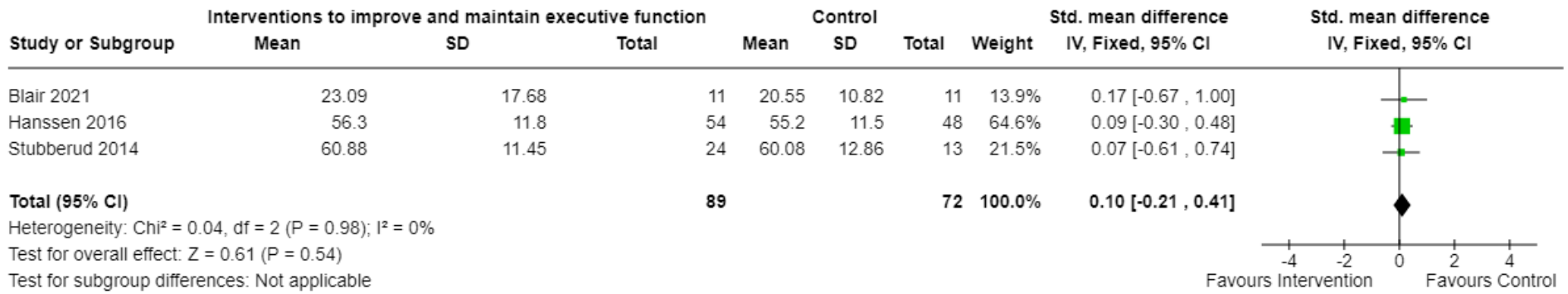
CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 4: Executive function as measured by a validated scale; scores at post-intervention (5 weeks to 4 months)



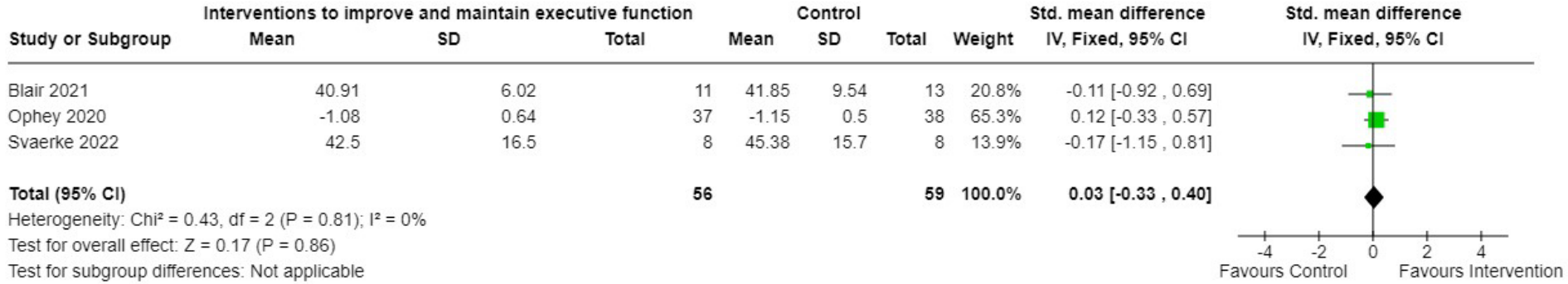
CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 5: Executive function as measure by a validated scale; scores at follow-up (6 to 7 months)



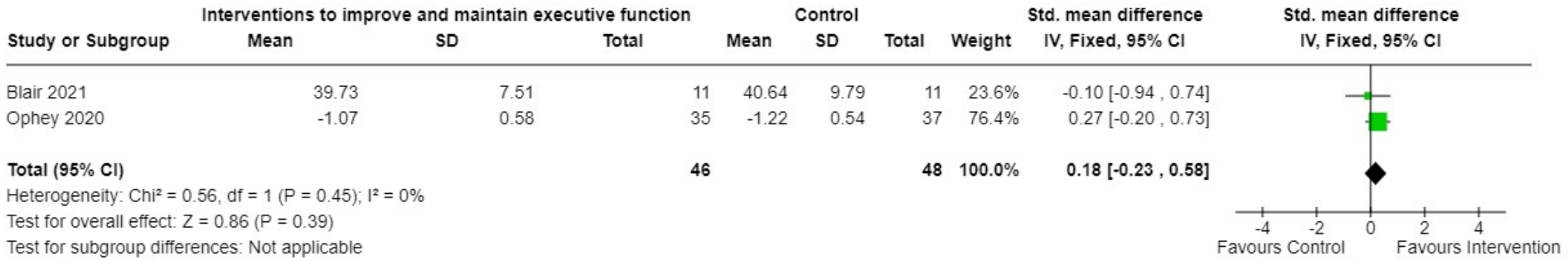
CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 6: Processing speed as measured by a validated scale; scores at post-intervention (5 to 8 weeks)



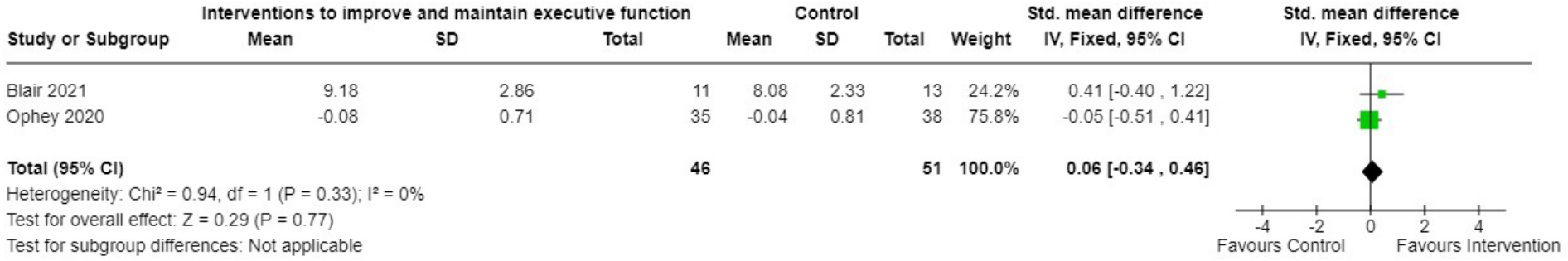
CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 7: Processing speed as measured by a validated scale; scores at follow-up (3 to 6 months)



CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 8: Working memory as measured by a validated scale; scores at post-intervention (5 weeks)

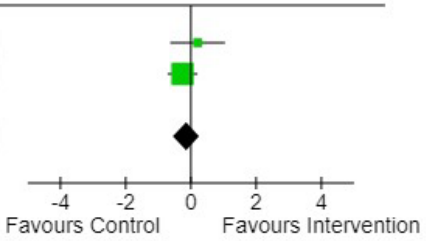


CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 9: Working memory as measured by a validated scale; scores at follow-up (3 to 6 months)

Study or Subgroup	Interventions to improve and maintain executive function Mean	SD	Total	Control Mean	SD	Total	Weight	Std. mean difference IV, Fixed, 95% CI
Blair 2021	8.45	2.58	11	7.82	3.28	11	23.0%	0.21 [-0.63 , 1.04]
Ophey 2020	-0.17	0.7	37	0.03	0.84	37	77.0%	-0.26 [-0.71 , 0.20]
Total (95% CI)			**48**			**48**	**100.0%**	**-0.15 [-0.55 , 0.25]**

Heterogeneity: Chi² = 0.90, df = 1 (P = 0.34); I² = 0%
Test for overall effect: Z = 0.73 (P = 0.46)
Test for subgroup differences: Not applicable

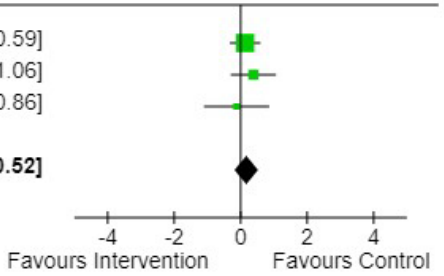


CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 10: Attention as measured by a validated scale; scores at post-intervention (5 weeks to 3 months)

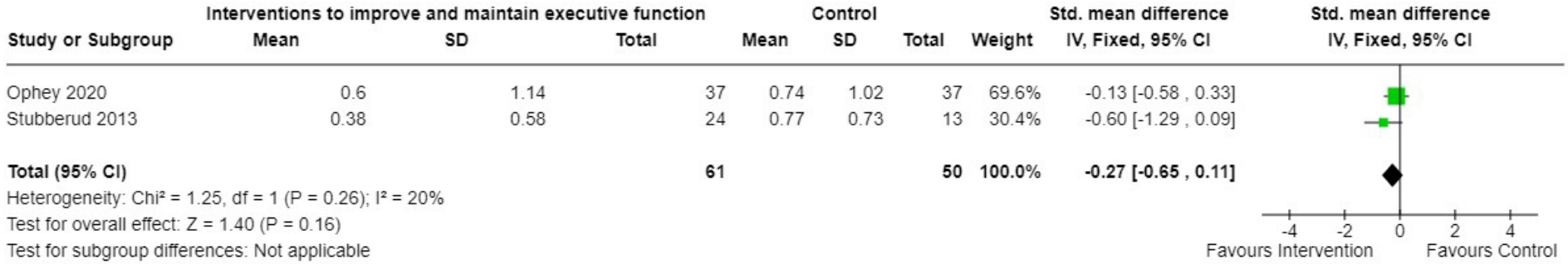
Study or Subgroup	Interventions to improve and maintain executive function Mean	SD	Total	Control Mean	SD	Total	Weight	Std. mean difference IV, Fixed, 95% CI
Ophey 2020	0.63	1.27	35	0.46	1.23	38	59.7%	0.13 [-0.33 , 0.59]
Stubberud 2013	1.25	2.44	24	0.46	0.66	13	27.2%	0.38 [-0.30 , 1.06]
Svaerke 2022	38	17.1	8	40.25	17.2	8	13.1%	-0.12 [-1.11 , 0.86]
Total (95% CI)			**67**			**59**	**100.0%**	**0.17 [-0.19 , 0.52]**

Heterogeneity: Chi² = 0.75, df = 2 (P = 0.69); I² = 0%
Test for overall effect: Z = 0.93 (P = 0.35)
Test for subgroup differences: Not applicable



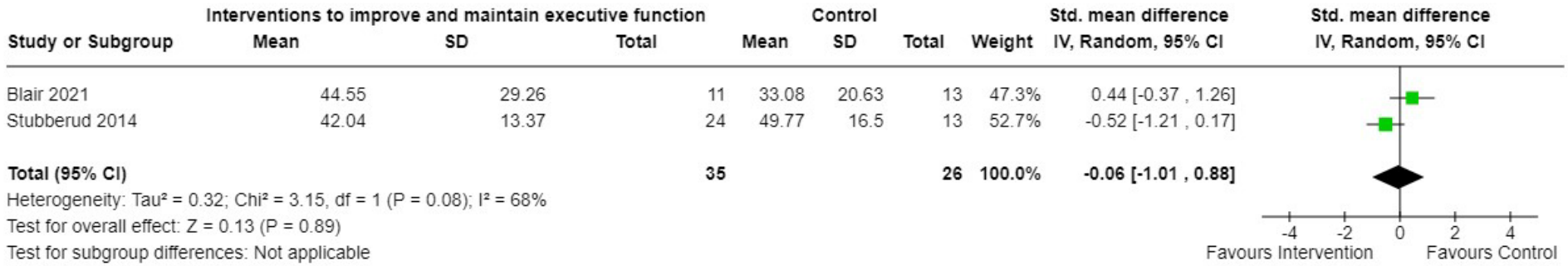
CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 11: Attention as measured by a validated scale; scores at follow-up (3 to 6 months)



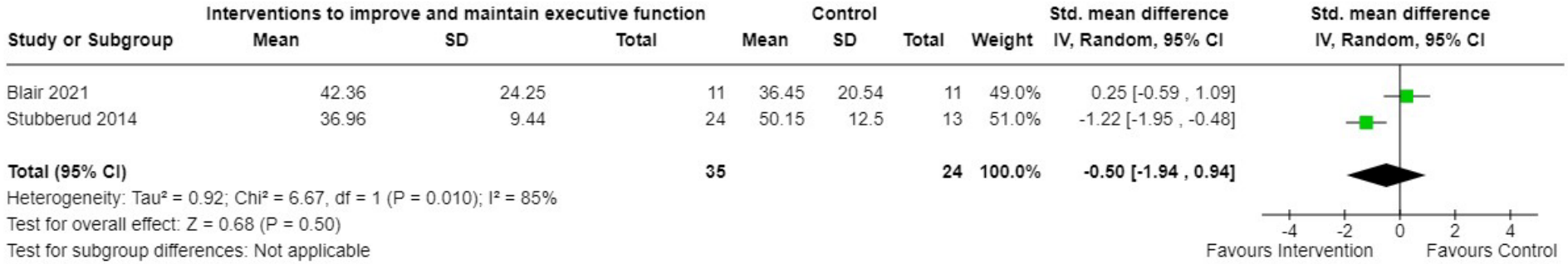
CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 12: Functioning as measured by a validated scale; scores at post-intervention (5 weeks to 3 months)



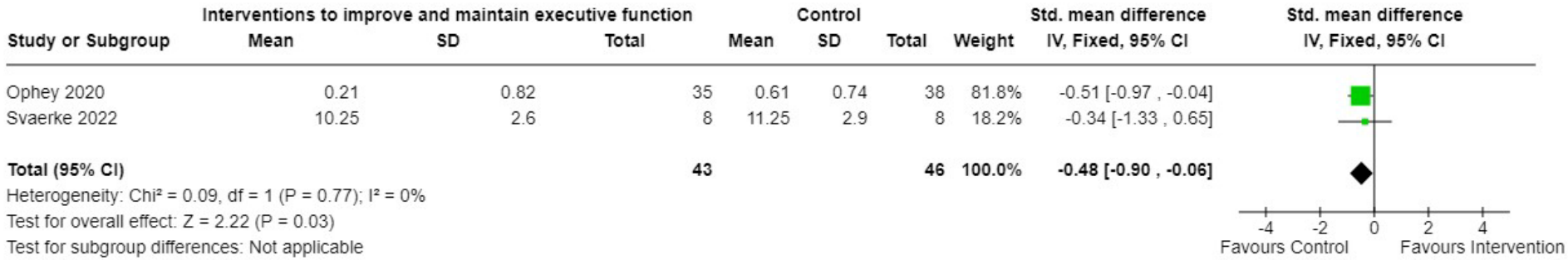
CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 13: Functioning as measured by a validated scale; scores at follow-up (6 months)



CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 14: Working memory and attention as measured by a validated scale; scores at post-intervention (5 to 8 weeks)



CI: confidence interval; IV: inverse variance; SD: standard deviation

Interventions to improve memory and learning and attention

Interventions to improve memory and learning and attention versus Control in adults

Figure 15: Global memory as measured by a validated scale; scores at post-intervention (10 weeks)

CI: confidence interval; IV: inverse variance; SD: standard deviation

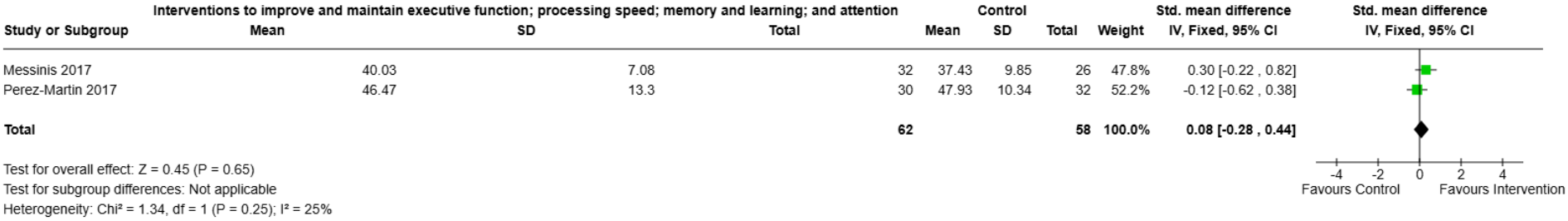
Figure 16: Global memory as measured by a validated scale; scores at end of follow-up (8 to 12 months)

CI: confidence interval; IV: inverse variance; SD: standard deviation

Interventions to improve and maintain executive function, processing speed, memory and learning, and attention

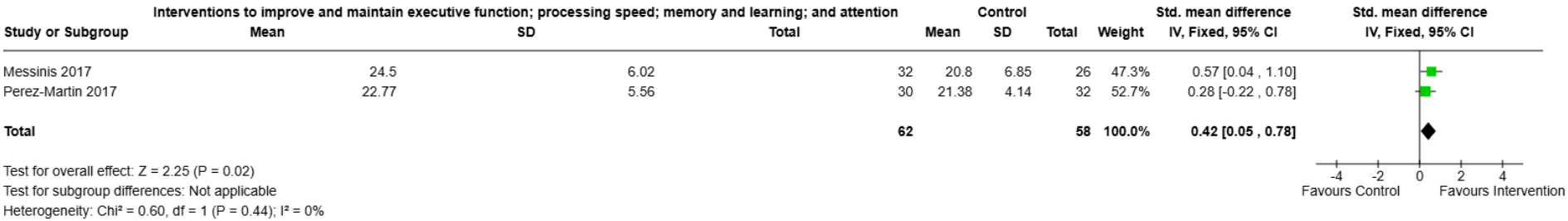
Interventions to improve and maintain executive function, processing speed, memory and learning, and attention versus Control in adults

Figure 17: Processing speed as measured by a validated scale; scores at post-intervention (10 to 12 weeks)



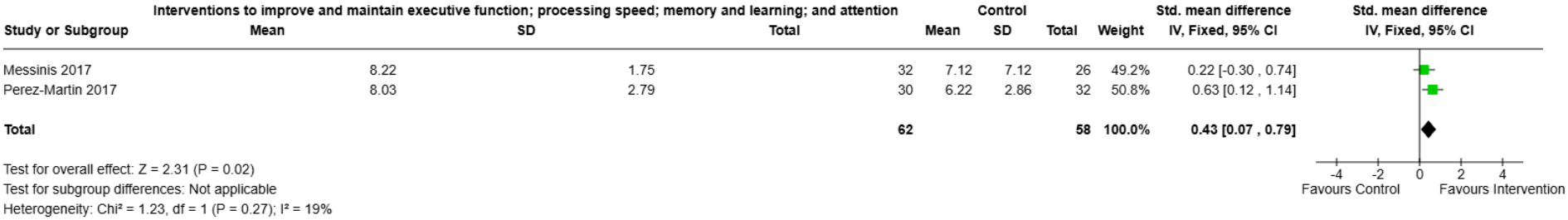
CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 18: Working memory as measured by a validated scale; scores at post-intervention (10 to 12 weeks)



CI: confidence interval; IV: inverse variance; SD: standard deviation

Figure 19: Long-term declarative memory as measured by a validated scale; scores at post-intervention (10 to 12 weeks)



CI: confidence interval; IV: inverse variance; SD: standard deviation

Appendix F GRADE tables

GRADE tables for review question: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

Table 7 Evidence profile for comparison between interventions to improve and maintain executive function and with others in the same protocol intervention group in adults with acquired brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (Higher is better) - GMT plus additional component												
1 (Cuberos-Urbano 2018)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	8	8	-	SMD **0.29 higher** (0.69 lower to 1.28 higher)	Low	CRITICAL
Processing speed post-intervention as measured by a validated scale (Lower is better) - GMT plus additional component												
1 (Cuberos-Urbano 2018)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	8	8	-	SMD **0.33 higher** (0.66 lower to 1.32 higher)	Low	CRITICAL
Working memory post-intervention as measured by a validated scale (Higher is better) - GMT plus additional component												
1 (Cuberos-Urbano 2018)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	8	8	-	SMD **0.12 lower** (0.86 lower to 1.1 higher)	Very low	CRITICAL

CI: confidence interval; GMT: goal management training; SMD: standardised mean difference
a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 2 MIDs (for SMD +/-0.5)
c 95% CI crosses 1 MID (for SMD +/-0.5)

Table 8 Evidence profile for comparison between Interventions to improve and maintain executive function and with others in the same protocol intervention group in adults with acquired brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (Higher is better)- GMT plus WMT												
1 (Emmanouel 2020)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	9	9	-	SMD **0.17 lower** (1.09 lower to 0.76 higher)	Very low	CRITICAL
Processing speed post-intervention as measured by a validated scale (Lower is better) - GMT plus WMT												
1 (Emmanouel 2020)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	9	9	-	SMD **0.54 lower** (1.48 lower to 0.41 higher)	Low	CRITICAL
Working memory post-intervention as measured by a validated scale (Higher is better) - GMT plus WMT												
1 (Emmanouel 2020)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	9	9	-	SMD **0.15 higher** (0.78 lower to 1.07 higher)	Very low	CRITICAL
Attention post-intervention as measured by a validated scale (Lower is better) - GMT plus WMT												
1 (Emmanouel 2020)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	9	9	-	SMD **0.34 lower** (1.27 lower to 0.59 higher)	Very low	CRITICAL

CI: confidence interval; GMT: goal management therapy; SMD: standardised mean difference; WMT: working memory training
a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 2 MIDs (for SMD +/-0.5)
c 95% CI crosses 1 MID (for SMD +/-0.5)

Table 9 Evidence profile for comparison between Interventions to improve memory and learning and with others in the same protocol intervention group in adults with a history of severe traumatic brain injury and subsequent memory impairment

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
Working memory post-intervention as measured by a validated scale (Higher is better)- Memory plus a-tDCS												
1 (Lesniak 2014)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	12	11	-	Intervention to improve memory and learning (Mem + a-tDCs): (median [IQR]): 5 (5-7) Intervention to improve memory and learning (Mem + sham): (median [IQR]): 5 (5-7) p=0.43[d]	Very low	CRITICAL
Working memory at the end of follow-up as measured by a validated scale (Higher is better) - Memory plus a-tDCS												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2014)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	11	10	-	Intervention to improve memory and learning (Mem + a-tDCs): (median [IQR]): 6 (5-6) Intervention to improve memory and learning (Mem + sham): (median [IQR]): 6 (4.8-7) p=0.66[d]	Very low	CRITICAL

Long-term declarative memory post-intervention as measured by a validated scale (Higher is better) - Memory plus a-tDCS

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2014)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	12	11	-	Intervention to improve memory and learning (Mem + a-tDCs): (median [IQR]): 9.5 (6.3-11) Intervention to improve memory and learning (Mem + sham): (median [IQR]): 8 (7-10) p=0.44[d]	Very low	CRITICAL

Long-term declarative memory end of follow-up as measured by a validated scale (Higher is better) - Memory plus a-tDCS

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2014)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	11	10	-	Intervention to improve memory and learning (Mem + a-tDCs): (median [IQR]): 10 (7-12) Intervention to improve memory and learning (Mem + sham): (median [IQR]): 9 (8-11) p=0.59[d]	Very low	CRITICAL

Attention post-intervention as measured by a validated scale (Higher is better) - Memory plus a-tDCS

1 (Lesniak 2014)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	12	11	-	SMD **0.18 lower** (1 lower to 0.64 higher)	Very low	CRITICAL

Attention end of follow-up as measured by a validated scale (Higher is better) - Memory plus a-tDCS

1 (Lesniak 2014)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	11	10	-	SMD **0.17 lower** (1.03 lower to 0.68 higher)	Very low	CRITICAL

Working memory, processing speed and attention end of follow-up as measured by a validated scale (Higher is better) - Memory plus a-tDCS

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2014)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	11	10	-	SMD **0.04 higher** (0.81 lower to 0.9 higher)	Very low	CRITICAL
Working memory, processing speed and attention post-intervention as measured by a validated scale (Higher is better) - Memory plus a-tDCS												
1 (Lesniak 2014)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	12	11	-	SMD **0.02 higher** (0.8 lower to 0.83 higher)	Very low	CRITICAL

A-tDcS: *anodal transcranial direct current stimulation;* CI: *confidence interval;* IQR*: interquartile range;* SMD: *standardised mean difference*

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 2 MIDs (for SMD +/-0.5)
c Very serious imprecision due to sample size <200
d No statistically significant difference between groups, according to author analysis.

Table 10 Evidence profile for comparison between Interventions to improve memory and learning and with others in the same protocol intervention group in adults with acquired brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
Physical and mental health related quality of life and social care related quality of life end of follow-up as measured by a validated scale (Lower is better)- MACT												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
1 (Martin 2014)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	12	17	-	Intervention to improve memory and learning (Comp.): (median [IQR]): 2.5 (3.6-12) Intervention to improve memory and learning (Rest.): (median [IQR]): 7 (4.4-17) p=0.30[c]	Very low	CRITICAL

Independence in ADL at the end of follow-up as measured by a validated scale (Higher is better) - MACT

1 (Martin 2014)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	12	16	-	Intervention to improve memory and learning (Comp.): (median [SD]): 54 (11.9) Intervention to improve memory and learning (Rest.): (median [SD]): 48.5 (10.9) p=0.62[c]	Very low	CRITICAL

Global memory at the end of follow-up as measured by a validated scale (Higher is better) - MACT

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
1 (Martin 2014)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	11	16	-	Intervention to improve memory and learning (Comp.): (median [SD]): 39 (19.2) Intervention to improve memory and learning (Rest.): (median [SD]): 30 (25.5) p=0.78[c]	Very low	CRITICAL

ADL: *activity of daily living;* APT: *attention process training*; Comp: *Compensation;* IQR: *interquartile range;* MACT*: music attention control training;* Rest.: *restitution;* SD: *standard deviation*

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b Very serious imprecision due to sample size <200
c No statistically significant difference between groups, according to author analysis.

Table 11 Evidence profile for comparison between Interventions to improve and maintain executive function and attention and with others in the same protocol intervention group in adults with acquired brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
Attention post-intervention as measured by a validated scale (Lower is better) - MACT												
1 Jones (2021)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	7	8	-	SMD **0.31 lower** (1.33 lower to 0.71 higher)	Very low	CRITICAL

APT: attention process training; CI: confidence interval; MACT: music attention control training; SMD: standardised mean difference
a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 2 MIDs (for SMD +/-0.5)

Table 12 Evidence profile for comparison between Interventions to improve and maintain executive function and attention and with others in the same protocol intervention group in adults with multiple sclerosis

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
Processing speed post-intervention as measured by a validated scale (Lower is better) - CMg												
1 (Tramontano 2024)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	12	12	-	SMD **0.56 lower** (1.38 lower to 0.26 higher)	Very low	CRITICAL
Processing speed end of follow-up as measured by a validated scale (Lower is better) - CMg												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
1 (Tramontano 2024)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	12	12	-	SMD **0.4 higher** (0.41 lower to 1.21 higher)	Very low	CRITICAL

CI: confidence interval; CMg; cognitive motor group; CTg: cognitive training group; SMD: standardised mean difference

a Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (for SMD +/-0.5)

Table 13 Evidence profile for comparison between Interventions to improve processing speed and attention and with others in the same protocol intervention group in adults with multiple sclerosis

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve processing speed and attention	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
Executive function change from baseline to post-intervention as measured by a validated scale (Lower is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	10	10	-	SMD **0.3 lower** (1.18 lower to 0.59 higher)	Very low	CRITICAL
Executive function change from baseline to follow-up as measured by a validated scale (Higher is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	10	10	-	SMD **0.08 lower** (0.96 lower to 0.8 higher)	Very low	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve processing speed and attention	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
Processing speed change from baseline to post-intervention as measured by a validated scale (Higher is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	10	10	-	SMD **1.11 higher** (0.15 higher to 2.06 higher)	Low	CRITICAL
Processing speed change from baseline to follow-up as measured by a validated scale (Higher is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	10	10	-	SMD **0.63 higher** (0.27 lower to 1.54 higher)	Low	CRITICAL
Working memory change from baseline to post-intervention as measured by a validated scale (Higher is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	10	10	-	SMD **0.33 higher** (0.55 lower to 1.21 higher)	Very low	CRITICAL
Working memory change from baseline to follow-up as measured by a validated scale (Higher is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	10	10	-	SMD **0.38 higher** (0.5 lower to 1.27 higher)	Very low	CRITICAL
Long-term declarative memory change from baseline to post-intervention as measured by a validated scale (Higher is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	10	10	-	SMD **0.15 lower** (1.03 lower to 0.73 higher)	Very low	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve processing speed and attention	Others in the same protocol intervention group	Relative (95% CI)	Absolute (95% CI)		
Long-term declarative memory change from baseline to follow-up as measured by a validated scale (Higher is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	10	10	-	SMD **0.07 lower** (0.94 lower to 0.81 higher)	Very low	CRITICAL
Working memory, processing speed and attention change from baseline to post-intervention as measured by a validated scale (Higher is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	10	10	-	SMD **0.57 higher** (0.33 lower to 1.47 higher)	Low	CRITICAL
Working memory, processing speed, and attention change from baseline to follow-up as measured by a validated scale (Higher is better) – Cognitive plus a-tDCS												
1 (Mattioli 2016)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	10	10	-	SMD **1.19 higher** (0.22 higher to 2.15 higher)	Low	CRITICAL

a-tCDS: anodal transcranial direct current stimulation; CI: confidence interval; cog.: cognitive training; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 2 MIDs (for SMD +/-0.5)
c 95% CI crosses 1 MID (for SMD +/-0.5)

Table 14 Evidence profile for comparison between Interventions to improve and maintain executive function and Placebo in children with traumatic brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Placebo	Relative (95% CI)	Absolute (95% CI)		
Attention change from baseline to post-intervention as measured by a validated scale (higher is better) - Adaptive training												
1 (Phillips 2016)	randomised trials	very serious[a]	not serious	not serious	very serious[b]	none	13	14	-	Intervention to improve and maintain executive function (median [IQR]): -1.0 (5.19) Placebo/Sham (Rest.): (median [IQR]): -0.50 (4.50) p=1.0[c]	Very low	CRITICAL
Attention change from baseline to end of follow-up as measured by a validated scale (higher is better) - Adaptive training												
1 (Phillips 2016)	randomised trials	very serious[a]	not serious	not serious	very serious[b]	none	13	14	-	Intervention to improve and maintain executive function (median [IQR]): 2.0 (4.97) Placebo/Sham (Rest.): (median [IQR]): -0.69 (3.50) p=0.17[c]	Very low	CRITICAL

CI: confidence interval; IQR: interquartile range

a Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2

b Very serious imprecision due to sample size <200
c No statistically significant difference between groups, according to author analysis.

Table 15 Evidence profile for comparison between Interventions to improve and maintain executive function and Placebo in adults with Parkinson's disease

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Placebo	Relative (95% CI)	Absolute (95% CI)		
Attention post-intervention as measured by a validated scale (Lower is better) – Prospective memory												
1 (Costa 2014)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	9	8	-	SMD **0.56 lower** (1.54 lower to 0.41 higher)	Very low	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (for SMD +/-0.5)

Table 16 Evidence profile for comparison between Interventions to improve processing speed, memory and learning, and attention and Placebo in children with acquired brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve processing speed, memory and learning, and attention	Placebo	Relative (95% CI)	Absolute (95% CI)		
Processing speed post-intervention as measured by a validated scale (Lower is better) – Neurofeedback training												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve processing speed, memory and learning, and attention	Placebo	Relative (95% CI)	Absolute (95% CI)		
1 (de Ruiter 2016)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	34	37	-	SMD **0.18 lower** (0.64 lower to 0.29 higher)	Very low	CRITICAL
Processing speed end of follow-up as measured by a validated scale (Lower is better) – Neurofeedback training												
1 (de Ruiter 2016)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	33	35	-	SMD **0.23 lower** (0.7 lower to 0.25 higher)	Very low	CRITICAL
Short-term memory post-intervention as measured by a validated scale (Higher is better) – Neurofeedback training												
1 (de Ruiter 2016)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	34	37	-	SMD **0.09 higher** (0.37 lower to 0.56 higher)	Very low	CRITICAL
Short-term memory end of follow-up as measured by a validated scale (Higher is better) – Neurofeedback training												
1 (de Ruiter 2016)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	33	35	-	SMD **0.27 higher** (0.2 lower to 0.75 higher)	Very low	CRITICAL

CI: *confidence interval;* SMD: *standardised mean difference*

a Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (for SMD +/-0.5)

Table 17 Evidence profile for comparison between Interventions to improve and maintain executive function, processing speed, memory and learning, and attention and Placebo in adults with multiple sclerosis

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, memory and learning, and attention	Placebo	Relative (95% CI)	Absolute (95% CI)		
Physical and Mental Health related Quality of Life and Social Care related Quality of Life post-intervention as measured by a validated scale (Higher is better) - Computer based cognitive rehabilitation training												
1 (Messinis 2020)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	19	17	-	SMD **0.36 higher** (0.3 lower to 1.02 higher)	Low	CRITICAL
Processing speed post-intervention as measured by a validated scale (Higher is better) - Computer based cognitive rehabilitation training												
1 (Messinis 2020)	randomised trials	serious[b]	not serious	not serious	serious[b]	none	19	17	-	SMD **1.04 higher** (0.33 higher to 1.74 higher)	Low	CRITICAL
Working memory post-intervention as measured by a validated scale (Higher is better) - Computer based cognitive rehabilitation training												
1 (Messinis 2020)	randomised trials	serious[b]	not serious	not serious	serious[b]	none	19	17	-	SMD **0.58 higher** (0.09 lower to 1.25 higher)	Low	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (for SMD +/-0.5)

Table 18 Evidence profile for comparison between Interventions to improve and maintain executive function and Control in children with acquired brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Control	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (Lower is better) - Move it to improve it												
1 (Piovesana 2017)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	25	26	-	SMD **0.09 lower** (0.64 lower to 0.46 higher)	Very low	CRITICAL
Attention post-intervention as measured by a validated scale (Higher is better) - Move it to improve it												
1 (Piovesana 2017)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	25	26	-	SMD **0.22 higher** (0.33 lower to 0.77 higher)	Very low	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (for SMD +/-0.5)

Table 19 Evidence profile for comparison between Interventions to improve and maintain executive function and Control in adults with progressive neurological diseases

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Control	Relative (95% CI)	Absolute (95% CI)		
Physical and Mental Health related Quality of life and Social Care related Quality of Life post-intervention as measured by a validated scale (Lower is better) - Computerised working memory												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Control	Relative (95% CI)	Absolute (95% CI)		
3*	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	70	72	-	SMD **0.37 lower** (0.71 lower to 0.04 lower)	Very low	CRITICAL

Physical and Mental Health related Quality of Life and Social Care related Quality of Life end of follow-up as measured by a validated scale (Lower is better) - Computerised working memory

2*	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	65	59	-	SMD **0.15 lower** (0.51 lower to 0.2 higher)	Very low	CRITICAL

Executive function post-intervention as measured by a validated scale (Lower is better) - Computerised working memory

3*	randomised trials	very serious[a]	not serious	not serious	not serious	none	86	77	-	SMD **0.05 higher** (0.26 lower to 0.36 higher)	Low	CRITICAL

Executive function end of follow-up as measured by a validated scale (Lower is better) - Computerised working memory

3*	randomised trials	very serious[a]	not serious	not serious	not serious	none	89	72	-	SMD **0.1 higher** (0.21 lower to 0.41 higher)	Low	CRITICAL

Processing speed post-intervention as measured by a validated scale (Higher is better) - Computerised working memory

3*	randomised trials	serious[c]	not serious	not serious	not serious	none	56	59	-	SMD **0.03 higher** (0.33 lower to 0.4 higher)	Moderate	CRITICAL

Processing speed end of follow-up as measured by a validated scale (Higher is better) - Computerised working memory

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Control	Relative (95% CI)	Absolute (95% CI)		
2*	randomised trials	serious[c]	not serious	not serious	serious[b]	none	46	48	-	SMD **0.18 higher** (0.23 lower to 0.58 higher)	Low	CRITICAL
Working memory post-intervention as measured by a validated scale (Higher is better) - Computerised working memory												
2*	randomised trials	serious[c]	not serious	not serious	not serious	none	46	51	-	SMD **0.06 higher** (0.34 lower to 0.46 higher)	Moderate	CRITICAL
Working memory end of follow-up as measured by a validated scale (Higher is better) - Computerised working memory												
2*	randomised trials	serious[c]	not serious	not serious	serious[b]	none	48	48	-	SMD **0.15 lower** (0.55 lower to 0.25 higher)	Low	CRITICAL
Attention post-intervention as measured by a validated scale (Lower is better) - Computerised working memory												
3*	randomised trials	serious[c]	not serious	not serious	serious[b]	none	67	59	-	SMD **0.17 higher** (0.19 lower to 0.52 higher)	Low	CRITICAL
Attention end of follow-up as measured by a validated scale (Lower is better) - Computerised working memory												
2*	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	61	50	-	SMD **0.27 lower** (0.65 lower to 0.11 higher)	Very low	CRITICAL
Functioning post-intervention as measured by a validated scale (Lower is better) - Computerised working memory												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Control	Relative (95% CI)	Absolute (95% CI)		
2*	randomised trials	very serious[a]	serious[d]	not serious	very serious[e]	none	35	26	-	SMD **0.06 lower** (1.01 lower to 0.88 higher)	Very low	IMPORTANT
Functioning end of follow-up as measured by a validated scale (Lower is better) - Computerised working memory												
2*	randomised trials	very serious[a]	very serious[f]	not serious	very serious[e]	none	35	24	-	SMD **0.5 lower** (1.94 lower to 0.94 higher)	Very low	IMPORTANT
Working memory and attention post-intervention as measured by a validated scale (Higher is better) - Computerised working memory												
2*	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	43	46	-	SMD **0.48 lower** (0.9 lower to 0.06 lower)	Very low	CRITICAL
Working memory and attention end of follow-up as measured by a validated scale (Higher is better) - Computerised working memory												
1 (Ophey 2020)	randomised trials	not serious	not serious	not serious	serious[b]	none	37	37	-	SMD **0.1 lower** (0.55 lower to 0.36 higher)	Moderate	CRITICAL
Working memory, processing speed and attention post-intervention as measured by a validated scale (Higher is better) - Computerised working memory												
1 (Blair 2021)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	11	13	-	SMD **0.59 higher** (0.23 lower to 1.42 higher)	Very low	CRITICAL
Working memory, processing speed and attention end of follow-up as measured by a validated scale (Higher is better) - Computerised working memory												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Blair 2021)	randomised trials	very serious[a]	not serious	not serious	very serious[e]	none	11	11	-	SMD **0.11 higher** (0.73 lower to 0.94 higher)	Very low	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95%CI crosses 1 MID (for SMD +/-0.5)
c Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
d Serious heterogeneity unexplained by subgroup analysis (I^2=68%)
e 95%CI crosses 2 MIDs (for SMD +/-0.5)
f Very serious heterogeneity unexplained by subgroup analysis (I^2=85%)
** See corresponding forest plot*

Table 20 Evidence profile between comparison Interventions to improve memory and learning and Control in adults with traumatic brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning	Control	Relative (95% CI)	Absolute (95% CI)		
Physical and Mental Health related Quality of Life and Social Care related Quality of Life post-intervention as measured by a validated scale (Lower is better) - Memory rehabilitation												
1 (das Nair 2019)	randomised trials	serious[a]	not serious	not serious	very serious[d]	none	124	110	-	SMD **0.10 lower** (3.74 lower to 3.54 higher)	Very low	CRITICAL
Physical and Mental Health related Quality of Life and Social Care related Quality of Life end of follow-up as measured by a validated scale (Lower is better) - Memory rehabilitation												
1 (das Nair 2019)	randomised trials	serious[a]	not serious	not serious	very serious[d]	none	119	102	-	SMD **0.01 lower** (4.28 lower to 4.26 higher)	Very low	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning	Control	Relative (95% CI)	Absolute (95% CI)		
Independence in ADLs post-intervention as measured by a validated scale (Higher is better) - Compensatory strategy training												
1 (Fleming 2022)	randomised trials	serious[a]	not serious	serious[b]	serious[c]	none	17	18	-	SMD **0.87 higher** (0.17 higher to 1.56 higher)	Very low	CRITICAL
Independence in ADLs end of follow-up as measured by a validated scale (Higher is better) - Compensatory strategy training												
1 (Fleming 2022)	randomised trials	serious[a]	not serious	serious[b]	serious[c]	none	17	18	-	SMD **1.12 higher** (0.41 higher to 1.84 higher)	Very low	CRITICAL
Prospective memory post-intervention as measured by a validated scale (Higher is better) - Compensatory strategy training												
1 (Fleming 2022)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	17	18	-	SMD **0.25 higher** (0.42 lower to 0.91 higher)	Low	CRITICAL
Prospective memory end of follow-up as measured by a validated scale (Higher is better) - Compensatory strategy training												
1 (Fleming 2022)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	17	18	-	SMD **0.45 higher** (0.22 lower to 1.12 higher)	Low	CRITICAL
Global memory post-intervention as measured by a validated scale (Higher is better) - Memory rehabilitation												
1 (das Nair 2019)	randomised trials	not serious	not serious	not serious	very serious[d]	none	129	122	-	SMD **0.17 higher** (2.16 lower to 2.50 higher)	Low	CRITICAL
Global memory end of follow-up as measured by a validated scale (Higher is better) - Memory rehabilitation												
1 (das Nair 2019)	randomised trials	not serious	not serious	not serious	very serious[d]	none	124	107	-	SMD **0.03 higher** (3.05 lower to 3.11 higher)	Low	CRITICAL

ADL: activity of daily living; CI: confidence interval; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b Indirect outcome as only 1 component of the SPRS is directly applicable to ADLs
c 95% CI crosses 1 MID (for SMD +/-0.5)
d 95% CI crosses 2 MIDs (for SMD +/-0.5)

Table 21 Evidence profile for comparison between Interventions to improve and maintain executive function and memory and learning and Control in adults with traumatic brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and memory and learning	Control	Relative (95% CI)	Absolute (95% CI)		
Independence in ADLs post-intervention as measured by a validated scale (Higher is better) - Compensatory strategy training												
1 (Fleming 2022)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	17	18	-	SMD **0.16 higher** (0.51 lower to 0.82 higher)	Very low	CRITICAL
Independence in ADLs end of follow-up as measured by a validated scale (Higher is better) - Compensatory strategy training												
1 (Fleming 2022)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	17	18	-	SMD **0.2 higher** (0.47 lower to 0.86 higher)	Low	CRITICAL
Prospective memory post-intervention as measured by a validated scale (Higher is better) - Compensatory strategy training												
1 (Fleming 2022)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	17	18	-	SMD **0.36 lower** (1.03 lower to 0.31 higher)	Low	CRITICAL
Prospective memory end of follow-up as measured by a validated scale (Higher is better) - Compensatory strategy training												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and memory and learning	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Fleming 2022)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	17	18	-	SMD **0.1 lower** (0.76 lower to 0.56 higher)	Very low	CRITICAL

ADL: activity of daily living; CI: confidence interval; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2.
b 95% CI crosses 2 MIDs (for SMD +/-0.5)
c 95% CI crosses 1 MID (for SMD +/-0.5)

Table 22 Evidence profile for comparison between Interventions to improve and maintain executive function and attention compared to Control in adults with traumatic brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (Higher is better) - Neurological musical therapy												
1 (Siponkoski 2020)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	20	19	-	SMD **0.22 higher** (0.41 lower to 0.85 higher)	Low	CRITICAL
Processing speed post-intervention as measured by a validated scale (Higher is better) - Neurological musical therapy												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.16 lower** (0.56 lower to 0.25 higher)	Moderate	CRITICAL

Processing speed end of follow-up as measured by a validated scale (Higher is better) - Neurological musical therapy

1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.18 lower** (0.59 lower to 0.22 higher)	Moderate	CRITICAL

Working memory post-intervention as measured by a validated scale (Higher is better) - Neurological musical therapy

1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.21 higher** (0.19 lower to 0.61 higher)	Moderate	CRITICAL

Working memory post-intervention as measured by a validated scale (Higher is better) - Neurological musical therapy

1 (Siponkoski 2020)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	20	19	-	SMD **0.04 higher** (0.59 lower to 0.67 higher)	Low	CRITICAL

Working memory end of follow-up as measured by a validated scale (Higher is better) - Neurological musical therapy

1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.62 higher** (0.21 higher to 1.03 higher)	Moderate	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Long-term declarative memory post-intervention as measured by a validated scale (Higher is better) - Neurological musical therapy												
1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.23 higher** (0.17 lower to 0.64 higher)	Moderate	CRITICAL
Long-term declarative memory end of follow-up as measured by a validated scale (Higher is better) - Neurological musical therapy												
1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.2 higher** (0.21 lower to 0.6 higher)	Moderate	CRITICAL
Attention post-intervention as measured by a validated scale (Higher is better) - Neurological musical therapy												
1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.26 lower** (0.67 lower to 0.14 higher)	Moderate	CRITICAL
Attention end of follow-up as measured by a validated scale (Continuous) (lower is better) - Neurological musical therapy												
1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.1 higher** (0.31 lower to 0.5 higher)	Moderate	CRITICAL
Working memory, processing speed and attention post-intervention as measured by a validated scale (Higher is better) - Neurological musical therapy												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function and attention	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.42 higher** (0.01 higher to 0.82 higher)	Moderate	CRITICAL
Working memory, processing speed and attention end of follow-up as measured by a validated scale (Higher is better) - Neurological musical therapy												
1 (Mantynen 2014)	randomised trials	not serious	not serious	not serious	serious[b]	none	58	40	-	SMD **0.18 higher** (0.22 lower to 0.59 higher)	Moderate	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (for SMD +/-0.5)
** See corresponding forest plot*

Table 23 Evidence profile for comparison between Interventions to improve memory and learning and attention compared to Control in adults with multiple sclerosis

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Physical and Mental Health related Quality of Life and Social Care related Quality of Life post-intervention as measured by a validated scale (lower is better) - Cognitive rehabilitation												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning and attention	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Carr 2014)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	16	21	-	SMD **0.09 higher** (0.56 lower to 0.75 higher)	Very low	CRITICAL

Physical and Mental Health related Quality of Life and Social Care related Quality of Life end of follow-up as measured by a validated scale (lower is better) - Cognitive rehabilitation

1 (Carr 2014)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	17	16	-	SMD **0.74 lower** (1.45 lower to 0.03 lower)	Low	CRITICAL

Processing speed post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation

1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	217	187	-	SMD **0.06 higher** (0.14 lower to 0.25 higher)	Low	CRITICAL

Processing speed end of follow-up as measured by a validated scale (higher is better) - Cognitive rehabilitation

1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	214	173	-	SMD **0** (0.2 lower to 0.2 higher)	Low	CRITICAL

Global memory post-intervention as measured by a validated scale (lower is better) - Cognitive rehabilitation

2*	randomised trials	very serious[d]	not serious	not serious	not serious	none	231	202	-	SMD **0.29 lower** (0.48 lower to 0.1 lower)	Low	CRITICAL

Global memory end of follow-up as measured by a validated scale (lower is better) - Cognitive rehabilitation

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning and attention	Control	Relative (95% CI)	Absolute (95% CI)		
2*	randomised trials	very serious[d]	not serious	not serious	not serious	none	225	184	-	SMD **0.25 lower** (0.44 lower to 0.05 lower)	Low	CRITICAL
Working memory post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	217	187	-	SMD **0.13 lower** (0.33 lower to 0.07 higher)	Low	CRITICAL
Working memory end of follow-up as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	214	173	-	SMD **0.06 lower** (0.26 lower to 0.14 higher)	Low	CRITICAL
Long-term declarative memory post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	217	187	-	SMD **0.07 higher** (0.13 lower to 0.26 higher)	Low	CRITICAL
Long-term declarative memory end of follow-up as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	214	173	-	SMD **0.14 higher** (0.06 lower to 0.34 higher)	Low	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Attention post-intervention as measured by a validated scale (lower is better) - Cognitive rehabilitation												
1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	217	187	-	SMD **0.02 higher** (0.18 lower to 0.21 higher)	Low	CRITICAL
Attention end of follow-up as measured by a validated scale (lower is better) - Cognitive rehabilitation												
1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	214	173	-	SMD **0.04 lower** (0.24 lower to 0.16 higher)	Low	CRITICAL
Working memory, Processing speed and Attention post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	217	187	-	SMD **0.08 higher** (0.12 lower to 0.28 higher)	Low	CRITICAL
Working memory, Processing speed and Attention end of follow-up as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Lincoln 2020)	randomised trials	very serious[d]	not serious	not serious	not serious	none	214	173	-	SMD **0.04 lower** (0.24 lower to 0.16 higher)	Low	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 2 MIDs (SMD +/-0.5)
c 95% CI crosses 1 MID (SMD +/-0.5)
d Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
** See corresponding forest plot*

Table 24 Evidence profile for comparison between Interventions to improve and maintain executive function, processing speed, and memory and learning compared to Control in adults with multiple sclerosis

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, and memory and learning	Control	Relative (95% CI)	Absolute (95% CI)		
Physical and Mental Health related Quality of Life and Social Care related Quality of Life post-intervention as measured by a validated scale (lower is better) - Cognitive rehabilitation												
1 (Svaerke 2022)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	8	8	-	SMD **0.62 lower** (1.64 lower to 0.39 higher)	Very low	CRITICAL
Executive function change from baseline to post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Gich 2015)	randomised trials	serious[c]	not serious	not serious	not serious	none	21	20	-	SMD **3.64 higher** (2.61 higher to 4.67 higher)	Moderate	CRITICAL
Processing speed change from baseline to post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Gich 2015)	randomised trials	serious[c]	not serious	not serious	not serious	none	21	20	-	SMD **1.6 higher** (0.89 higher to 2.31 higher)	Moderate	CRITICAL
Processing speed post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Svaerke 2022)	randomised trials	very serious[a]	not serious	not serious	very serious[d]	none	8	8	-	SMD **0.47 lower** (1.46 lower to 0.53 higher)	Very low	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, and memory and learning	Control	Relative (95% CI)	Absolute (95% CI)		
Working memory change from baseline to post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Gich 2015)	randomised trials	serious[c]	not serious	not serious	not serious	none	21	20	-	SMD **2.93 higher** (2.03 higher to 3.84 higher)	Moderate	CRITICAL
Long-term declarative memory change from baseline to post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (Gich 2015)	randomised trials	serious[c]	not serious	not serious	not serious	none	21	20	-	SMD **4.66 higher** (3.44 higher to 5.89 higher)	Moderate	CRITICAL
Attention change from baseline to post-intervention as measured by a validated scale (lower is better) - Cognitive rehabilitation												
1 (Gich 2015)	randomised trials	serious[c]	not serious	not serious	not serious	none	21	20	-	SMD **3.79 lower** (4.85 lower to 2.73 lower)	Moderate	CRITICAL
Attention post-intervention as measured by a validated scale (lower is better) - Cognitive rehabilitation												
1 (Svaerke 2022)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	8	8	-	SMD **0.56 higher** (0.45 lower to 1.56 higher)	Very low	CRITICAL
Working memory and attention composite change from baseline to post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, and memory and learning	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Gich 2015)	randomised trials	serious[c]	not serious	not serious	not serious	none	21	20	-	SMD **2.41 higher** (1.59 higher to 3.23 higher)	Moderate	CRITICAL

Working memory and attention composite post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation

1 (Svaerke 2022)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	8	8	-	SMD **0.63 lower** (1.65 lower to 0.38 higher)	Very low	CRITICAL

Working memory, processing speed and attention composite change from baseline to post intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation

1 (Gich 2015)	randomised trials	serious[c]	not serious	not serious	not serious	none	21	20	-	SMD **1.73 higher** (1 higher to 2.46 higher)	Moderate	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Very serious risk of bias in the evidence contributing to the outcomes as per Cochrane RoB2
b 95% CI crosses 1 MID (SMD +/-0.5)
c Serious risk of bias in the evidence contributing to the outcomes as per Cochrane RoB2
d 95% CI crosses 2 MIDs (SMD +/-0.5)

Table 25 Evidence profile for comparison between Interventions to improve and maintain executive function, memory and learning, and attention compared to Control in adults with traumatic brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, memory and learning, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Physical and Mental Health related Quality of Life and Social Care related Quality of Life post-intervention as measured by a validated scale (higher is better) - Cognitive enrichment programme												
1 (Cisneros 2021b)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	18	9	-	SMD **0.15 lower** (0.95 lower to 0.65 higher)	Very low	CRITICAL
Physical and Mental Health related Quality of Life and Social Care related Quality of Life end of follow-up as measured by a validated scale (higher is better) - Cognitive enrichment programme												
1 (Cisneros 2021b)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	17	6	-	SMD **0.63 lower** (1.59 lower to 0.32 higher)	Low	CRITICAL
Executive function post-intervention as measured by a validated scale (higher is better) - Cognitive enrichment programme												
1 (Cisneros 2021a)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	20	11	-	SMD **0.7 higher** (0.06 lower to 1.46 higher)	Low	CRITICAL
Executive function end of follow-up as measured by a validated scale (higher is better) - Cognitive enrichment programme												
1 (Cisneros 2021a)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	17	7	-	SMD **0.53 higher** (0.37 lower to 1.42 higher)	Low	CRITICAL
Processing speed post-intervention as measured by a validated scale (higher is better) - Cognitive enrichment programme												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, memory and learning, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Cisneros 2021b)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	20	11	-	SMD **0.4 higher** (0.34 lower to 1.15 higher)	Low	CRITICAL
Processing speed end of follow-up as measured by a validated scale (higher is better) - Cognitive enrichment programme												
1 (Cisneros 2021b)	randomised trials	serious[a]	not serious	not serious	very serious[d]	none	17	6	-	SMD **0.11 higher** (0.82 lower to 1.04 higher)	Very low	CRITICAL
Global memory post-intervention as measured by a validated scale (higher is better) – Individual therapy												
1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	43	20	-	SMD **0.25 lower** (0.78 lower to 0.28 higher)	Low	CRITICAL
Working memory post-intervention as measured by a validated scale (Higher is better) – Individual therapy												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, memory and learning, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	very serious[d]	none	Individual: n=23 Group: n=20	20	-	Interventions to improve and maintain executive function; memory and learning; and attention: Individual: (median [IQR]): 5 (1) Group: (median [IQR]): 5 (1) Control: (median [IQR]): 5 (0.5) p=0.264[e]	Very low	CRITICAL

Working memory end of follow-up as measured by a validated scale (Higher is better) – Individual therapy

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, memory and learning, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	very serious[d]	none	Individual: n=23 Group: n=18	NR	-	Interventions to improve and maintain executive function; memory and learning; and attention: Individual: (median [IQR]): 5 (2) Group: (median [IQR]): 5(1) Control: (median [IQR]): NR (NR) p=0.10[e]	Very low	CRITICAL

Long-term declarative memory post-intervention as measured by a validated scale (higher is better) – Individual therapy

1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	43	20	-	SMD **0.13 lower** (0.66 lower to 0.4 higher)	Low	CRITICAL

Attention post-intervention as measured by a validated scale (higher is better) – Individual therapy

1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	43	20	-	SMD **0.42 higher** (0.11 lower to 0.96 higher)	Low	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, memory and learning, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Working memory and attention composite post-intervention as measured by a validated scale (higher is better) - Cognitive enrichment programme												
1 (Cisneros 2021b)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	20	11	-	SMD **0.06 lower** (0.8 lower to 0.67 higher)	Very low	CRITICAL
Working memory and attention composite end of follow-up as measured by a validated scale (higher is better) - Cognitive enrichment programme												
1 (Cisneros 2021b)	randomised trials	serious[a]	not serious	not serious	serious[c]	none	16	5	-	SMD **0.71 lower** (1.74 lower to 0.33 higher)	Low	CRITICAL

CI: confidence interval; IQR: interquartile range; NR: not reported; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 2 MIDs (SMD +/-0.50)
c 95% CI crosses 1 MID (SMD +/-0.50)
d Very serious imprecision due to sample size <200
e No statistically significant difference between groups, according to author analysis

Table 26 Evidence profile for comparison between Interventions to improve memory and learning, visual, spatial and perceptual functions, and attention compared to Control in adults with multiple sclerosis

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve memory and learning, visual, spatial and perceptual functions, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Processing speed post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (De Giglio 2016)	randomised trials	not serious	not serious	not serious	serious[a]	none	12	12	-	SMD **0.72 higher** (0.11 lower to 1.55 higher)	Moderate	CRITICAL
Working memory, processing speed and attention composite post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation												
1 (De Giglio 2016)	randomised trials	not serious	not serious	not serious	serious[a]	none	12	12	-	SMD **0.98 higher** (0.13 higher to 1.84 higher)	Moderate	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a 95% CI crosses 1 MID (SMD +/-0.5)

Table 27 Evidence profile for comparison between Interventions to improve and maintain executive function, processing speed, memory and learning, and attention compared to Control in children with acquired brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, memory and learning, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (lower is better) - Computerised cognitive training												
1 (Corti 2020)	randomised trials	not serious	not serious	not serious	serious[a]	none	18	14	-	SMD **0.44 higher** (0.26 lower to 1.15 higher)	Moderate	CRITICAL
Working memory post-intervention as measured by a validated scale (higher is better) - Computerised cognitive training												
1 (Corti 2020)	randomised trials	not serious	not serious	not serious	serious[a]	none	18	14	-	SMD **0.67 higher** (0.05 lower to 1.39 higher)	Moderate	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a 95% CI crosses 1 MID (SMD +/-0.5)

Table 28 Evidence profile for comparison between Interventions to improve and maintain executive function, processing speed, memory and learning, and attention compared to Control in adults with multiple sclerosis

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, memory and learning, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (higher is better) - Computer based cognitive rehabilitation												
1 (Messinis 2017)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	32	26	-	SMD **0.43 higher** (0.09 lower to 0.96 higher)	Low	CRITICAL
Processing speed post-intervention as measured by a validated scale (higher is better)												
2*	randomised trials	very serious[c]	not serious	not serious	not serious	none	62	58	-	SMD **0.08 higher** (0.28 lower to 0.44 higher)	Low	CRITICAL
Working memory post-intervention as measured by a validated scale (higher is better)												
2*	randomised trials	very serious[c]	not serious	not serious	serious[b]	none	62	58	-	SMD **0.42 higher** (0.05 higher to 0.78 higher)	Very low	CRITICAL
Long-term declarative memory post-intervention as measured by a validated scale (higher is better)												
2*	randomised trials	very serious[c]	not serious	not serious	serious[b]	none	62	58	-	SMD **0.43 higher** (0.07 higher to 0.79 higher)	Very low	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, memory and learning, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Attention post-intervention as measured by a validated scale (lower is better) - Computer based cognitive rehabilitation												
1 (Messinis 2017)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	32	26	-	SMD **0.48 lower** (1 lower to 0.05 higher)	Low	CRITICAL
Working memory, processing speed and attention composite post-intervention as measured by a validated scale (higher is better) - Computer based cognitive rehabilitation												
1 (Messinis 2017)	randomised trials	very serious[c]	not serious	not serious	serious[b]	none	30	32	-	SMD **0.05 lower** (0.54 lower to 0.45 higher)	Very low	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (SMD -/+0.5)
c Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
d Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
** See corresponding forest plot*

Table 29 Evidence profile for comparison between Interventions to improve and maintain executive function, processing speed, visual, spatial and perceptual functions, and attention compared to Control in adults with Parkinson's disease

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, visual, spatial and perceptual functions, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation												
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **1.05 higher** (0.34 higher to 1.77 higher)	Very low	CRITICAL
Executive function end of follow-up as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation												
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	not serious	none	17	18	-	SMD **1.99 higher** (1.17 higher to 2.82 higher)	Low	CRITICAL
Processing speed post-intervention as measured by a validated scale (lower is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation												
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.4 lower** (1.07 lower to 0.27 higher)	Very low	CRITICAL
Processing speed end of follow-up as measured by a validated scale (lower is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation												
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.31 lower** (0.97 lower to 0.36 higher)	Very low	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, visual, spatial and perceptual functions, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Working memory post-intervention as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation												
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	very serious[c]	none	17	18	-	SMD **0.07 higher** (0.59 lower to 0.73 higher)	Very low	CRITICAL
Working memory end of follow-up as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation												
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.7 higher** (0.01 higher to 1.38 higher)	Very low	CRITICAL
Long-term declarative memory post-intervention as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation												
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.74 higher** (0.05 higher to 1.43 higher)	Very low	CRITICAL
Long-term declarative memory end of follow-up as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation												
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.57 higher** (0.11 lower to 1.25 higher)	Very low	CRITICAL
Perceptual function post-intervention as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, visual, spatial and perceptual functions, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.39 higher** (0.28 lower to 1.06 higher)	Very low	CRITICAL

Perceptual function end of follow-up as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation

1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.3 higher** (0.37 lower to 0.97 higher)	Very low	CRITICAL

Attention post-intervention as measured by a validated scale (lower is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation

1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.27 lower** (0.93 lower to 0.4 higher)	Very low	CRITICAL

Attention end of follow-up as measured by a validated scale (lower is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation

1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.35 lower** (1.01 lower to 0.32 higher)	Very low	CRITICAL

Working memory and attention composite post-intervention as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, processing speed, visual, spatial and perceptual functions, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.71 higher** (0.03 higher to 1.4 higher)	Very low	CRITICAL

Working memory and attention composite end of follow-up as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation plus standard physical rehabilitation

1 (Bernini 2019)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	17	18	-	SMD **0.69 higher** (0.01 higher to 1.38 higher)	Very low	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (SMD +/-0.5)
c 95% CI crosses 2 MIDs (SMD +/-0.5)

Table 30 Evidence profile for comparison between Interventions to improve and maintain executive function, memory and learning, social cognition, and attention compared to Control in adults with multiple sclerosis

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Interventions to improve and maintain executive function, memory and learning, social cognition, and attention	Control	Relative (95% CI)	Absolute (95% CI)		
Processing speed post-intervention as measured by a validated scale (higher is better) – Cognitive rehabilitation												
1 (Rilo 2018)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	21	21	-	SMD **0.38 lower** (0.99 lower to 0.23 higher)	Low	CRITICAL
Working memory post-intervention as measured by a validated scale (higher is better) – Cognitive rehabilitation												
1 (Rilo 2018)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	21	21	-	SMD **0.33 lower** (0.94 lower to 0.28 higher)	Low	CRITICAL
Attention post-intervention as measured by a validated scale (lower is better) – Cognitive rehabilitation												
1 (Rilo 2018)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	21	21	-	SMD **0.27 higher** (0.34 lower to 0.88 higher)	Low	CRITICAL
Working memory and attention composite post-intervention as measured by a validated scale (higher is better) – Cognitive rehabilitation												
1 (Rilo 2018)	randomised trials	serious[a]	not serious	not serious	very serious[d]	none	21	21	-	SMD **0.11 higher** (0.5 lower to 0.71 higher)	Very low	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (SMD +/-0.5)
c 95% CI crosses 2 MIDs (SMD +/-0.5)

Table 31 Evidence profile for comparison between Higher intensity intervention to improve and maintain executive function compared to Lower intensity intervention to improve and maintain executive function in adults with multiple sclerosis

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Higher intensity intervention to improve and maintain executive function	Lower intensity intervention to improve and maintain executive function	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (higher is better) - Adaptive working memory cognitive training												
1 (Pedulla 2016)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	14	14	-	SMD **0.94 higher** (0.15 higher to 1.72 higher)	Very low	CRITICAL
Processing speed post-intervention as measured by a validated scale (higher is better) - Adaptive working memory cognitive training												
1 (Pedulla 2016)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	14	14	-	SMD **0.74 higher** (0.03 lower to 1.51 higher)	Very low	CRITICAL
Working memory post-intervention as measured by a validated scale (higher is better) - Adaptive working memory cognitive training												
1 (Pedulla 2016)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	14	14	-	SMD **0.95 higher** (0.17 higher to 1.74 higher)	Very low	CRITICAL
Long-term declarative memory post-intervention as measured by a validated scale (higher is better) - Adaptive working memory cognitive training												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Higher intensity intervention to improve and maintain executive function	Lower intensity intervention to improve and maintain executive function	Relative (95% CI)	Absolute (95% CI)		
1 (Pedulla 2016)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	14	14	-	SMD **0.8 higher** (0.03 higher to 1.58 higher)	Very low	CRITICAL
Working memory, processing speed and attention composite post-intervention as measured by a validated scale (higher is better) - Adaptive working memory cognitive training												
1 (Pedulla 2016)	randomised trials	very serious[a]	not serious	not serious	serious[b]	none	14	14	-	SMD **0.65 higher** (0.11 lower to 1.42 higher)	Very low	CRITICAL

CI: confidence interval; SMD: standardised mean difference

a Very serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (SMD +/-0.5)

Table 32 Evidence profile for comparison between Virtual interventions to improve attention compared to Face-to-face interventions to improve attention in adults with traumatic brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve attention	Face-to-face interventions to improve attention	Relative (95% CI)	Absolute (95% CI)		
Attention post-intervention as measured by a validated scale (higher is better) - Virtual Reality Based-Attention Processes Training												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve attention	Face-to-face interventions to improve attention	Relative (95% CI)	Absolute (95% CI)		
1 (De Luca 2022)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	15	15	-	Virtual interventions to improve attention: (median [IQR]): 76 (56.5-139.5) Face-to-face interventions to improve attention: (median [IQR]): 55 (30.5 to 64.5) p=0.01[c]	Very low	CRITICAL

CI: confidence interval; IQR: interquartile range

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b Very serious imprecision due to sample size <200
c Differences between groups judged to be statistically significant according to author analysis, favouring face-to-face interventions. Clinical significance could not be determined

Table 33 Evidence profile for comparison between Group interventions to improve and maintain executive function, memory and learning, and attention compared to Individual interventions to improve and maintain executive function, memory and learning, and attention in adults with acquired brain injury

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Group interventions to improve and maintain executive function, memory and learning, and attention	Individual interventions to improve and maintain executive function, memory and learning, and attention	Relative (95% CI)	Absolute (95% CI)		

Global memory post-intervention as measured by a validated scale (higher is better) – Individual therapy

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Group interventions to improve and maintain executive function, memory and learning, and attention	Individual interventions to improve and maintain executive function, memory and learning, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	20	23	-	SMD **0.26 lower** (0.86 lower to 0.35 higher)	Low	CRITICAL

Global memory end of follow up as measured by a validated scale (higher is better) – Individual therapy

1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	18	23	-	SMD **0.11 lower** (0.73 lower to 0.51 higher)	Very low	CRITICAL

Working memory post-intervention as measured by a validated scale (Higher is better) – Individual therapy

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Group interventions to improve and maintain executive function, memory and learning, and attention	Individual interventions to improve and maintain executive function, memory and learning, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	very serious[d]	none	23	20	-	Group interventions to improve and maintain executive function; memory and learning; and attention: (median [IQR]): 5 (1) Individual interventions to improve and maintain executive function; memory and learning; and attention: (median [IQR]): 5 (1) p=0.184[e]	Very low	CRITICAL

Working memory end of follow-up as measured by a validated scale (Higher is better) – Individual therapy

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Group interventions to improve and maintain executive function, memory and learning, and attention	Individual interventions to improve and maintain executive function, memory and learning, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	very serious[d]	none	23	20	-	Group interventions to improve and maintain executive function; memory and learning; and attention: (median [IQR]): 5 (2) Individual interventions to improve and maintain executive function; memory and learning; and attention: (median [IQR]): 5 (1) p=0.06[e]	Very low	CRITICAL

Long-term declarative memory post-intervention as measured by a validated scale (higher is better) – Individual therapy

1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	20	23	-	SMD **1.05 lower** (1.7 lower to 0.41 lower)	Low	CRITICAL

Long-term declarative memory end of follow up as measured by a validated scale (higher is better) – Individual therapy

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Group interventions to improve and maintain executive function, memory and learning, and attention	Individual interventions to improve and maintain executive function, memory and learning, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	18	23	-	SMD **0.02 lower** (0.64 lower to 0.6 higher)	Very low	CRITICAL

Attention post-intervention as measured by a validated scale (lower is better) – Individual therapy

1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	20	23	-	SMD **0.14 lower** (0.74 lower to 0.46 higher)	Low	CRITICAL

Attention end of follow up as measured by a validated scale (lower is better) – Individual therapy

1 (Lesniak 2018)	randomised trials	serious[a]	not serious	not serious	serious[b]	none	18	23	-	SMD **0.15 lower** (0.77 lower to 0.47 higher)	Low	CRITICAL

CI: confidence interval; IQR: interquartile range; SMD: standardised mean difference

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 1 MID (SMD +/-0.5)
c 95% CI crosses 2 MIDs (SMD +/-0.5)
d Very serious imprecision due to sample size <200
e No statistically significant difference between groups, according to author analysis.

Table 34 Evidence profile for comparison between Virtual interventions to improve and maintain executive function, visual, spatial and perceptual functions, and attention versus Face-to-face interventions to improve and maintain executive function, visual, spatial and perceptual functions, and attention in adults with Parkinson's disease

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (Higher is better) - Computerised cognitive rehabilitation												
1 (De Luca 2019b)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	50	50	-	Virtual interventions to improve and maintain executive function; visual, spatial and perceptual functions; and attention: (median [IQR]): 17.2 (15.2-18.0) Face-to-face interventions to improve and maintain executive function; visual, spatial and perceptual functions; and attention in adults: (median [IQR]): 14.9 (14.0-16.4) p=NR[c]	Very low	CRITICAL

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
Attention post-intervention as measured by a validated scale (Lower is better) - Computerised cognitive rehabilitation												
1 (De Luca 2019b)	randomised trials	serious[a]	not serious	not serious	very serious[b]	none	50	50	-	Virtual interventions to improve and maintain executive function; visual, spatial and perceptual functions; and attention: (median [IQR]): 57 (35-88) Face-to-face interventions to improve and maintain executive function; visual, spatial and perceptual functions; and attention in adults: (median [IQR]): 74.5 (44-160.75) p=NR[c]	Very low	CRITICAL

CI: confidence interval; IQR: interquartile range; NR: not reported

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2

b Very serious imprecision due to sample size <200
c No evidence of important difference due to degree of overlap in IQRs

Table 35 Evidence profile for comparison between Virtual interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention compared to Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention in adults with progressive neurological diseases

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
Executive function post-intervention as measured by a validated scale (Higher is better) - Computerised cognitive rehabilitation												

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (De Luca 2019a)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	30	30		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 17.4 (15.3-18.3) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 14.5 (13.2-15.9) p=NR[e]	Very low	CRITICAL

Executive function post-intervention as measured by a validated scale (Higher is better) - Virtual cognitive rehabilitation

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Leonardi 2021)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	15	15		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 17.8 (14.1-20.1) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 16.1 (12.5-18.0) p=NR[e]	Very low	CRITICAL

Executive function post-intervention as measured by a validated scale (Higher is better) - Virtual reality training

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Maggio 2018)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	10	10		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 15.3 (11.8-15.9) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 13.9 (12.3-15.0) p=NR[e]	Very low	CRITICAL

Processing speed post-intervention as measured by a validated scale (higher is better) - Virtual cognitive rehabilitation

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Leonardi 2021)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	15	15		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 24.3 (20.3-34.8) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 20.5 (17.3-34.8) p=NR[e]	Very low	CRITICAL

Global memory post-intervention as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (De Luca 2019a)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	30	30		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median[IQR]): 21 (20-24) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median[IQR]): 15 (11-20) p=NR[f]	Very low	CRITICAL

Global memory post-intervention as measured by a validated scale (higher is better) - Virtual reality training

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Maggio 2018)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	10	10		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 15.5 (13.3-20.5) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 17.5 (12.8-18.8) p=NR[e]	Very low	CRITICAL

Working memory post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation with virtual reality

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Maggio 2022)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	30	30		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 16.6 (12.7-22.5) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 11.7 (9.7-15.6) p=NR[e]	Very low	CRITICAL

Short-term memory post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation with virtual reality

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Maggio 2022)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	30	30		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 16.1 (13.8-17.0) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 13.3 (11.0-16.5) p=NR[e]	Very low	CRITICAL

Long-term declarative memory post-intervention as measured by a validated scale (higher is better) - Virtual cognitive rehabilitation

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Leonardi 2021)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	15	15		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 7.8 (5.6-9.63) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 6.8 (4.8-7.8) p=NR[e]	Very low	CRITICAL

Long-term declarative memory post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation with virtual reality

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Maggio 2022)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	30	30		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 14.3 (9.1-16) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 10.6 (8-12.3) p=NR[e]	Very low	CRITICAL

Perceptual function post-intervention as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (De Luca 2019a)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	30	30		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 16 (15 to 16) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 12 (10.2-15) p=NR[e]	Very low	CRITICAL

Perceptual function post-intervention as measured by a validated scale (higher is better) - Virtual reality training

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Maggio 2018)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	10	10		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 14 (11 to 14.8) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 9.5 (6-10) p=NR[e]	Very low	CRITICAL

Perceptual function post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation with virtual reality

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Maggio 2022)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	30	30		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 28.9 (26.1-32.4) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 25 (20.4-27.5) p=NR[e]	Very low	CRITICAL

Attention and Orientation post-intervention as measured by a validated scale (higher is better) - Computerised cognitive rehabilitation

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (De Luca 2019a)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	30	30		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 18 (15.5-18) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median IQR]): 12.5 (11-18) p=NR[e]	Very low	CRITICAL

Attention and Orientation post-intervention as measured by a validated scale (higher is better) - Virtual reality training

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Maggio 2018)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	10	10		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 16 (15.3-18) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 14.5 (12-16.8) p=NR[e]	Very low	CRITICAL

Working memory, Processing speed and Attention (divided) post-intervention as measured by a validated scale (higher is better) - Virtual cognitive rehabilitation

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Leonardi 2021)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	15	15		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 20.3 (4.9-25.9) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 13.3 (4.9-23.1) p=NR[e]	Very low	CRITICAL

Working memory, Processing speed and Attention (divided) post-intervention as measured by a validated scale (higher is better) - Cognitive rehabilitation with virtual reality

Quality assessment							№ of patients		Effect		Quality	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Virtual interventions to improve and maintain executive function, memory and learning; ,visual, spatial and perceptual functions, and attention	Face-to-face interventions to improve and maintain executive function, memory and learning, visual, spatial and perceptual functions, and attention	Relative (95% CI)	Absolute (95% CI)		
1 (Maggio 2022)	randomised trials	serious[a]	not serious	not serious	very serious[c]	none	15	15		Virtual interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 24.3 (15.8-32.3) Face-to-face interventions to improve and maintain executive function; memory and learning; visual, spatial and perceptual functions; and attention: (median [IQR]): 16 (4.8-17.8) p=NR[e]	Very low	CRITICAL

CI: confidence interval; IQR: interquartile range; NR: not reported

a Serious risk of bias in the evidence contributing to the outcomes as per RoB 2
b 95% CI crosses 2 MIDs (SMD +/-0.5)
c Very serious imprecision due to sample size <200
d 95% CI crosses 1 MID (SMD +/-0.5)
e No evidence of important difference due to degree of overlap in IQRs

f Possible important benefit as IQR does not overlap

Appendix G Economic evidence study selection

Study selection for: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

Please see Supplement 2 for details on study selection.

Appendix H Economic evidence tables

Economic evidence tables for review question: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

Table 36: Economic evidence table for a group-based memory rehabilitation programme:

Study country and type	Intervention and comparator	Study population, design and data sources	Costs and outcomes (descriptions and values)	Results	Comments
das Nair 2019 UK (England) Cost-effectiveness and cost-utility analysis Source of funding: the National Institute for Health Research (NIHR), Health Technology Assessment Programme (project no. 10/57/24)	Group-based memory rehabilitation programme (plus usual care) - 10 weekly sessions of a manualised memory rehabilitation programme - Each session lasted approximately 1.5 hours - 4 to 6 people per group - Delivered by assistant psychologist - Sessions involved retraining memory functions using restitution strategies like attention retraining and encoding improvement, teaching compensation strategies like mnemonics and external device usage and addressing memory problem coping methods. Comparator: Usual care only which included no formal rehabilitation. People may	People with TBI aged 18–69, must have had admission to hospital for TBI and had memory problems. Economic evaluation alongside an RCT (Das Nair 2019) Source of baseline data: RCT (N=328) Source of effectiveness data: RCT (N=238) Source of resource use data: RCT (N=238) Source of unit cost data: National sources (PSSRU)	Costs: Implementation and delivery of the group-based memory rehabilitation programme, community-based services (GPs, practice nurses, other community-based professionals and community-based social care services and medication), hospital services (outpatient appointments, accident and emergency department attendance, day-care services, and hospitalisation) Mean cost per participant at 12 months: Intervention: £1,397 (95% CI: £1,092 to £1,702)	ICERs: Dominant using EMQ as an outcome measure and £2,445 per QALY lost. Probability of being cost-effective: The probability of memory rehabilitation being cost-effective was 29% at £20,000/QALY and 24% at £30,000/QALY. Subgroup analysis: NR Sensitivity analysis: Results showed significant uncertainty, varying based on imputation method and confidence interval ranges for costs and outcomes. In some scenarios, usual care dominated, while in	Perspective: NHS and PSS Currency: UK£ Cost year: Likely 2016 Time horizon: 12 months Discounting: NA Applicability: Directly Limitations: Minor Other comments: Intervention resulted in a reduction of –2.1 (95% CI: –6.7 to 2.5) in EMQ score at 6 months, however this finding was not significant, p = 0.37

Study country and type	Intervention and comparator	Study population, design and data sources	Costs and outcomes (descriptions and values)	Results	Comments
	have attended employment rehabilitation services or self-help groups or received support from specialist charities, such as Headway.		Control: £1,424 (95% CI: £1,032 to £1,815) Difference: -£27 (95% CI: –£455 to £401), p = 0.91 Primary measure of outcome: Everyday Memory Questionnaire (EMQ) where higher scores indicate more frequent memory difficulties and QALYs (EQ-5D-5L) Mean EMQ score per participant at 12 months: Intervention: 38.0 (SD: 25.0) Control: 43.0 (SD: 26.7) Difference: –4.8 (95% CI: –9.6 to 0.0) Mean QALYs per participant at 12 months: Intervention: -0.007 (95% CI: −0.025 to 0.012) Control: 0.004 (95% CI: −0.017 to 0.025)	others, the intervention was dominant.	

Study country and type	Intervention and comparator	Study population, design and data sources	Costs and outcomes (descriptions and values)	Results	Comments
			Difference: -0.011 (95% CI: −0.031 to 0.011)		

Abbreviations: CI: Confidence Interval; EMQ: Everyday Memory Questionnaire; EQ-5D-5L: EuroQol 5-Dimension 5-Level; QALY: Quality-Adjusted Life Year; NIHR: National Institute for Health Research; TBI: Traumatic Brain Injury; RCT: Randomised Controlled Trial; GP: General Practitioner; NR: Not Reported; PSS: Personal Social Services; ICER: Incremental Cost Effectiveness Ratio; NA: Not Applicable; PSSRU: Person Social Services Research Unit; SD: Standard Deviation

Table 37: Economic evidence table for a group-based cognitive rehabilitation for attention and memory problems:

Study country and type	Intervention and comparator	Study population, design and data sources	Costs and outcomes (descriptions and values)	Results	Comments
Lincoln 2020 UK (England) Cost-effectiveness and cost-utility analysis Source of funding: The National Institute for Health Research Health (NIHR) Technology Assessment programme (project number 12/190/05)	A group cognitive rehabilitation for attention and memory problems (in addition to usual care) - Delivered by assistant psychologist - 10 weekly sessions - 4 to 6 people per group - The intervention involved restitution strategies for attention and memory, encoding and retrieval improvement, compensation strategies using internal mnemonics and external devices, and coping methods for attention and memory issues. Comparator: Usual care only and included: - General guidance from multiple sclerosis (MS) nurse	People with relapsing-remitting or progressive multiple sclerosis aged 18–69 who reported as having cognitive problems defined as >27 on the patient version of the MS Neuropsychological Screening Questionnaire and Impaired on at least one of the Brief Repeatable Battery of Neuropsychological tests. Economic evaluation alongside an RCT (Lincoln 2020) Source of baseline data: RCT (N=449)	Costs: Unclear but have included intervention (assistant psychologist), also medication and social services Mean cost per participant at 12 months: Intervention: £5,885 (SD: £5,641) Control: £6,574 (SD: £9,188) Difference: -£808 (95% CI: −£2,248 to £632) Primary measure of outcome: QALYs (EQ-5D-5L) and Multiple Sclerosis Impact Scale Psychological subscale (a higher score indicates a greater	ICERs: Intervention dominant using both outcomes, however, both costs and outcome differences were not significant. The probability of cognitive rehabilitation being cost-effective was 95% at £20,000/QALY and 97% at £30,000/QALY. Subgroup analysis: NR Sensitivity analysis: NR	Perspective: Unclear but seems to be NHS and PSS Currency: UK£ Cost year: Likely 2019 Time horizon: 12 months Discounting: NA Applicability: Directly Limitations: Potentially serious (unclear what costs included and unit cost data unclear)

Study country and type	Intervention and comparator	Study population, design and data sources	Costs and outcomes (descriptions and values)	Results	Comments
	specialists and occupational therapists on managing cognitive difficulties - Information from MS charity webpages with suggestions for coping with cognitive issues - Access to all other clinical services and support from specialist charities	Source of effectiveness data: RCT (N=387) Source of resource use data: RCT (N=387) Source of unit cost data: Unclear	impact of MS on a person's psychological well-being) Mean MSIS-psychological score at 12 months: Intervention: 22.2 (SD: 6.1) Control: 23.4 (SD: 6.0) Difference: -0.06, p-value = 0.20 Mean QALYs at 12 months: Intervention: 0.60 (SD: 0.25) Control: 0.57 (SD: 0.27) Difference: 0.01, 95% CI: −0.03 to 0.05		

CI: Confidence Interval; EQ-5D-5L: EuroQol 5-Dimension 5-Level; MS: Multiple Sclerosis; MSIS: Multiple Sclerosis Impact Scale; NA: Not Applicable; NIHR: National Institute for Health Research Health; NR: Not Reported; PSS: Personal Social Services; QALY: Quality-Adjusted Life Year; RCT: Randomised Controlled Trial; SD: Standard Deviation

Appendix I Health economic model

Health economic model for review question: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

No economic analysis was conducted for this review question.

Appendix J Excluded studies

Excluded studies for review question: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

Excluded effectiveness studies

Table 38: Excluded studies and reasons for their exclusion

Study	Reason for exclusion
(2011) Cognitive rehabilitation for traumatic brain injury (TBI).	- Publication date Published before 2013.
Abasiyanik, Z. and Kahraman, T. (2022) Effect of dual-task training on cognitive functions in persons with multiple sclerosis: A systematic review and meta-analysis. Multiple Sclerosis and Related Disorders 62: 103801	- Country Study conducted in Turkey.
Abasiyanik, Z., Yigit, P., Ozdogar, A.T. et al. (2018) A comparison of the effects of yoga and clinical pilates exercise on mobility, respiratory muscle strength and cognition in persons with multiple sclerosis. Multiple Sclerosis Journal 24(2supplement): 976-977	- Publication type Conference abstract.
Abdolghaderi, M., Narimani, M., Atadokht, A. et al. (2019) Comparing the effect of positive psychotherapy and dialectical behavior therapy on memory and attention in multiple sclerosis patients. NeuroQuantology 17(12): 1-8	- Country Study conducted in Iran.
Abdulhadi, E., Mirkowski, M., Morrow, S.A. et al. (2021) An evidence-based review of cognition in MS from the MSBEST project. Multiple Sclerosis Journal 27(3suppl): 19	- Publication type Conference abstract.
Abgottspon, Stephanie, Steiner, Leonie, Slavova, Nedelina et al. (2022) Relationship between motor abilities and executive functions in patients after pediatric stroke. Applied Neuropsychology: Child 11(4): 618-628	- Study design (adults) Not an RCT
Abraham, M.; Poulopoulos, N.; Larson, E. (2019) Clinical Utility of Transcranial Direct Current Stimulation (tDCS) Following Traumatic Brain Injury and Stroke. Archives of Physical Medicine and Rehabilitation 100(10): e149	- Publication type Conference abstract.
Acik, M., Senisik, S., Taskiran, D. et al. (2023) Exercise Improves Physical Capacity, Cognition, Quality of Life and Promotes Neurotrophic Factors in Patients with Multiple Sclerosis. Noropsikiyatri Arsivi 60(4): 335-343	- Country Study conducted in Turkey.
ACTRN12617000009314 (2017) Comparison of computer-based training and compensatory memory rehabilitation in Acquired Brain Injury.	- Publication type Trial protocol.
Adamson, M., Siddiqi, S., Swaminath, G. et al. (2019) Repetitive transcranial magnetic stimulation for	- Publication type Conference abstract.

Study	Reason for exclusion
improving cognition in veterans with TBI: Results from pilot clinical trial. Brain Stimulation 12(2): 551	
Ade, K., Podlewska, A., Banducci, S. et al. (2019) The effects of time-varying caloric vestibular stimulation therapy on cognition impairment in parkinson's disease. Movement Disorder 34(supplement2): 674	- Publication type Conference abstract.
Agency for Care Effectiveness, (ACE) (2022) Non-vitamin K antagonist oral anti-coagulation agents (NOACs) for the prevention of stroke and systemic embolism in non-valvular atrial fibrillation.	- Publication type Technology guidance for the prevention of stroke and systemic embolism.
Agency for Healthcare Research and Quality, (AHRQ) (1999) Rehabilitation for traumatic brain injury in children and adolescents.	- Publication date Published before 2013.
Agency for Healthcare Research and, Quality (1999) Rehabilitation for traumatic brain injury.	- Publication date Published before 2013.
Aguirre, N., Cruz-Gomez, A.J., Esbri, S.F. et al. (2021) Enhanced frontoparietal connectivity in multiple sclerosis patients and healthy controls in response to an intensive computerized training focused on working memory. Multiple Sclerosis and Related Disorders 52: 102976	- Outcomes No relevant outcomes reported. Reports measures of functional connectivity.
Aguirre, N., Cruz-Gomez, A.J., Miro-Padilla, A. et al. (2019) Repeated Working Memory Training Improves Task Performance and Neural Efficiency in Multiple Sclerosis Patients and Healthy Controls. Multiple Sclerosis International 2019: 2657902	- Outcomes No relevant outcomes reported. Reports measures of task performance and cerebral activity.
Ahorsu, D.K.; Adjaottor, E.S.; Hung Lam, B.Y. (2021) Intervention effect of non-invasive brain stimulation on cognitive functions among people with traumatic brain injury: A systematic review and meta-analysis. Brain Sciences 11(7): 840	- Country Study conducted in Hong Kong.
Akerlund, E., Esbjornsson, E., Sunnerhagen, K.S. et al. (2013) Can computerized working memory training improve impaired working memory, cognition and psychological health?. Brain Injury 27(1314): 1649-1657	- Population 71% of included participants were adults with stroke, which is outside of protocol.
Aksu, Serkan, Hasirci Bayir, Buse Rahime, Sayman, Ceyhun et al. (2023) Working memory improvement after transcranial direct current stimulation paired with working memory training in diabetic peripheral neuropathy. Applied neuropsychology. Adult: 1-14	- Country Study conducted in Turkey.
Al-Wardat, Mohammad, Schirinzi, Tommaso, Hadoush, Hikmat et al. (2022) Home-Based Exercise to Improve Motor Functions, Cognitive Functions, and Quality of Life in People with Huntington's Disease: A Systematic Review and Meta-Analysis. International journal of environmental research and public health 19(22)	- Intervention Systematic review with studies investigating home-based exercise. Therefore no studies were checked against protocol criteria.
Alanazi, Majed Awad (2024) The Role of Physical Activity in Adjunctive Nursing Management of Neuro-Degenerative Diseases among Older Adults: A Systematic Review of Interventional Studies. Life (Basel, Switzerland) 14(5)	- Population Systematic review including participants who are in protocol (4/19 people with Parkinsons), out of protocol (1/19 people with dementia, 3/19 adults with stroke, 1/19 people with Alzheimer's), and unclear (10/19 people with mild cognitive

Study	Reason for exclusion
	impairment). Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Alashram, A.R., Annino, G., Padua, E. et al. (2019) Cognitive rehabilitation post traumatic brain injury: A systematic review for emerging use of virtual reality technology. Journal of Clinical Neuroscience 66: 209-219	- Study design (adults) Systematic review with 4/9 randomised controlled trials, 3/9 case studies, 1/9 prospective study, and 1/9 pilot study. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Alashram, A.R.; Padua, E.; Annino, G. (2022) Noninvasive brain stimulation for cognitive rehabilitation following traumatic brain injury: a systematic review. Applied neuropsychology. Adult: 1-16	- Country Systematic review with 2/10 studies conducted in the US, 1/10 in South Korea, 1/10 in Brazil, 1/10 in Italy, 2/10 in Australia, 2/10 in Canada, and 1/10 in Poland. Italian, Australian, Canadian and Polish studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Alashram, Anas R (2024) Computerized cognitive rehabilitation for patients with traumatic brain injury: A systematic review of randomized controlled trials. Applied neuropsychology. Adult: 1-10	- Country Systematic review with 5/8 studies included studies conducted in the US, 2/8 in Australia, and 1/8 in the Netherlands. Australian and Dutch studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Alashram, Anas R (2024) Compensatory cognitive training for people with traumatic brain injury: A systematic review of randomized controlled trial. Applied neuropsychology. Adult: 1-9	- Country Systematic review with 5/8 studies included studies conducted in the US, 2/8 in Australia, and 1/8 in the Netherlands. Australian and Dutch studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Alashram, Anas R, Janada, Qusai, Ghrear, Tamara et al. (2023) Role of music therapy in improving cognitive function post-traumatic brain injury: A systematic review. Applied neuropsychology. Adult: 1-10	- Study design (adults) Systematic review with 2/5 randomised controlled trials, 1/5 case study, and 1/5 pilot study. Randomised controlled trials were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Ali, Saba Ghazanfar, Wang, Xiangning, Li, Ping et al. (2023) A systematic review: Virtual-reality-based techniques for human exercises and health improvement. Frontiers in public health 11: 1143947	- Population Systematic review with 61/120 studies conducted in a population with ophthalmological disorders, 15/120 studies conducted in a population with Alzheimer's disease, 10/120 studies

Study	Reason for exclusion
	conducted in a population with multiple sclerosis, 9/120 studies conducted in a population with epilepsy, 10/120 studies conducted in a population with autistic spectrum disorder, and 15/120 studies conducted in an unspecified population. Studies conducted in people with multiple sclerosis were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Allison, D.J., Josse, A.R., Gabriel, D.A. et al. (2017) Targeting inflammation to influence cognitive function following spinal cord injury: A randomized clinical trial. Spinal Cord 55(1): 26-32	- Intervention Anti-inflammatory diet intervention, and not an intervention or approach for improving cognitive function.
Alloni, A., Quaglini, S., Panzarasa, S. et al. (2018) Evaluation of an ontology-based system for computerized cognitive rehabilitation. International Journal of Medical Informatics 115: 64-72	- Outcomes Insufficient presentation of results - only p-values from Wilcoxon test are presented.
Alloni, Anna, Sinforiani, Elena, Zucchella, Chiara et al. (2017) Computer-based cognitive rehabilitation: The CoRe system. Disability and Rehabilitation: An International, Multidisciplinary Journal 39(4): 407-417	- Intervention Specific tool as a potential intervention for cognitive rehabilitation. Not an intervention that fits one of the 7 protocol intervention groups.
Altmann, Lori J P, Stegemoller, Elizabeth, Hazamy, Audrey A et al. (2016) Aerobic Exercise Improves Mood, Cognition, and Language Function in Parkinson's Disease: Results of a Controlled Study. Journal of the International Neuropsychological Society : JINS 22(9): 878-889	- Country Study conducted in the US.
Alwashmi, K.; Meyer, G.; Rowe, F.J. (2022) Audio-visual stimulation for visual compensatory functions in stroke survivors with visual field defect: a systematic review. Neurological Sciences 43(4): 2299-2321	- Study design (adults) Systematic review with 1/16 non-systematic review, 1/16 systematic review, 2/16 randomised controlled trials, 3/16 case-control studies, 6/16 uncontrolled longitudinal studies, and 3/16 cohort studies. Randomised controlled trials and the systematic review were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Alwi, S.M.S., Narayanan, V., Din, N.C. et al. (2021) Cognitive Rehabilitation Programs for Survivors of Breast Cancer Treated with Chemotherapy: A Systematic Review. Rehabilitation Oncology 39(4): 155-167	-Publication date Systematic review with 6/10 studies published 2013 or later, and 4/10 pre-2013. Potentially relevant papers were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Alzahrani, H. and Venneri, A. (2018) Cognitive rehabilitation in Parkinson's disease: A systematic review. Journal of Parkinson's Disease 8(2): 233-245	- Publication date Systematic review with 1/15 studies published 2013 or later, and 14/15 pre-2013. Study published 2013 or later was

Study	Reason for exclusion
	checked against protocol criteria and was added to this review.
Amato, M.P., Goretti, B., Portaccio, E. et al. (2012) Computer-assisted rehabilitation of attention in patients with multiple sclerosis: Results of a randomised double-blind trial. Multiple Sclerosis 18(4suppl1): 32-33	- Publication type Conference abstract.
Amato, M.P., Goretti, B., Viterbo, R.G. et al. (2014) Computer-assisted rehabilitation of attention in patients with multiple sclerosis: Results of a randomized, double-blind trial. Multiple Sclerosis 20(1): 91-98	- Outcomes Insufficient presentation of results - only p-values, figures, and predictor scores were presented.
Amoako, A.N. and Hare, D.J. (2020) Non-medical interventions for individuals with Rett syndrome: A systematic review. Journal of applied research in intellectual disabilities : JARID 33(5): 808-827	- Outcomes Systematic review with no meta-analysis and only a narrative description of results, so no relevant outcomes. Included studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Anagnostouli, M., Babili, I., Chrousos, G. et al. (2019) A novel cognitive-behavioral stress management method for multiple sclerosis. A brief report of an observational study. Neurological Research 41(3): 223-226	- Country Study conducted in Greece.
Ando, S., Ishioka, Y., Kambayashi, S. et al. (2024) Combined effects of electrical muscle stimulation and cycling exercise on cognitive performance. Frontiers in Physiology 15: 1408963	- Population Population did not include any participants with chronic neurological disorders.
Angelucci, F., Peppe, A., Carlesimo, G.A. et al. (2015) A pilot study on the effect of cognitive training on BDNF serum levels in individuals with Parkinson's disease. 9(mar): 130	- Outcomes No relevant outcomes reported. Reports measures of synaptic connectivity.
Antoniotti, P., Biscaro, V., Mancini, F. et al. (2024) Rehabilitation activities with tablet (REACT) in Parkinson's disease. Neurological Sciences 45(7): 3173-3181	- Outcomes No relevant outcomes reported. Reports measures of usability of a mobile application.
Argento, O., Piacentini, C., Bossa, M. et al. (2023) Motor, cognitive, and combined rehabilitation approaches on MS patients' cognitive impairment. Neurological Sciences 44(3): 1109-1118	- Comparator Comparator(s) include an active intervention component that is not within the scope of the protocol.
Argento, O., Piacentini, C., Santamato, A. et al. (2021) Comparison of the effectiveness of motor and cognitive rehabilitation alone compared to the combination of the two in patients with multiple sclerosis. Journal of the Neurological Sciences 429(supplement): 118566	- Publication type Abstract only.
Arnemann, K.L., Chen, A.J.-W., Novakovic-Agopian, T. et al. (2015) Functional brain network modularity predicts response to cognitive training after brain injury. Neurology 84(15): 1568-1574	- Country Study conducted in the US.
Ashman, T. and Tsaousides, T. (2011) Embedding problem solving and emotional regulation into	- Publication type Conference abstract.

Study	Reason for exclusion
traditional comprehensive day treatment program for brain injury. Brain Impairment 12(suppl1): 62	
Askari, M, Radmehr, H, Mohammadi, H et al. (2017) The effectiveness of mindfulness-based cognitive therapy on increasing the quality of life and reducing psychological symptoms in patients with multiple sclerosis. Journal of isfahan medical school 34(410): 1487-1495	- Paper unavailable Not available in English language.
Assonov, D. (2021) TWO-STEP RESILIENCE-ORIENTED INTERVENTION FOR VETERANS WITH TRAUMATIC BRAIN INJURY: A PILOT RANDOMIZED CONTROLLED TRIAL. Clinical Neuropsychiatry 18(5): 247-259	- Country Study conducted in Ukraine.
Atias, H.; Hausdorff, J.M.; Milman, U. (2015) Effects of computerized cognitive training on gait and mobility in patients with parkinson's disease. Physiotherapy (United Kingdom) 101(suppl1): es95	- Publication type Conference abstract.
Aval, N.M. and Rostami, R. (2010) Examining brain wave patterns in patients suffering from mild traumatic brain injury (MTBI) by the use of qeeg and effectiveness of neurofeedback in rehabilitating cognitive performance. Clinical EEG and Neuroscience: 223	- Publication type Conference abstract.
Avenali, M., Picascia, M., Tassorelli, C. et al. (2021) Evaluation of the efficacy of physical therapy on cognitive decline at 6-month follow-up in Parkinson disease patients with mild cognitive impairment: a randomized controlled trial. Aging Clinical and Experimental Research 33(12): 3275-3284	- Intervention Exercise intervention with goal-directed learning facilitated through cognitive engagement. Not an intervention that fits one of the 7 protocol intervention groups.
Awad, A.M., Shaker, H., El Gohary, A.M. et al. (2018) Effect of vestibular rehabilitation therapy on fatigue in patients with multiple sclerosis: A randomized controlled trial. Neurorehabilitation and Neural Repair 32(45): 360	- Publication type Conference abstract.
Azimian, M., Yaghoubi, Z., Ahmadi Kahjoogh, M. et al. (2021) The Effect of Cognitive Rehabilitation on Balance Skills of Individuals with Multiple Sclerosis. Occupational Therapy in Health Care 35(1): 93-104	- Country Study conducted in Iran.
Badr, L.K. (2009) Statistical versus clinical significance for infants with brain injury: Reanalysis of outcome data from a randomized controlled study. Clinical Nursing Research 18(2): 136-152	- Publication date Published before 2013.
Badr, L.K.; Garg, M.; Kamath, M. (2006) Intervention for infants with brain injury: Results of a randomized controlled study. Infant Behavior and Development 29(1): 80-90	- Publication date Published before 2013.
Bai, F., Allegrini, M., Falcinella, C. et al. (2018) Efficacy of a computerised cognitive rehabilitation training in improving HIV-associated neurocognitive disorders. Journal of the International AIDS Society 21(supplement8): 134	- Publication type Conference abstract.
Baldi, S., Mundula, T., Nannini, G. et al. (2021) Microbiota shaping - The effects of probiotics, prebiotics, and fecal microbiota transplant on cognitive	- Population Healthy people and people with Alzheimer's disease, encephalopathy, stress, HIV, fibromyalgia, depression and

Study	Reason for exclusion
functions: A systematic review. World Journal of Gastroenterology 27(39): 6715-6732	frailty syndrome. Not relevant according to protocol population criteria.
Balk, E, Chung, M, Raman, G et al. (2006) B vitamins and berries and age-related neurodegenerative disorders.	- Publication type Conference abstract.
Bangirana, P., Giordani, B., John, C.C. et al. (2009) Immediate neuropsychological and behavioral benefits of computerized cognitive rehabilitation in Ugandan pediatric cerebral malaria survivors. American Journal of Tropical Medicine and Hygiene 81(5suppl1): 98-99	- Publication date Published before 2013.
Bansi, J. (2017) High intensity endurance exercise increases cognitive functions and reduces peripheral matrix metalloproteinase-2 levels in persons with MS - A randomized controlled trial. Multiple Sclerosis 23(6): 885	- Publication type Conference abstract.
Baquet, L., Hasselmann, H., Patra, S. et al. (2017) Bicycle ergometry does not improve verbal memory in mild relapsing remitting MS - Results of a RCT. Multiple Sclerosis Journal 23(3supplement1): 950-951	- Publication type Conference abstract.
Baquet, L., Hasselmann, H., Patra, S. et al. (2018) Short-term interval aerobic exercise training does not improve memory functioning in relapsing-remitting multiple sclerosis- A randomized controlled trial. PeerJ 2018(12): e6037	- Intervention Exercise intervention that does not contain any elements with an aim of improving cognitive function. Not an intervention that fits one of the 7 protocol intervention groups.
Barbarulo, A.M., Lus, G., Signoriello, E. et al. (2018) Integrated cognitive and neuromotor rehabilitation in multiple sclerosis: A pragmatic study. Frontiers in Behavioral Neuroscience 12: 196	- Study design (adults) Ineligible study design (non-randomised study).
Barboza, N.M., Terra, M.B., Bueno, M.E.B. et al. (2019) Physiotherapy Versus Physiotherapy Plus Cognitive Training on Cognition and Quality of Life in Parkinson Disease: Randomized Clinical Trial. American journal of physical medicine & rehabilitation 98(6): 460-468	- Country Study conducted in Brazil.
Barha, C.K., Dao, E., Marcotte, L. et al. (2021) Cardiovascular risk moderates the effect of aerobic exercise on executive functions in older adults with subcortical ischemic vascular cognitive impairment. Scientific reports 11(1): 19974	- Population Adults with vascular cognitive impairment. Not relevant according to protocol population criteria.
Barrera, M., Atenafu, E.G., Sung, L. et al. (2018) A randomized control intervention trial to improve social skills and quality of life in pediatric brain tumor survivors. Psycho-Oncology 27(1): 91-98	- Intervention Intervention designed to improve social skills. Not an intervention that fits one of the 7 protocol intervention groups.
Bartfai, A., Sojka, P., Nilsson, C. et al. (2010) Quantitative and qualitative validation of a group treatment program for Mild ABI. Brain Injury 24(3): 249	- Publication type Conference abstract.
Basso, Michael R, Lowery, Natasha, Ghormley, Courtney et al. (2006) Self-generated learning in people with multiple sclerosis. Journal of the International Neuropsychological Society : JINS 12(5): 640-8	- Publication date Published before 2013.

Study	Reason for exclusion
Becker, H., Stuifbergen, A.K., Zhang, W. et al. (2020) Moderator Effects in Intervention Studies. Nursing research 69(1): 62-68	- Country Study conducted in the US.
Bedeschi Ferrari, C., Rodrigues, L., Bauer, D. et al. (2012) Gait training associated with executive functions tasks in subjects with Parkinson's disease: Improvement of performance and effects in motor learning. Movement Disorders 27(suppl1): 12	- Publication type Conference abstract.
Bedeschi Ferrari, C., Rodrigues, L., Bauer, D. et al. (2011) Improvement of gait, functional and cognitive performance in patients with parkinson's disease after gait training associated with executive function tasks. Physiotherapy (United Kingdom) 97(suppl1): es998-es999	- Publication type Conference abstract.
Bell, K.R., Brockway, J.A., Hart, T. et al. (2011) Scheduled telephone intervention for traumatic brain injury: A multicenter randomized controlled trial. Archives of Physical Medicine and Rehabilitation 92(10): 1552-1560	- Publication date Published before 2013.
Bell, K.R., Fann, J., Brockway, J.A. et al. (2015) Telephone problem solving treatment for active duty service members with mild traumatic brain injury. PM and R 7(9suppl1): 84-s85	- Publication type Conference abstract.
Bell, K.R., Fann, J.R., Brockway, J.A. et al. (2017) Telephone Problem Solving for Service Members with Mild Traumatic Brain Injury: A Randomized, Clinical Trial. Journal of Neurotrauma 34(2): 313-321	- Country Study conducted in the US.
Beretta, V.S., Conceicao, N.R., Nobrega-Sousa, P. et al. (2020) Transcranial direct current stimulation combined with physical or cognitive training in people with Parkinson's disease: A systematic review. Journal of NeuroEngineering and Rehabilitation 17(1): 74	- Outcomes Systematic review with studies reporting no relevant protocol outcomes. Studies examined the outcomes cognition, upper limb function, and gait/mobility. Included studies with relevant outcomes were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Berger, Sue, Kaldenberg, Jennifer, Selmane, Romeissa et al. (2016) Effectiveness of interventions to address visual and visual-perceptual impairments to improve occupational performance in adults with traumatic brain injury: A systematic review. American Journal of Occupational Therapy 70(3): no-specified	- Intervention Systematic review with studies investigating improving occupational performance. No interventions fit any of the 7 protocol intervention groups. Therefore no studies were checked against protocol criteria.
Bergquist, T., Gehl, C., Mandrekar, J. et al. (2009) The effect of internet-based cognitive rehabilitation in persons with memory impairments after severe traumatic brain injury. Brain Injury 23(10): 790-799	- Country Study conducted in the US.
Bermudez, M., Olivares, T., Moises, B. et al. (2015) Cognitive behavioural therapy in multiple sclerosis: Effectiveness in reducing depressive symptoms and cognitive impairments. Multiple Sclerosis 23(11suppl1): 230	- Publication type Conference poster.
Bernini, S., Panzarasa, S., Barbieri, M. et al. (2021) A double-blind randomized controlled trial of the efficacy	- Comparator

Study	Reason for exclusion
of cognitive training delivered using two different methods in mild cognitive impairment in Parkinson's disease: preliminary report of benefits associated with the use of a computerized tool. Aging Clinical and Experimental Research 33(6): 1567-1575	Active comparator. Does not fit any of the protocol comparator groups.
Bertens, D., Fasotti, L., Boelen, D.H. et al. (2016) Moderators, mediators, and nonspecific predictors of treatment outcome in an intervention for everyday task improvement in persons with executive deficits after brain injury. Archives of Physical Medicine and Rehabilitation 97(1): 97-103	- Population Mostly adult stroke survivors (approximately 66%). Outcomes for non-stroke survivors are not reported separately. Not relevant according to protocol population criteria.
Bertens, D., Kessels, R.P., Fiorenzato, E. et al. (2015) Do Old Errors Always Lead to New Truths? A Randomized Controlled Trial of Errorless Goal Management Training in Brain-Injured Patients. Journal of the International Neuropsychological Society : JINS 21(8): 639-649	- Population Mostly adults stroke survivors (approximately 66%). Outcomes for non-stroke survivors are not reported separately. Not relevant according to protocol population criteria.
Bertens, D., Kessels, R.P.C., Boelen, D.H.E. et al. (2016) Transfer effects of errorless Goal Management Training on cognitive function and quality of life in brain-injured persons. NeuroRehabilitation 38(1): 79-84	- Population Mostly adult stroke survivors (approximately 66%). Outcomes for non-stroke survivors are not reported separately. Not relevant according to protocol population criteria.
Bharadwaj, Sneha V, Yeatts, Paul, Headley, Johnna et al. (2022) Efficacy of Cogmed Working Memory Training program in improving working memory in school-age children with and without neurological insults or disorders: A meta-analysis. Applied Neuropsychology: Child 11(4): 891-903	- Population Systematic review including participants who are in protocol (1/11 children with traumatic brain injury), and out of protocol (5/11 children with attention deficit hyperactivity disorder, 1/11 children with epilepsy, 2/11 pre-term infants, 1/11 typically developed children, 1/11 low working memory). The study including children with traumatic brain injury was checked against protocol criteria and had been separately located by the literature search and screened.
Bhargav, P., Bhargav, H., Raghuram, N. et al. (2016) Immediate effect of two yoga-based relaxation techniques on cognitive functions in patients suffering from relapsing remitting multiple sclerosis: A comparative study. International Review of Psychiatry 28(3): 299-308	- Intervention Yoga-based relaxation techniques. Not an intervention that fits one of the 7 protocol intervention groups.
Biddiscombe, K.J., Ong, B., Kalinowski, P. et al. (2020) Physical activity and cognition in young-onset Parkinson's disease. Acta Neurologica Scandinavica 142(2): 151-160	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Biggs, A.T.; Dainer, H.M.; Littlejohn, L.F. (2021) Effect sizes for symptomatic and cognitive improvements in traumatic brain injury following hyperbaric oxygen therapy. Journal of applied physiology (Bethesda, Md. : 1985) 130(5): 1594-1603	- Intervention Hyperbaric oxygen therapy to treat traumatic brain injuries. Not an intervention that fits one of the 7 protocol intervention groups.
Bilek, F.; Bahcecioglu-Turan, G.; Ozer, Z. (2022) The effect of self-acupressure on quality of life, physical and cognitive function in relapsing remitting multiple	- Country Study conducted in Turkey.

Study	Reason for exclusion
sclerosis patients: A randomized controlled study. Explore	
Biundo, R., Weis, L., Facchini, S. et al. (2014) Safety and efficacy of cognitive rehabilitation in PD with cognitive impairments. Movement Disorders 29(suppl1): 338-s339	- Publication type Conference abstract.
Biundo, R., Weis, L., Fiorenzato, E. et al. (2015) Double-blind randomized trial of t-DCS versus sham in Parkinson patients with mild cognitive impairment receiving cognitive training. Brain Stimulation 8(6): 1223-1225	- Study design (adults) Commentary.
Bjorkdahl, A., Akerlund, E., Svensson, S. et al. (2013) A randomized study of computerized working memory training and effects on functioning in everyday life for patients with brain injury. Brain Injury 27(1314): 1658-1665	- Population Mostly adult stroke survivors (approximately 66%). Outcomes for non-stroke survivors are not reported separately. Not relevant according to protocol population criteria.
BlueCross BlueShield, Association (2008) Cognitive rehabilitation for traumatic brain injury in adults.	- Paper unavailable Resource no longer exists.
Bode, M., Sulzer, P., Schulte, C. et al. (2023) Multidomain cognitive training increases physical activity in people with Parkinson's disease with mild cognitive impairment. Parkinsonism and Related Disorders 113: 105330	- Outcomes No relevant protocol outcomes reported. Study reports measures of physical activity and its relation to change of cognitive function.
Bogdanova, Y., Ho, V., Martin, P. et al. (2017) Transcranial LED treatment for cognitive dysfunction and sleep in chronic TBI: Randomized controlled pilot trial. Archives of Physical Medicine and Rehabilitation 98(10): e122-e123	- Publication type Conference abstract.
Bogdanova, Y.; Yee, M.K.; Ho, V.T. (2014) Computerized cognitive rehabilitation in acquired brain injury: A systematic review. Archives of Physical Medicine and Rehabilitation 95(10): e76-e77	- Publication type Conference poster.
Bogdanova, Y., Yee, M.K., Ho, V.T. et al. (2016) Computerized cognitive rehabilitation of attention and executive function in acquired brain injury: A systematic review. Journal of Head Trauma Rehabilitation 31(6): 419-433	- Publication date Systematic review with 7/28 studies published 2013 or later and 21/28 pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Boivin, M.J., Busman, R.A., Parikh, S.M. et al. (2010) A Pilot Study of the Neuropsychological Benefits of Computerized Cognitive Rehabilitation in Ugandan Children With HIV. Neuropsychology 24(5): 667-673	- Publication date Published before 2013.
Boivin, M.J., Nakasujja, N., Sikorskii, A. et al. (2016) A randomized controlled trial of the neuropsychological benefits of computerized cognitive rehabilitation training in ugandan children surviving severe malaria. American Journal of Tropical Medicine and Hygiene 95(5supplement1): 403	- Publication type Conference abstract

Study	Reason for exclusion
Bonavita, S., Sacco, R., Della Corte, M. et al. (2015) Computer-aided cognitive rehabilitation improves cognitive performances and induces brain functional connectivity changes in relapsing remitting multiple sclerosis patients: An exploratory study. Journal of Neurology 262(1): 91-100	- Study design (adults) Ineligible study design (non-randomised study).
Bonnechere, B., Rintala, A., Spooren, A. et al. (2021) Is mhealth a useful tool for self-assessment and rehabilitation of people with multiple sclerosis? A systematic review. Brain Sciences 11(9): 1187	- Intervention Systematic review with 16/30 studies investigating mhealth aimed at improving cognitive function and 14/30 studies not aimed at improving cognitive function. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Bonnechere, Bruno and Klass, Malgorzata (2023) Cognitive Computerized Training for Older Adults and Patients with Neurological Disorders: Do the Amount and Training Modality Count? An Umbrella Meta-Regression Analysis. Games for health journal 12(2): 100-117	- Population Systematic review with 48/100 studies with a population with older adults, 17/100 studies with a population with multiple sclerosis, 15/100 studies with a population with mild cognitive impairment, 14/100 studies with a population with stroke, and 6/100 studies with a population with Parkinsons disease. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Bonotis, K., Anargyros, K., Liaskopoulos, N. et al. (2022) Evaluation of memory performance in patients with brain disorders following rTMS treatment. A systematic review. Clinical Neurophysiology 135: 126-153	- Population Systematic review with 36/104 studies with a population with depression, 4/104 studies with a population with bipolar disorder, 20/104 studies with a population with schizophrenia, 5/104 studies with a population with autism, alcohol dependence, post-traumatic stress disorder, or obsessive compulsive disorder, 28/104 studies with a population with mild cognitive impairment, and 11/104 studies with a population with dementia or Alzheimer's disease. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Bornhofen, C. and McDonald, S. (2008) Comparing strategies for treating emotion perception deficits in traumatic brain injury. Journal of Head Trauma Rehabilitation 23(2): 103-115	- Publication date Published before 2013.
Bove, R., Rowles, W., Zhao, C. et al. (2021) A novel in-home digital treatment to improve processing speed in people with multiple sclerosis: A pilot study. Multiple Sclerosis Journal 27(5): 778-789	- Country Study conducted in the US.

Study	Reason for exclusion
Bove, R., Rowles, W., Zhao, C. et al. (2019) A novel home-based digital treatment to improve processing speed in people with multiple sclerosis: A pilot study. Multiple Sclerosis Journal 25(supplement2): 86	- Publication type Conference abstract.
Bowen, Audrey, Knapp, Peter, Gillespie, David et al. (2011) Non-pharmacological interventions for perceptual disorders following stroke and other adult-acquired, non-progressive brain injury. The Cochrane database of systematic reviews: cd007039	- Publication date Systematic review with 6/6 studies published before 2013. Therefore, no studies were checked against protocol criteria.
Bowen, R., Brown, J., Frymark, T. et al. (2021) ASHA's Evidence-based Clinical Practice Guideline on Cognitive Rehabilitation in Individuals with Acquired Brain Injury. Archives of Physical Medicine and Rehabilitation 102(10): e123-e124	- Publication type Poster.
Braga, L.W. (2012) Cooperative learning and metacognition (metacognitive dimension) in preadolescents with acquired brain injury (ABI): Improving self-concept, selfregulation and quality of life. Brain Impairment 13(1): 173	- Publication type Conference abstract.
Braga, L.W., Rossi, L., Moretto, A.L.L. et al. (2012) Empowering preadolescents with ABI through metacognition: Preliminary results of a randomized clinical trial. NeuroRehabilitation 30(3): 205-212	- Publication date Published before 2013.
Brandt, A., Jensen, M.P., Soberg, M.S. et al. (2020) Information and communication technology-based assistive technology to compensate for impaired cognition in everyday life: a systematic review. Disability and rehabilitation. Assistive technology 15(7): 810-824	- Population Systematic review with 5/12 studies with a population with acquired brain injury, 2/12 studies with a population with traumatic brain injury, 2/12 studies with a population with autism, 1/12 with a population with intellectual development disorder, and 2/12 studies with a population with attention deficit hyperactivity disorder. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Brandt, A.E., Finnanger, T.G., Hypher, R.E. et al. (2021) Rehabilitation of executive function in chronic paediatric brain injury: a randomized controlled trial. BMC Medicine 19(1): 253	- Comparator Active comparator (psychoeducation) not within the same intervention group. Not within scope of the comparison groups defined in the protocol..
Bray, V.J., Dhillon, H.M., Bell, M. et al. (2015) Evaluation of a web based cognitive rehabilitation programme (CRP) in cancer survivors reporting cognitive symptoms following chemotherapy. Asia-Pacific Journal of Clinical Oncology 11(suppl4): 67-68	- Publication type Conference abstract.
Bray, V.J., Dhillon, H.M., Bell, M.L. et al. (2017) Evaluation of a web-based cognitive rehabilitation program in cancer survivors reporting cognitive symptoms after chemotherapy. Journal of Clinical Oncology 35(2): 217-225	- Population Ineligible population. Study examines cancer survivors with non-CNS sold primary tumours. Outcomes for people with other cancers are not reported separately. Not relevant according to protocol population criteria .

Study	Reason for exclusion
Briken, S., Gold, S.M., Patra, S. et al. (2014) Effects of exercise on fitness and cognition in progressive MS: A randomized, controlled pilot trial. Multiple Sclerosis 20(3): 382-390	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Brissart, H., Omorou, A., Forthoffer, N. et al. (2019) Memory improvement after a cognitive rehabilitation program in multiple sclerosis. Multiple Sclerosis Journal 25(supplement2): 84	- Publication type Conference abstract.
Brissart, H., Omorou, A.Y., Forthoffer, N. et al. (2020) Memory improvement in multiple sclerosis after an extensive cognitive rehabilitation program in groups with a multicenter double-blind randomized trial. Clinical rehabilitation 34(6): 754-763	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Burckhardt, M., Herke, M., Wustmann, T. et al. (2016) Omega-3 fatty acids for the treatment of dementia. Cochrane Database of Systematic Reviews 2016(4): cd009002	- Population Ineligible population. All participants were people with dementia, which is not relevant according to protocol population criteria.
Burt, J, Ravid, EN, Bradford, S et al. (2020) The Effects of Music-Contingent Gait Training on Cognition and Mood in Parkinson Disease: a Feasibility Study. Neurorehabilitation and neural repair 34(1): 82-92	- Outcome No relevant outcomes reported. Study examines test performance and mood.
Bushnik, T., Englander, J., Oggins, J. et al. (2010) A randomized clinical trial of a cognitive orthotic with executive planning capability in individuals with cognitive dysfunction. Brain Injury 24(3): 392-393	- Publication type Conference abstract.
Butler, R.W., Copeland, D.R., Fairclough, D.L. et al. (2008) A Multicenter, Randomized Clinical Trial of a Cognitive Remediation Program for Childhood Survivors of a Pediatric Malignancy. Journal of Consulting and Clinical Psychology 76(3): 367-378	- Publication date Published before 2013.
Butterfield, London C, Cimino, Cynthia R, Salazar, Robert et al. (2017) The Parkinson's Active Living (PAL) Program. Journal of geriatric psychiatry and neurology 30(1): 11-25	- Country Study conducted in the US.
Cacciante, L., Pieta, C., Rutkowski, S. et al. (2022) Cognitive telerehabilitation in neurological patients: systematic review and meta-analysis. Neurological Sciences 43(2): 847-862	- Population Systematic review with 2/9 studies with a population with mild cognitive impairments or dementia, 2/9 studies with a population with multiple sclerosis, 1/9 study with a population with acquired brain injury, 1/9 study with a population with Alzheimer's disease, 2/9 studies with a population with stroke, and 1/9 study with a population with aphasia. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Cammisuli, D.M., Cignoni, F., Ceravolo, R. et al. (2022) Transcranial Direct Current Stimulation (tDCS) as a Useful Rehabilitation Strategy to Improve Cognition in	- Population Systematic review with 10/17 studies with a population with Alzheimer's disease

Study	Reason for exclusion
Patients With Alzheimer's Disease and Parkinson's Disease: An Updated Systematic Review of Randomized Controlled Trials. Frontiers in Neurology 12: 798191	and 7/17 studies with a population with Parkinson's disease. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Campbell, E., Coulter, E., Mattison, P. et al. (2020) High intensity interval training is feasible in people moderately disabled by progressive multiple sclerosis. Physiotherapy (United Kingdom) 107(supplement1): e16-e17	- Publication type Conference abstract.
Campbell, J., Cercignani, M., Langdon, D. et al. (2015) Feasibility and effectiveness of home-based, computerised cognitive rehabilitation in multiple sclerosis-a functional MRI study. European Journal of Neurology 22(suppl1): 47	- Publication type Conference abstract.
Campbell, J., Cercignani, M., Langdon, D. et al. (2015) Cognitive rehabilitation in multiple sclerosis. Journal of Neurology, Neurosurgery and Psychiatry 86(11)	- Outcomes No relevant outcomes reported. Reported measures include MRI images and results.
Campbell, J., Langdon, D., Cercignani, M. et al. (2016) A Randomised controlled trial of efficacy of cognitive rehabilitation in multiple sclerosis: A cognitive, behavioural, and MRI study. Neural Plasticity 2016: 4292585	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Cantor, J., Ashman, T., Dams-O'Connor, K. et al. (2014) Evaluation of the short-term executive plus intervention for executive dysfunction after traumatic brain injury: A randomized controlled trial with minimization. Archives of Physical Medicine and Rehabilitation 95(1): 1-9e3	- Country Study conducted in the US.
Canu, E., Agosta, F., Leocadi, M. et al. (2019) Cognitive improvement after six-week action observation and motor imagery training in patients with parkinson's disease. Neurology 92(15supplement1)	- Publication type Conference abstract.
Cao, H., Tan, X., Liu, Z. et al. (2021) The Effect of Adding Transcranial Direct Current Stimulation to Hyperbaric Oxygen Therapy in Patients With Delayed Encephalopathy After Carbon Monoxide Poisoning: A Randomised Controlled Trial. Frontiers in Neurology 12: 719765	- Country Study conducted in China.
Cao, SQ, Gao, X, Zhu, BY et al. (2020) Effects of transcranial direct current stimulation on cognitive function in delayed encephalopathy after carbon monoxide poisoning. Zhonghua lao dong wei sheng zhi ye bing za zhi [Chinese journal of industrial hygiene and occupational diseases] 38(9): 696-700	- Paper unavailable Not available in English language.
Capato, T.T.C., Agostini, N., Kolozuk, F. et al. (2015) The freezing of gait (FoG) in Parkinso's disease (PD) could be reduced by a physiotherapy programme with multisensory cues. Movement Disorders 30(suppl1): 74-s75	- Publication type Conference abstract.
Cardona, J. and Suarez, D. (2019) Effects of transcranial direct current stimulation on action-verb	- Publication type Conference abstract.

Study	Reason for exclusion
processing in patients with Parkinson's disease. Journal of the Neurological Sciences 405(supplement): 270	
Carelli, L., Solca, F., Tagini, S. et al. (2022) Gaze-Contingent Eye-Tracking Training in Brain Disorders: A Systematic Review. Brain Sciences 12(7): 931	- Outcomes Systematic review with no meta-analysis and only a narrative description of results, so no relevant outcomes. Included studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Carr, B., Allaous, J., Lannin, N. et al. (2012) Efficacy of using handheld computers plus occupational therapy training to compensate for memory and planning difficulties after brain injury: A randomised control trial. Neurorehabilitation and Neural Repair 26(6): 687	- Publication type Conference abstract.
Casaletto, K.B., Moore, D.J., Woods, S.P. et al. (2016) Abbreviated Goal Management Training Shows Preliminary Evidence as a Neurorehabilitation Tool for HIV-associated Neurocognitive Disorders among Substance Users. The Clinical neuropsychologist 30(1): 107-130	- Country Study conducted in the US.
Castelli, L, Giovannini, S, Iacovelli, C et al. (2022) Training-dependent plasticity and far transfer effect enhanced by Bobath rehabilitation in Multiple Sclerosis. Multiple sclerosis and related disorders 68: 104241	- Intervention Intervention focused on movement recovery and was not aimed at improving cognitive function. Not an intervention that fits on of the 7 protocol intervention groups.
Cerasa, A, Gioia, MC, Valentino, P et al. (2012) Computer-assisted cognitive rehabilitation of attention deficits for multiple sclerosis: a randomized trial with fMRI correlates 15515. 27	- Publication date Published before 2013.
Cerezo-Garcia, M., Laredo Curiel, M.J., Aladro, Y. et al. (2018) Face-to-face and telematics cognitive stimulation in multiple sclerosis patients. Multiple Sclerosis Journal 24(2supplement): 447	- Publication type Conference abstract.
Chalah, M.A., Lefaucheur, J.-P., Creange, A. et al. (2017) Targeting fatigue, mood and cognition in multiple sclerosis using tDCS. European Archives of Psychiatry and Clinical Neuroscience 267(supplement2): 151-s152	- Publication type Conference abstract.
Chan, D.Y. and Fong, K.N. (2011) The effects of problem-solving skills training based on metacognitive principles for children with acquired brain injury attending mainstream schools: a controlled clinical trial. Disability and rehabilitation 33(2122): 2023-2032	- Country Study conducted in China.
Chang, Chia-Wen, Tzeng, Hsin-Ya, Ma, Ching-Yuan et al. (2023) Effectiveness of exercise in improving quality of life in patients with traumatic brain injury: A systematic review and meta-analysis. Brain injury 37(2): 140-146	- Study design (adults) Systematic review with 3/6 randomised controlled trials and 3/6 non-randomised controlled trials. Randomised controlled trials which were published 2013 or later were checked against protocol criteria and were either not relevant or had been

Study	Reason for exclusion
	separately located by the literature search and screened.
Chang, TJ (2022) Foreword. Clinics in podiatric medicine and surgery 39(1): ix-x	- Publication type Conference paper.
Charvet, L. and Shaw, M. (2017) Procedures and results using a remotely-supervised protocol for at-home access to tDCS in multiple sclerosis. Brain Stimulation 10(2): 422-423	- Publication type Conference abstract.
Charvet, L., Shaw, M., Dobbs, B. et al. (2018) Remotely Supervised Transcranial Direct Current Stimulation Increases the Benefit of At-Home Cognitive Training in Multiple Sclerosis. Neuromodulation 21(4): 383-389	- Study design (adults) Ineligible study design (non-randomised study).
Charvet, L., Yang, J., Shaw, M. et al. (2016) An adaptive computer-based cognitive training program improves cognitive functioning in adults with multiple sclerosis (MS): Results of a double-blind randomized active-placebo-controlled 12-week trial. Neurology 86(16suppl1)	- Publication type Conference abstract.
Charvet, L.E., Haider, L., Shaw, M. et al. (2015) Remotely-supervised cognitive remediation is feasible and effective: Results of a pilot study. Multiple Sclerosis 23(11suppl1): 333-334	- Publication type Conference poster.
Charvet, L.E., Yang, J., Shaw, M.T. et al. (2017) Cognitive function in multiple sclerosis improves with telerehabilitation: Results from a randomized controlled trial. PLoS ONE 12(5): e0177177	- Country Study conducted in the US.
Chavez Arana, C., van IJzendoorn, M.H., Serrano-Juarez, C.A. et al. (2024) Interventions to improve executive functions in children and adolescents with acquired brain injury: a systematic review and multilevel meta-analysis. Child Neuropsychology 30(1): 164-187	- Publication date Systematic review with 16/24 studies published 2013 or later, and 8/24 pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Chen, AJ-W, Novakovic-Agopian, T, Nycum, TJ et al. (2011) Training of goal-directed attention regulation enhances control over neural processing for individuals with brain injury. Brain 134(5): 1541-1554	- Country Study conducted in the US.
Chen, AJ-W, Nycum, TJ, Novakovic-Agopian, T et al. (2010) Rehabilitation training of goal-directed attention enhances control over neural information processing for individuals with brain injury. Annals of neurology 68(suppl14): S60-S61	- Publication type Conference abstract.
Chen, Jia, Dong, Yuanwei, Guo, Hong et al. (2024) Efficacy of rTMS combined with cognitive training in TBI with cognition disorder: a systematic review and meta-analysis. Neurological sciences : official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology	- Country Systematic review with 1/14 studies conducted in Brazil, 1/14 in Korea, and 12/14 in China. Therefore, no studies checked against protocol.
Chen, JL and Leng, W (2021) Effect of scalp acupuncture on cognitive function and self-care ability of daily life in patients with traumatic brain injury.	- Publication type Non-English language study.

Study	Reason for exclusion
Zhongguo zhen jiu [Chinese acupuncture & moxibustion] 41(2): 127-130	
Chen, Pin-Yuan, Su, I-Chang, Shih, Chun-Ying et al. (2023) Effects of Neurofeedback on Cognitive Function, Productive Activity, and Quality of Life in Patients With Traumatic Brain Injury: A Randomized Controlled Trial. Neurorehabilitation and neural repair 37(5): 277-287	- Country Study conducted in Taiwan.
Chenet, A., Gosseaume, A., Wiertlewski, S. et al. (2016) Efficacity of exercise training on multiple sclerosis patients with cognitive impairments. Annals of Physical and Rehabilitation Medicine 59(supplement): e42	- Publication type Conference abstract.
Cherrier, M.M., Anderson, K., David, D. et al. (2013) A randomized trial of cognitive rehabilitation in cancer survivors. Life Sciences 93(17): 617-622	- Country Study conducted in the US.
Chiaravalloti, N.D., Costa, S.L., Moore, N.B. et al. (2022) The efficacy of speed of processing training for improving processing speed in individuals with multiple sclerosis: a randomized clinical trial. Journal of Neurology 269(7): 3614-3624	- Outcomes Insufficient presentation of results; no comparative raw data reported and insufficient information in figures to extract raw data.
Chiaravalloti, N.D. and De Luca, J. (2015) The influence of cognitive dysfunction on benefit from learning and memory rehabilitation in MS: A sub-analysis of the MEMREHAB trial. Multiple Sclerosis Journal 21(12): 1575-1582	- Country Study conducted in the US.
Chiaravalloti, N.D., DeLuca, J., Moore, N.B. et al. (2005) Treating learning impairments improves memory performance in multiple sclerosis: A randomized clinical trial. Multiple Sclerosis 11(1): 58-68	- Country Study conducted in the US.
Chiaravalloti, N.D., Goverover, Y., Costa, S.L. et al. (2018) A pilot study examining speed of processing training (SPT) to improve processing speed in persons with multiple sclerosis. Frontiers in Neurology 9(aug): 685	- Country Study conducted in the US.
Chiaravalloti, N.D., Moore, N.B., Nikelshpur, O.M. et al. (2013) An RCT to treat learning impairment in multiple sclerosis: The MEMREHAB trial. Neurology 81(24): 2066-2072	- Country Study conducted in the US.
Chiaravalloti, N.D., Moore, N.B., Weber, E. et al. (2021) The application of Strategy-based Training to Enhance Memory (STEM) in multiple sclerosis: A pilot RCT. Neuropsychological rehabilitation 31(2): 231-254	- Country Study conducted in the US.
Chiaravalloti, N.D., Sandry, J., Moore, N.B. et al. (2016) An RCT to Treat Learning Impairment in Traumatic Brain Injury. Neurorehabilitation and Neural Repair 30(6): 539-550	- Country Study conducted in the US.
Chiaravalloti, N.D., Wylie, G., Leavitt, V. et al. (2012) Increased cerebral activation after behavioral treatment for memory deficits in MS. Journal of Neurology 259(7): 1337-1346	- Publication date Published before 2013.
Chiaravalloti, Nancy D, Costa, Silvana, Armknecht, Caroline et al. (2023) The influence of information processing speed on benefit from learning and memory	- Country Study conducted in the US.

Study	Reason for exclusion
rehabilitation in TBI: a sub-analysis of the TBI-MEM trial. Brain injury 37(8): 689-696	
Chmelarova, D., Fiala, L., Dostal, M. et al. (2020) Intensive computer-assisted cognitive rehabilitation in persons with multiple sclerosis - results of a 12-week randomized study. Ceska a Slovenska Neurologie a Neurochirurgie 83(4): 408-415	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Chopra, S. (2021) Neuropsychological rehabilitation after traumatic brain injury in low-resource settings-a single blind randomized study. Neuroepidemiology 55(suppl1): 26	- Publication type Conference abstract.
Chopra, S, Kumaran, S, Pandey, R et al. (2016) Visual memory activation changes postcognitive rehabilitation after traumatic brain injury: a controlled trial. Brain injury conference: pp20160656	- Publication type Conference abstract.
Christensen, M.G.; Damsgaard, J.; Fink-Jensen, A. (2021) Use of ketogenic diets in the treatment of central nervous system diseases: a systematic review. Nordic Journal of Psychiatry 75(1): 1-8	- Intervention Ketogenic diet with no reference to it being rehabilitation. Not an intervention that fits one of the 7 protocol intervention groups.
Chuaykarn, Uraporn; Thato, Ratsiri; Crago, Elizabeth A (2024) Nonpharmacological interventions to improve the cognitive function among persons with traumatic brain injury: A systematic review. Journal of nursing scholarship : an official publication of Sigma Theta Tau International Honor Society of Nursing	- Country Systematic review with 9/21 studies conducted in the US, 2/21 in India, 1/21 in Egypt, 3/21 in Canada, 1/21 in Australia, 1/21 in Denmark, 1/21 in Finland, 1/21 in Poland, and 2/21 in Iran. Canadian, Australian, Danish, and Polish studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Chung, C.S.Y., Pollock, A., Campbell, T. et al. (2013) Cognitive rehabilitation for executive dysfunction in adults with stroke or other adult non-progressive acquired brain damage. Cochrane Database of Systematic Reviews 2013(4): cd008391	- Publication date Systematic review with all included studies published before 2013. Therefore no studies checked against protocol.
Chung, C.S.Y., Pollock, A., Campbell, T. et al. (2012) Cognitive rehabilitation for executive dysfunction in adults with stroke or other non-progressive acquired brain damage: A Cochrane systematic review. International Journal of Stroke 7(suppl2): 53-54	- Publication date Systematic review with all included studies published before 2013. Therefore no studies checked against protocol.
Chung, P. and Khan, F. (2014) Traumatic brain injury (TBI) diagnosis and treatment: A systematic review and update. Brain Injury 28(56): 744-745	- Publication type Conference abstract.
Cicerone, K.D., Dahlberg, C., Malec, J.F. et al. (2005) Evidence-based cognitive rehabilitation: Updated review of the literature from 1998 through 2002. Archives of Physical Medicine and Rehabilitation 86(8): 1681-1692	- Publication date Published before 2013.
Cicerone, K.D., Goldin, Y., Ganci, K. et al. (2019) Evidence-Based Cognitive Rehabilitation: Systematic Review of the Literature From 2009 Through 2014. Archives of Physical Medicine and Rehabilitation 100(8): 1515-1533	- Outcomes Systematic review with no meta-analysis and only a narrative description of results, so no relevant outcomes. Included studies were checked against protocol criteria and were either not relevant or

Study	Reason for exclusion
	had been separately located by the literature search and screened.
Cicerone, K.D., Langenbahn, D.M., Braden, C. et al. (2011) Evidence-based cognitive rehabilitation: Updated review of the literature from 2003 through 2008. Archives of Physical Medicine and Rehabilitation 92(4): 519-530	- Publication date Published before 2013.
Clasby, Betony, Hughes, Nathan, Clasby, Elizabeth et al. (2023) School-based interventions for children and adolescents following traumatic brain injury: A systematic review. NeuroRehabilitation 52(4): 539-568	- Country Systematic review with all included studies conducted in the US. Therefore no studies checked against protocol.
Coghe, G., Corona, F., Marongiu, E. et al. (2018) Fatigue, as measured using the Modified Fatigue Impact Scale, is a predictor of processing speed improvement induced by exercise in patients with multiple sclerosis: data from a randomized controlled trial. Journal of Neurology 265(6): 1328-1333	- Outcomes Correlational analysis of impact of fatigue. Does not report relevant outcomes by allocation to treatment group.
Coghe, G., Fenu, G., Lai, M. et al. (2019) Positive effects of exercise on cognition are enhanced by the transcranial direct current stimulation. Multiple Sclerosis Journal 25(7): 1064	- Publication type Conference abstract.
Coleman, J.J., Frymark, T., Franceschini, N.M. et al. (2015) Assessment and Treatment of Cognition and Communication Skills in Adults With Acquired Brain Injury via Telepractice: A Systematic Review. American journal of speech-language pathology / American Speech-Language-Hearing Association 24(2): 295-315	- Publication date Systematic review with 9/10 studies published before 2013 and 1/10 studies published in 2013, which was checked against protocol criteria and was either not relevant or had been separately located by the literature search and screened.
Conceicao, N.R., Gobbi, L.T.B., Nobrega-Sousa, P. et al. (2021) Aerobic Exercise Combined With Transcranial Direct Current Stimulation Over the Prefrontal Cortex in Parkinson Disease: Effects on Cortical Activity, Gait, and Cognition. Neurorehabilitation and Neural Repair 35(8): 717-728	- Country Study conducted in Brazil.
Conklin, H.M., Ashford, J.M., Clark, K.N. et al. (2017) Long-Term Efficacy of Computerized Cognitive Training Among Survivors of Childhood Cancer: A Single-Blind Randomized Controlled Trial. Journal of pediatric psychology 42(2): 220-231	- Country Study conducted in the US.
Conklin, H.M., Ogg, R.J., Ashford, J.M. et al. (2015) Computerized cognitive training for amelioration of cognitive late effects among childhood cancer survivors: A randomized controlled trial. Journal of Clinical Oncology 33(33): 3894-3902	- Country Study conducted in the US.
Constantinidou, F (2019) Efforts of systematic categorization training on cognitive performance in healthy older adults and in adults with traumatic brain injury. Behavioural neurology vol 2019 2019, artid 9785319 2019	- Study design (adults) No control group - all traumatic brain injury patients included in the study received the intervention.
Constantinidou, F. and Messinis, L. (2019) Effects of systematic categorization training on cognitive performance in healthy older adults and in adults with traumatic brain injury. Behavioural Neurology 2019: 9785319	- Study design (adults) No control group - all traumatic brain injury patients included in the study received the intervention.

Study	Reason for exclusion
Constantinidou, F.; Thomas, R.D.; Robinson, L. (2008) Benefits of categorization training in patients with traumatic brain injury during post-acute rehabilitation: Additional evidence from a randomized controlled trial. Journal of Head Trauma Rehabilitation 23(5): 312-328	- Publication date Published before 2013.
Cook, L.G., Chapman, S.B., Elliott, A.C. et al. (2014) Cognitive gains from gist reasoning training in adolescents with chronic-stage traumatic brain injury. Frontiers in Neurology 5jun: 87	- Country Study conducted in the US.
Cook, L.G., Chapman, S.B., Evenson, N. et al. (2012) Training of gist-based strategic reasoning in adolescents with chronic traumatic brain injury. Journal of Head Trauma Rehabilitation 27(5): e22	- Publication type Conference abstract.
Corti, Claudia, Oldrati, Viola, Papini, Marta et al. (2023) Randomized clinical trial on the effects of a computerized cognitive training for pediatric patients with acquired brain injury or congenital malformation. Scientific reports 13(1): 14559	- Population Half the population included in this study did not meet inclusion criteria. The other half were participants with acquired brain injury.. Outcomes for participants included in the protocol are not reported separately. Not relevant according to protocol population criteria.
Couillet, J., Soury, S., Lebornec, G. et al. (2010) Rehabilitation of divided attention after severe traumatic brain injury: A randomised trial. Neuropsychological Rehabilitation 20(3): 321-339	- Publication date Study published before 2013.
Couture, M.; Giguere-Rancourt, A.; Simard, M. (2017) Impact of cognitive interventions on cognitive symptoms in idiopathic Parkinson's disease. Neurodegenerative Diseases 17(supplement1): 1835	- Publication type Conference abstract.
Couture, M.; Giguere-Rancourt, A.; Simard, M. (2019) The impact of cognitive interventions on cognitive symptoms in idiopathic Parkinson's disease: a systematic review. Neuropsychology, development, and cognition. Section B, Aging, neuropsychology and cognition 26(5): 637-659	- Population Systematic review with 7/13 studies with a population of Parkinson’s disease and mild cognitive impairment, and 6/13 studies with a population of Parkinson’s disease. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Cox, E., Bells, S., Timmons, B.W. et al. (2020) A controlled clinical crossover trial of exercise training to improve cognition and neural communication in pediatric brain tumor survivors. Clinical Neurophysiology 131(7): 1533-1547	- Outcomes No relevant outcomes reported. Reports measures of brain activity, reaction times, and accuracy on a go/no go task.
Craciunas, L, Zdoukopoulos, N, Vinayagam, S et al. (2022) Hormone therapy for uterine and endometrial development in women with premature ovarian insufficiency. Cochrane Database of Systematic Reviews	- Population Ineligible population. Study examines women with premature ovarian insufficiency. Not relevant according protocol to population criteria.
Crocker, L.D., Sullan, M.J., Jurick, S.M. et al. (2022) Baseline executive functioning moderates treatment-related changes in quality of life in veterans with posttraumatic stress disorder and comorbid traumatic brain injury. Journal of traumatic stress	- Country Study conducted in the US.

Study	Reason for exclusion
Cruise, K.E., Bucks, R.S., Loftus, A.M. et al. (2011) Exercise and Parkinson's: Benefits for cognition and quality of life. Acta Neurologica Scandinavica 123(1): 13-19	- Publication date Published before 2013.
Cui, H.S., Perez, J., El-Nazer, R. et al. (2011) Cognitive and affective modulation in PD induced by cortical DC stimulation: Preliminary analysis. Movement Disorders 26(suppl2): 123-s124	- Publication type Conference abstract.
D'Angelo, E. (2017) Intensive semantic memory training: A comparison to traditional episodic memory therapy. Brain Injury 31(67): 794	- Publication type Conference abstract.
D'Angelo, E.C.; Ober, B.A.; Shenaut, G.K. (2021) Combined Memory Training: An Approach for Episodic Memory Deficits in Traumatic Brain Injury. American journal of speech-language pathology 30(2): 920-932	- Country Study conducted in the US.
Da Silva, F.C., Iop, R.D.R., De Oliveira, L.C. et al. (2018) Effects of physical exercise programs on cognitive function in Parkinson's disease patients: A systematic review of randomized controlled trials of the last 10 years. PLoS ONE 13(2): e0193113	- Intervention Systematic review with 9/9 studies examining the effect of physical activity interventions on different cognitive functions; however interventions did not contain elements of being aimed at improving cognitive function. No interventions fit one of the 7 protocol intervention groups.
Dagan, M., Herman, T., Harrison, R. et al. (2018) Multitarget transcranial direct current stimulation for freezing of gait in Parkinson's disease. Movement Disorders 33(4): 642-646	- Country Study conducted in Israel.
Dahmen-Zimmer, Katharina and Jansen, Petra (2017) Karate and Dance Training to Improve Balance and Stabilize Mood in Patients with Parkinson's Disease: A Feasibility Study. Frontiers in medicine 4: 237	- Study design (adults) Ineligible study design (non-randomised study).
Dai, X and Wan, Z-R (2006) Effect of function training on cognitive dysfunction of patients with mild or moderate traumatic brain injury. Chinese journal of clinical rehabilitation 10(34): 4-6	- Publication type Non-English language study.
Dardiotis, E., Nousia, A., Siokas, V. et al. (2018) Efficacy of computer-based cognitive training in neuropsychological performance of patients with multiple sclerosis: A systematic review and meta-analysis. Multiple Sclerosis and Related Disorders 20: 58-66	- Publication date Systematic review with 6/9 studies published after 2013 and 3/9 studies published before 2013, 3/9 studies were already included in this review, and other relevant studies published in or after 2013 were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Das Nair, R. (2017) Cognitive rehabilitation for attention and memory in people with multiple sclerosis: The CRAMMS trial. Multiple Sclerosis Journal 23(3supplement1): 464	- Publication type Conference abstract.
Das Nair, R. and Lincoln, N. (2018) Cognitive rehabilitation for attention and memory in people with multiple sclerosis: A randomised controlled trial. Multiple Sclerosis Journal 24(2supplement): 1001	- Publication type Conference abstract.

Study	Reason for exclusion
das Nair, R. and Lincoln, N.B. (2012) Evaluation of rehabilitation of memory in neurological disabilities (ReMiND): a randomized controlled trial. Clinical rehabilitation 26(10): 894-903	- Publication date Study published before 2013.
das Nair, R.; Martin, K.-J.; Lincoln, N.B. (2016) Memory rehabilitation for people with multiple sclerosis. Cochrane Database of Systematic Reviews 2016(3): cd008754	- Publication date Systematic review with 7/15 studies published before 2013, and 8/15 published after 2013. Potentially relevant studies were checked against protocol criteria and included in this review.
das Nair, R, Cogger, H, Worthington, E et al. (2016) Cognitive rehabilitation for memory deficits after stroke. Cochrane Database of Systematic Reviews	- Population Systematic review with all studies comprising entirely of adult stroke survivors, which are not relevant according to protocol population criteria. Therefore, no studies were checked against protocol criteria.
Das, E., Jacobs, W., Aben, J.E.J. et al. (2018) Communicating cognitive problems in MS: The effect of indirect language and stigma consciousness on subjective and objective memory performance. Multiple Sclerosis Journal 24(2supplement): 353-354	- Publication type Conference abstract.
David, F.J., Robichaud, J.A., Leurgans, S.E. et al. (2015) Exercise improves cognition in Parkinson's disease: The PRET-PD randomized, clinical trial. Movement Disorders 30(12): 1657-1663	- Country Study conducted in the US.
De Freitas, D.J., De Carvalho, D., Paglioni, V.M. et al. (2021) Effects of transcranial direct current stimulation (tDCS) and concurrent cognitive training on episodic memory in patients with traumatic brain injury: A double-blind, randomised, placebo-controlled study. BMJ Open 11(8): e045285	- Country Study conducted in Brazil.
De Giglio, L., De Luca, F., Prosperini, L. et al. (2015) A low-cost cognitive rehabilitation with a commercial video game improves sustained attention and executive functions in multiple sclerosis: A pilot study. Neurorehabilitation and Neural Repair 29(5): 453-461	- Publication type Conference abstract.
De Giglio, L., De Luca, F., Prosperini, L. et al. (2013) Home-based rehabilitation using brain training in cognitive impaired patients with multiple sclerosis. Multiple Sclerosis 19(11suppl1): 28	- Publication type Conference abstract.
De Giglio, L., Tona, F., Petsas, N. et al. (2014) Changes in thalamic resting-state functional connectivity induced by a home-based cognitive rehabilitation program in patients with multiple sclerosis. Multiple Sclerosis 20(1suppl1): 16-17	- Publication type Conference abstract.
de Joode, E., van Heugten, C., Verhey, F. et al. (2010) Efficacy and usability of assistive technology for patients with cognitive deficits: a systematic review. Clinical rehabilitation 24(8): 701-714	- Publication date Published before 2013.
de Lima, M.F.R., Cavendish, B.A., de Deus, J.S. et al. (2020) Retrieval Practice in Memory- and Language-Impaired Populations: A Systematic Review. Archives of clinical neuropsychology : the official journal of the National Academy of Neuropsychologists	- Population Systematic review with 1/16 studies in a population with HIV, 4/16 studies with a population with traumatic brain injury, 1/16 studies with a population with

Study	Reason for exclusion
	schizophrenia, 1/16 studies with a population with stroke, 2/16 studies with a population with multiple sclerosis, 1/16 studies with a population with mild cognitive impairment, and 6/16 studies with a population with aphasia. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
De Los Reyes Aragon, C.J., Ruiz, K.G., Diaz, M.A.R. et al. (2012) Rehabilitation of memory and functional impairments in patients with acquired brain injury. Brain Injury 26(45): 590-591	- Publication type Conference abstract.
De Luca, R., Calabro, R.S., Gervasi, G. et al. (2014) Is computer-assisted training effective in improving rehabilitative outcomes after brain injury? A case-control hospital-based study. Disability and Health Journal 7(3): 356-360	- Population Sample comprised entirely of adults, less than 66% of whom are in scope for this guideline (the majority of acquired brain injuries were caused by stroke), and treatment effects are not reported separately by injury type.
De Luca, R., Russo, M., Gasparini, S. et al. (2019) Do people with multiple sclerosis benefit from PC-based neurorehabilitation? A pilot study. Applied neuropsychology. Adult: 1-9	-Outcomes Insufficient presentation of results (data presented as F statistics, which have been excluded due to concerns about accuracy).
de Oliveira, R.T., Felippe, L.A., Bucken Gobbi, L.T. et al. (2017) Benefits of Exercise on the Executive Functions in People with Parkinson Disease: A Controlled Clinical Trial. American journal of physical medicine & rehabilitation 96(5): 301-306	- Country Study conducted in Brazil.
De Simone, Maria Stefania, Costa, Alberto, Tieri, Gaetano et al. (2023) The effectiveness of an immersive virtual reality and telemedicine-based cognitive intervention on prospective memory in Parkinson's disease patients with mild cognitive impairment and healthy aged individuals: design and preliminary baseline results of a placebo-controlled study. Frontiers in psychology 14: 1268337	- Other protocol criteria Ongoing study with results not yet available.
DeFord, Nicole E, Landy, Kelly M, Pirogovsky-Turk, Eva et al. (2016) The effect of interference on temporal order memory in individuals with Parkinson's disease. Brain and Cognition 107: 30-36	- Country Study conducted in US.
Del Olmo, M.F., Sanchez-Molina, J.A., Fernandez-Lago, H. et al. (2019) Effects of computerized cognitive training, with and without concurrent exercise, on executive functions in Parkinson's disease. Journal of Parkinson's Disease 9(1): 251	- Publication type Conference abstract.
Demey, I., Rojas, G., Feldberg, C. et al. (2012) Effectiveness of an outpatient cognitive stimulation program in patients with mild cognitive impairment, alzheimer's disease and other neurodegenerative diseases in Argentina: A prospective cohort study. Neurology 78(1meetingabstract)	- Publication type Conference abstract.

Study	Reason for exclusion
Dewar, Bonnie-Kate; Kapur, Narinder; Kopelman, Michael (2018) Do memory aids help everyday memory? A controlled trial of a Memory Aids Service. Neuropsychological rehabilitation 28(4): 614-632	- Population Condition does not fit 1 of the 5 protocol condition groups. More than 1/3 of the population does not fit protocol condition group.
Di Tella, S., Isernia, S., Pagliari, C. et al. (2020) A Multidimensional Virtual Reality Neurorehabilitation Approach to Improve Functional Memory: Who Is the Ideal Candidate?. Frontiers in Neurology 11: 618330	- Study design (adults) Ineligible study design. Study does not have a comparison group.
Diez-Cirarda, M., Ibarretxe-Bilbao, N., Pena, J. et al. (2018) Neurorehabilitation in Parkinson's Disease: A Critical Review of Cognitive Rehabilitation Effects on Cognition and Brain. Neural Plasticity 2018: 2651918	- Study design (adults) Ineligible study design. Critical review that doesn't use systematic review methodology.
Diez-Cirarda, M., Ojeda, N., Pena, J. et al. (2017) Increased brain connectivity and activation after cognitive rehabilitation in Parkinson's disease: a randomized controlled trial. Brain Imaging and Behavior 11(6): 1640-1651	- Outcomes No relevant outcomes reported. Reports measures of changes in brain activity.
Diez-Cirarda, M., Ojeda, N., Pena, J. et al. (2018) Long-term effects of cognitive rehabilitation on brain, functional outcome and cognition in Parkinson's disease. European Journal of Neurology 25(1): 5-12	- Study design (adults) Not comparative - only reports data for patients in experimental group (subset of larger trial).
Dobbs, B., Pawlak, N., Shaw, M. et al. (2018) Remotely-supervised transcranial direct current stimulation (RS-TDCS) is feasible for 40 treatment sessions. Neurology 90(15supplement1)	- Publication type Conference abstract.
Dobbs, B., Shaw, M., Pawlak, N. et al. (2017) Remotely supervised transcranial direct current stimulation (RS-tDCS) improves fatigue in multiple sclerosis. Multiple Sclerosis Journal 23(3supplement1): 415	- Publication type Conference abstract.
Dobkin, RD, Menza, M, Bienfait, KL et al. (2009) The impact of antidepressant treatment on cognitive functioning in depressed patients with Parkinson's dDisease. Annals of neurology 66(supp13hardcopysuppl1electroniccopy): S70, Abstract no: CD-6	- Publication type Conference abstract.
Dobryakova, E.; Wylie, G.; Chiaravalloti, N.D. (2014) Functional brain activity after memory retraining in traumatic brain injury: The memrehab trial. Archives of Physical Medicine and Rehabilitation 95(10): e2-e3	- Publication type Conference abstract.
Dobryakova, E., Wylie, G.R., DeLuca, J. et al. (2014) A pilot study examining functional brain activity 6 months after memory retraining in MS: the MEMREHAB trial. Brain Imaging and Behavior 8(3): 403-406	- Country Study conducted in the US.
Dockx, K., Bekkers, E.M.J., Van den Bergh, V. et al. (2016) Virtual reality for rehabilitation in Parkinson's disease. Cochrane Database of Systematic Reviews 2016(12): cd010760	- Intervention Systematic review with studies investigating exercise interventions and not exercise interventions specifically targeted at cognitive function. Therefore no studies were checked against protocol criteria.
Doiron, M. and Simard, M. (2013) A review of nicotine agonist treatment for cognitive impairment in	- Publication type Conference abstract.

Study	Reason for exclusion
Parkinson's disease. Journal of Parkinson's Disease 3(suppl1): 124	
Donato, M, Augustovski, F, Pichon-Riviere, A et al. (2018) Rehabilitación cognitiva en déficit cognitivo secundario.	- Publication type Non-English language study.
Dos Santos, M., Rigal, O., Leger, I. et al. (2019) Cognitive rehabilitation program to improve cognition of cancer patients treated with chemotherapy: A randomized controlled multicenter trial. Journal of Clinical Oncology 37(supplement15)	- Publication type Conference abstract.
Dou, Z-L, Ou, H-N, Wen, W-G et al. (2005) Application of errorless learning in memory rehabilitation in patients with brain injury. Chinese journal of clinical rehabilitation 9(16): 84-87	- Publication type Non-English language study.
Dou, Z.L., Man, D.W.K., Ou, H.N. et al. (2006) Computerized errorless learning-based memory rehabilitation for Chinese patients with brain injury: A preliminary quasi-experimental clinical design study. Brain Injury 20(3): 219-225	- Study design (adults) Ineligible study design (non-randomised study).
Dreneva, A., Ryabova, A., Kasatkin, V. et al. (2018) Feasibility of visual-motor and executive functions training in Pediatric posterior fossa tumor survivors: A quasi-experimental trial. Pediatric Blood and Cancer 65(supplement2): 431-s432	- Publication type Conference abstract.
Duraney, E.J., Fisher, M.E., Manglani, H.R. et al. (2022) Impact of Mindfulness Training on Emotion Regulation in Multiple Sclerosis: Secondary Analysis of a Pilot Randomized Controlled Trial. Rehabilitation Psychology	- Country Study conducted in the US.
Eddy, C.M., Shapiro, K., Clouter, A. et al. (2016) Transcranial direct current stimulation and cognitive training for working memory in huntington's disease. Journal of Neurology, Neurosurgery and Psychiatry 87(supplement1): a104	- Publication type Conference abstract.
Eddy, C.M., Shapiro, K., Clouter, A. et al. (2017) Transcranial direct current stimulation can enhance working memory in Huntington's disease. Progress in Neuro-Psychopharmacology and Biological Psychiatry 77: 75-82	- Outcomes No global or overall outcomes reported (for example, subscales of outcomes not reported).
Edwards, D., Williams, J., Carrier, J. et al. (2022) Technologies used to facilitate remote rehabilitation of adults with deconditioning, musculoskeletal conditions, stroke, or traumatic brain injury: an umbrella review. JBI evidence synthesis 20(8): 1927-1968	- Intervention Systematic review with studies investigating the effectiveness of technologies to aid rehabilitation and not interventions aimed specifically at targeting cognitive function. Therefore no studies were checked against protocol criteria.
Edwards, J.D., Hauser, R.A., O'Connor, M.L. et al. (2013) Randomized trial of cognitive speed of processing training in Parkinson disease. Neurology 81(15): 1284-1290	- Country Study conducted in the US.
Ehlhardt, L., Glang, A., Sohlberg, M. et al. (2010) Training assistive technology after acquired brain	- Publication type Conference abstract.

Study	Reason for exclusion
injury: results of a randomized controlled trial. Journal of Head Trauma Rehabilitation 25(5): 394	
El Semary, M.M., Abdelmageed, S.M., El-Serougy, H.R. et al. (2020) Efficacy of cognitive rehabilitation on functional outcomes & quality of life in parkinson's patients. International Journal of Pharmaceutical Research 12(supplementry2): 1305-1309	- Country Study conducted in Egypt.
Elbogen, E.B., Dennis, P.A., Van Voorhees, E.E. et al. (2019) Cognitive Rehabilitation with Mobile Technology and Social Support for Veterans with TBI and PTSD: A Randomized Clinical Trial. Journal of Head Trauma Rehabilitation 34(1): 1-10	- Country Study conducted in the US.
Eliav, R., Rand, D., Schwartz, Y. et al. (2017) Training with adaptive body-controlled virtual reality following acquired brain injury for improving executive functions. Brain Injury 31(67): 857-858	- Publication type Conference abstract.
Eliav, Rotem, Nadler Tzadok, Yael, Segal-Rotenberg, Shir et al. (2024) Efficacy of Intervention of Participation and Executive Functions (I-PEX) for Adults Following Traumatic Brain Injury: A Preliminary Pilot Randomized Controlled Trial. Neurorehabilitation and neural repair 38(4): 279-290	- Country Study conducted in Israel.
Elliott, M. and Parente, F. (2014) Efficacy of memory rehabilitation therapy: A meta-analysis of TBI and stroke cognitive rehabilitation literature. Brain Injury 28(12): 1610-1616	- Publication date Systematic review with all included studies published before 2013 Therefore no studies checked against protocol.
Ernst, A., Blanc, F., De Seze, J. et al. (2015) Using mental visual imagery to improve autobiographical memory and episodic future thinking in relapsing-remitting multiple sclerosis patients: A randomised-controlled trial study. Restorative Neurology and Neuroscience 33(5): 621-638	- Publication type Conference poster.
Ernst, A., Blanc, F., Gounot, D. et al. (2014) Efficacy of mental imagery to improve autobiographical memory in multiple sclerosis patients: A double approach in neuropsychology and neuroimaging. Multiple Sclerosis 20(1suppl1): 422	- Outcomes No relevant outcomes reported. Reports measures of efficacy of an intervention on autobiographical memory impairment.
Eschler, B., Moolenijzer, K., Vas, A. et al. (2015) The effects of higher order cognitive training on depressive symptoms in adults with MTBI. Journal of Head Trauma Rehabilitation 30(3): e92	- Publication type Conference abstract.
Essa, S. and Shendy, W. (2015) Impact of low level laser therapy and ultraviolet b radiation on fatigue and cognitive functions in relapsing remitting multiple sclerosis. Physiotherapy (United Kingdom) 101(suppl1): es1379	- Publication type Conference abstract.
Etesami, M.S., Saboury, N., Mohraz, M. et al. (2022) Immediate and Long-Term Effects of a Computerized Cognitive Rehabilitation Therapy on Cognitive Function in People Living with HIV in Iran: A Single-Blind Two-Arm Parallel Randomized Controlled Trial. The Journal of the Association of Nurses in AIDS Care : JANAC 33(5): 505-522	- Country Study conducted in Iran.
Ettenhofer, Mark L, Guise, Brian, Brandler, Brian et al. (2019) Neurocognitive Driving Rehabilitation in Virtual	- Country Study conducted in the US.

Study	Reason for exclusion
Environments (NeuroDRIVE): A pilot clinical trial for chronic traumatic brain injury. NeuroRehabilitation 44(4): 531-544	
Evens, R., Hoefler, M., Biber, K. et al. (2016) The Iowa Gambling Task in Parkinson's disease: A meta-analysis on effects of disease and medication. Neuropsychologia 91: 163-172	- Study design (adults) Ineligible study design. Literature review.
Ezeamama, A.E., Sikorskii, A., Sankar, P.R. et al. (2020) Computerized cognitive rehabilitation training for ugandan seniors living with HIV: A validation study. Journal of Clinical Medicine 9(7): 1-15	- Study design (adults) Ineligible study design (non-randomised study).
Fabio, R.A., Gangemi, A., Semino, M. et al. (2020) Effects of combined Transcranial direct current stimulation with cognitive training in girls with Rett syndrome. Brain Sciences 10(5): 276	- Outcomes No relevant outcomes reported. Reports measures of eye tracking and brain activity.
Fabio, Rosa Angela, Billeci, Lucia, Crifaci, Giulia et al. (2016) Cognitive training modifies frequency EEG bands and neuropsychological measures in Rett syndrome. Research in developmental disabilities 5354: 73-85	- Outcomes No relevant outcomes reported. Reported measures of stereotypies, loss of speech and hand skills, gait apraxia, irregular breathing with hyperventilation while awake, and frequent seizures.
Fantalis, D; Bordovsky, SP; Preobrazhenskaya, IS (2022) Cognitive and emotional disorders in neurosurgical patients and their impact on postoperative rehabilitation. Zhurnal nevrologii i psikhiatrii imeni S.S. Korsakova 122(2): 81-87	- Paper unavailable Not available in English language.
Faria, AL, Andrade, A, Soares, L et al. (2016) Benefits of virtual reality based cognitive rehabilitation through simulated activities of daily living: a randomized controlled trial with stroke patients. Journal of neuroengineering and rehabilitation 13(1): 96	- Population Sample comprised entirely of adults who had had a stroke.
Fazeli, P.L., Woods, A.J., Pope, C.N. et al. (2019) Effect of transcranial direct current stimulation combined with cognitive training on cognitive functioning in older adults with HIV: A pilot study. Applied neuropsychology. Adult 26(1): 36-47	- Country Study conducted in the US.
Fearon, C., Killane, I., Newman, L. et al. (2017) Combined motor and cognitive training improves motor and cognitive function in people with Parkinson's disease and freezing of gait. Movement Disorders 32(supplement2): 477	- Publication type Conference abstract.
Feinstein, Anthony, Amato, Maria Pia, Brichetto, Giampaolo et al. (2023) Cognitive rehabilitation and aerobic exercise for cognitive impairment in people with progressive multiple sclerosis (CogEx): a randomised, blinded, sham-controlled trial. The Lancet. Neurology 22(10): 912-924	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Fellman, D., Salmi, J., Ritakallio, L. et al. (2020) Training working memory updating in Parkinson's disease: A randomised controlled trial. Neuropsychological rehabilitation 30(4): 673-708	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Feng, Yang, Pey-Shan, Wen, Bethoux, F et al. (2022) Effects of Vibration Training on Cognition and Quality	- Country Study conducted in the US.

Study	Reason for exclusion
of Life in Individuals With Multiple Sclerosis. International journal of MS care 24(3): 132-138	
Fernandes, H.A.; Richard, N.M.; Edelstein, K. (2019) Cognitive rehabilitation for cancer-related cognitive dysfunction: a systematic review. Supportive Care in Cancer 27(9): 3253-3279	- Population Systematic review including participants out of protocol (cancer survivors without condition from 1 of the 5 protocol condition groups). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Fernandez-Del-Olmo, M., Sanchez-Molina, Ja., Fernandez-Lago, H. et al. (2018) Effects of computerized cognitive training, with and without concurrent exercise, on executive functions in Parkinson's disease. Movement Disorders 33(supplement2): 590-s591	- Publication type Conference abstract.
Ferrazzoli, Davide, Ortelli, Paola, Maestri, Roberto et al. (2017) Focused and sustained attention is modified by a goal-based rehabilitation in parkinsonian patients. Frontiers in Behavioral Neuroscience 11	- Study design (adults) Before/after study design with comparison against healthy controls.
Fetta, J.; Starkweather, A.; Gill, J.M. (2017) Computer-Based Cognitive Rehabilitation Interventions for Traumatic Brain Injury: A Critical Review of the Literature. The Journal of neuroscience nursing : journal of the American Association of Neuroscience Nurses 49(4): 235-240	- Study design (CYP) Not a systematic literature review.
Feys, P., Moumdjian, L., Van Halewyck, F. et al. (2019) Effects of an individual 12-week community-located "start-to-run" program on physical capacity, walking, fatigue, cognitive function, brain volumes, and structures in persons with multiple sclerosis. Multiple Sclerosis Journal 25(1): 92-103	- Intervention Exercise intervention that does not specifically target any aspect of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Filser, M., Graf, J., Baetge, S.J. et al. (2018) Physical exercise and cognitive training improve selfperceived cognitive deficits and information processing speed in multiple sclerosis. Multiple Sclerosis Journal 24(2supplement): 237	- Publication type Conference abstract.
Fink, F., Rischkau, E., Butt, M. et al. (2010) Efficacy of an executive function intervention programme in MS: A placebo-controlled and pseudo-randomized trial. Multiple Sclerosis 16(9): 1148-1151	- Study design (adults) Ineligible study design (non-randomised study).
Fink, F, Rischkau, E, Butt, M et al. (2010) Efficacy of an executive function intervention program in MS: a placebo-controlled and pseudo-randomised trial. Multiple sclerosis (Houndmills, Basingstoke, England): ahead of print	- Other protocol criteria Duplicate.
Fiorelli, C.M., Ciolac, E.G., Simieli, L. et al. (2019) Differential Acute Effect of High-Intensity Interval or Continuous Moderate Exercise on Cognition in Individuals With Parkinson's Disease. Journal of physical activity & health 16(2): 157-164	- Country Study conducted in Brazil.
Flachenecker, P., Meissner, H., Frey, R. et al. (2017) Neuropsychological Training of Attention Improves MS-Related Fatigue: Results of a Randomized, Placebo-	- Outcomes No relevant outcomes reported. Study reports measures of fatigue and alertness.

Study	Reason for exclusion
Controlled, Double-Blind Pilot Study. European Neurology 78(56): 312-317	
Flavia, M., Stampatori, C., Zanotti, D. et al. (2010) Efficacy and specificity of intensive cognitive rehabilitation of attention and executive functions in multiple sclerosis. Journal of the Neurological Sciences 288(12): 101-105	- Publication date Study published before 2013.
Folkerts, Ann-Kristin, Ernst, Moritz, Gollan, Romina et al. (2024) Can Physical Exercise Be Considered as a Promising Enhancer of Global Cognition in People with Parkinson's Disease? Results of a Systematic Review and Meta-Analysis. Journal of Parkinson's disease	- Outcome Systematic review with all studies (17/17) reporting outcomes which did not use any relevant/validated/standardised scales. Therefore, no studies were checked against protocol criteria.
Fong, K.N.K. and Howie, D.R. (2009) Effects of an explicit problem-solving skills training program using a metacomponential approach for outpatients with acquired brain injury. American Journal of Occupational Therapy 63(5): 525-534	- Publication date Published before 2013.
Formica, C., De Salvo, S., Corallo, F. et al. (2021) Role of neurorehabilitative treatment using transcranial magnetic stimulation in disorders of consciousness. Journal of International Medical Research 49(2)	- Study design (CYP) Not a systematic literature review.
Foster, E.R. (2012) Improving prospective memory performance among individuals with parkinson disease: A pilot randomized controlled trial. Archives of Physical Medicine and Rehabilitation 93(10): e51	- Publication type Conference abstract.
Fournier-Goodnight, A.S., Ashford, J.M., Clark, K.N. et al. (2019) Disseminability of computerized cognitive training: Performance across coaches. Applied neuropsychology. Child 8(2): 113-122	- Country Study conducted in the US
Franke, L.M., Gitchel, G.T., Perera, R.A. et al. (2022) Randomized trial of rTMS in traumatic brain injury: improved subjective neurobehavioral symptoms and increases in EEG delta activity. Brain Injury 36(5): 683-692	- Country Study conducted in the US.
Fraser, S and Cockcroft, K (2020) Working with memory: Computerized, adaptive working memory training for adolescents living with HIV. Child Neuropsychology 26(5): 612-634	- Country Study conducted in South Africa.
Frontario, A., Feld, E., Sherman, K. et al. (2016) Telehealth mindfulness meditation improves cognitive performance in adults with multiple sclerosis (MS). Neurology 86(16suppl1)	- Publication type Conference abstract.
Fujino, T.; Hossain, M.S.; Mawatari, S. (2020) Therapeutic Efficacy of Plasmalogens for Alzheimer's Disease, Mild Cognitive Impairment, and Parkinson's Disease in Conjunction with a New Hypothesis for the Etiology of Alzheimer's Disease. Adv. Exp. Med. Biol. 1299: 195-212	- Intervention Plasmalogens. Not an intervention that fits one of the 7 protocol intervention groups.
Galbiati, S., Recla, M., Pastore, V. et al. (2009) Attention Remediation Following Traumatic Brain Injury in Childhood and Adolescence. Neuropsychology 23(1): 40-49	- Publication date Published before 2013
Galvez, G., Recuero, M., Canuet, L. et al. (2018) Short-Term Effects of Binaural Beats on EEG Power,	- Study design (adults)

Study	Reason for exclusion
Functional Connectivity, Cognition, Gait and Anxiety in Parkinson's Disease. International journal of neural systems 28(5): 1750055	Ineligible study design (non-randomised study).
Gao, Jie, Zhao, Chongfa, Jiang, Wenchen et al. (2019) Effect of Acupuncture on Cognitive Function and Quality of Life in Patients With Idiopathic Trigeminal Neuralgia. The Journal of nervous and mental disease 207(3): 171-174	- Study design (adults) Ineligible study design (non-randomised study).
Garland, J.S., Gbade-Alabi, O., Taylor, J.A. et al. (2020) A Study of Bilateral Prefrontal Repetitive Transcranial Magnetic Stimulation (rTMS) to Treat the Symptoms of Mild TBI (mTBI) and PTSD: Preliminary Tolerability and Effectiveness. Brain Stimulation 13(6): 1848	- Publication type Conference abstract.
Gartell, Rebecca; Morris, John; Wallace, Tracey (2023) Feasibility of Using a Mobile App Supported Executive Function Intervention in Military Service Members and Veterans with mTBI and Co-Occurring Psychological Conditions. International journal of environmental research and public health 20(3)	- Country Study conducted in the US.
Gaspari, M.; Zini, F.; Stecchi, S. (2020) Enhancing cognitive rehabilitation in multiple sclerosis with a disease-specific tool. Disability and rehabilitation. Assistive technology: 1-14	- Study design (adults) Ineligible study design (non-randomised study).
Gavelin, H.M., Domellof, M.E., Leung, I. et al. (2022) Computerized cognitive training in Parkinson's disease: A systematic review and meta-analysis. Ageing Research Reviews 80: 101671	- Publication date Systematic review with 4/17 studies 2013 or later, and 13/17 published pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Gehring, K., Sitskoorn, M.M., Gundy, C.M. et al. (2009) Cognitive rehabilitation in patients with gliomas: A randomized, controlled trial. Journal of Clinical Oncology 27(22): 3712-3722	- Publication date Published before 2013.
Gehring, K., Stuiver, M.M., Visser, E. et al. (2020) A pilot randomized controlled trial of exercise to improve cognitive performance in patients with stable glioma: A proof of concept. Neuro-Oncology 22(1): 103-115	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Gelis, A, Stefan, A, Colin, D et al. (2011) Therapeutic education in persons with spinal cord injury: a review of the literature. Annals of physical and rehabilitation medicine 54(3): 189-210	- Study design (adults) Literature review.
Genova, H.M. and Chiaravalloti, N. (2014) Think fast! A processing speed intervention in TBI. Brain Injury 28(56): 761-762	- Publication type Conference abstract.
Ghaffar, A., Gallagher, R., McLeod, C. et al. (2019) Procedural memory changes of parkinson's disease patients post participation in boxing. Movement Disorder 34(supplement2): 689	- Publication type Conference abstract.

Study	Reason for exclusion
Gharakhanlou, R., Wesselmann, L., Rademacher, A. et al. (2021) Exercise training and cognitive performance in persons with multiple sclerosis: A systematic review and multilevel meta-analysis of clinical trials. Multiple Sclerosis Journal 27(13): 1977-1993	- Intervention Systematic review with studies investigating exercise training and not interventions aimed at improving cognitive function. Therefore, no studies were checked against protocol criteria.
Gholami, M., Nami, M., Shamsi, F. et al. (2021) Effects of transcranial direct current stimulation on cognitive dysfunction in multiple sclerosis. Neurophysiologie Clinique 51(4): 319-328	- Country Study conducted in Iran.
Gich, J., Ramio-Torrenta, L., Menendez, R. et al. (2011) Efficacy of a cognitive rehabilitation programme for patients with multiple sclerosis: "EM-line! project". Journal of Neurology 258(suppl1): 136	- Publication type Conference abstract.
Giehl, K., Ophey, A., Reker, P. et al. (2020) Effects of Home-Based Working Memory Training on Visuo-Spatial Working Memory in Parkinson's Disease: A Randomized Controlled Trial. Journal of Central Nervous System Disease 12	- Outcomes No global or overall outcomes reported (for example, subscales of outcomes not reported).
Giehl, Kathrin, Ophey, Anja, Hammes, Jochen et al. (2020) Working memory training increases neural efficiency in Parkinson's disease: a randomized controlled trial. Brain communications 2(2): fcaa115	- Outcomes Only reports outcomes relating to brain structure.
Giguere-Rancourt, A., Plourde, M., Racine, E. et al. (2022) Goal management training and psychoeducation/mindfulness for treatment of executive dysfunction in Parkinson's disease: A feasibility pilot trial. PLoS ONE 17(2february): e0263108	- Comparator Active comparator (psychoeducation) not within the same intervention group. Not within scope of the comparison groups defined in the protocol.
Gilbert, C., Mooradian, G., Citorik, A. et al. (2022) Multi-level outcomes for young adults with acquired brain injury through a remote intensive cognitive rehabilitation approach: a pilot intervention study. Brain Injury 36(2): 206-220	- Country Study conducted in the US.
Gimeno, H., Butchereit, K., Manzini, M. et al. (2022) Cognitive strategies and underlying mechanisms in childhood-onset hyperkinetic movement disorders including dystonia. Developmental Medicine and Child Neurology 64(suppl1): 44-45	- Publication type Conference abstract.
Giustiniani, A., Maistrello, L., Danesin, L. et al. (2022) Effects of cognitive rehabilitation in Parkinson disease: a meta-analysis. Neurological Sciences 43(4): 2323-2337	- Intervention Systematic review with studies investigating pharmacological interventions and not interventions aimed at improving cognitive function. Therefore, no studies were checked against protocol criteria.
Gobbi, L.T.B., Lahr, J., Santos, P.C.R. et al. (2014) Physical exercise can improve cognitive functions in Parkinson's disease. Movement Disorders 29(suppl1): 240	- Publication type Conference abstract.
Gobbi, L.T.B., Pelicioni, P.H.S., Lahr, J. et al. (2021) Effect of different types of exercises on psychological and cognitive features in people with Parkinson's disease: A randomized controlled trial. Annals of Physical and Rehabilitation Medicine 64(1): 101407	- Country Study conducted in Brazil.

Study	Reason for exclusion
Gocheva, Vanya, Hund-Georgiadis, Margret, Hediger, Karin et al. (2018) Effects of animal-assisted therapy on concentration and attention span in patients with acquired brain injury: A randomized controlled trial. Neuropsychology 32(1): 54-64	- Outcomes No relevant outcomes reported. Reports measures of attention span, instances of distraction and participant self-rated alertness.
Goedeken, S., Potempa, C., Prager, E.M. et al. (2018) Encoding strategy training and self-reported everyday prospective memory in people with Parkinson disease: a randomized-controlled trial. The Clinical neuropsychologist 32(7): 1282-1302	- Country Study conducted in the US.
Goldin, Y., Cicerone, K., Ganci, K. et al. (2013) Effect of computer-based cognitive training utilization on attention networks efficiency in chronic traumatic brain injury. Archives of Physical Medicine and Rehabilitation 94(10): e47-e48	- Publication type Conference abstract.
Golyk, V; Kalinkin, K; Ostroushko, O (2018) Influence of aerobic exercise on improvement of topographic memory in patients with traumatic brain injury. Neurorehabilitation and neural repair 32 (4-5): 474	- Publication type Conference abstract.
Goodwin, R., Lincoln, N., Bateman, A. et al. (2014) External memory aids for people with multiple sclerosis: A systematic review. Multiple Sclerosis 20(7): 972	- Publication type Conference abstract.
Goodwin, R., Lincoln, N., das Nair, R. et al. (2017) External memory aids for memory problems in people with multiple sclerosis: A systematic review. Neuropsychological rehabilitation 27(8): 1081-1102	- Outcomes Systematic review with no meta-analysis and only a narrative description of results, so no relevant outcomes. Included studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Gough, N., Brkan, L., Subramaniam, P. et al. (2020) Feasibility of remotely supervised transcranial direct current stimulation and cognitive remediation: A systematic review. PLoS ONE 15(2): e0223029	- Outcomes Systematic review with no meta-analysis and only a narrative description of results, so no relevant outcomes. Included studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Goverover, Y.; Chiaravalloti, N.; DeLuca, J. (2017) Evidenced based cognitive rehabilitation for persons with multiple sclerosis: An updated review of the literature from 2007-2016. Multiple Sclerosis Journal 23(3supplement1): 670-671	- Publication type Conference abstract.
Goverover, Y., Chiaravalloti, N., Genova, H. et al. (2018) A randomized controlled trial to treat impaired learning and memory in multiple sclerosis: The self-GEN trial. Multiple Sclerosis Journal 24(8): 1096-1104	- Country Study conducted in the US.
Goverover, Y., Chiaravalloti, N.D., O'Brien, A.R. et al. (2018) Evidenced-Based Cognitive Rehabilitation for Persons With Multiple Sclerosis: An Updated Review of the Literature From 2007 to 2016. Archives of Physical Medicine and Rehabilitation 99(2): 390-407	- Outcomes Systematic review with no meta-analysis and only a narrative description of results, so no relevant outcomes. Included studies were checked against protocol criteria and were either not relevant or

Study	Reason for exclusion
	had been separately located by the literature search and screened
Goverover, Yael, Chiaravalloti, Nancy, DeLuca, John et al. (2013) The influence of executive functions and memory on self-generation benefit in persons with multiple sclerosis. Journal of Clinical and Experimental Neuropsychology 35(7): 775-783	- Country Study conducted in the US.
Goverover, Yael, Costa, Silvana, DeLuca, John et al. (2023) The Efficacy of the Speed of Processing Training Program in Improving Functional Outcome: From Restoration to Generalization. Archives of physical medicine and rehabilitation 104(6): 925-931	- Country Study conducted in the US.
Goverover, Yael, Sharan, Saumya, Krupp, Lauren et al. (2024) Exploring the Efficacy of a Remote Strategy-Based Intervention for People With Multiple Sclerosis With Everyday Memory Impairments: A Pilot Study. The American journal of occupational therapy : official publication of the American Occupational Therapy Association 78(4)	- Country Study conducted in the US.
Gracey, F., Fish, J.E., Greenfield, E. et al. (2017) A Randomized Controlled Trial of Assisted Intention Monitoring for the Rehabilitation of Executive Impairments Following Acquired Brain Injury. Neurorehabilitation and Neural Repair 31(4): 323-333	- Population Sample comprised entirely of adults, less than 66% of whom are in scope for the guideline (the majority of acquired brain injuries were caused by stroke/cerebrovascular accident) and treatment effects are not reported by injury type.
Grasso, M.G., Broccoli, M., Casillo, P. et al. (2017) Evaluation of the impact of cognitive training on quality of life in patients with multiple sclerosis. European Neurology 78(12): 111-117	ore de
Graziano, F., Calandri, E., Borghi, M. et al. (2014) The effects of a group-based cognitive behavioral therapy on people with multiple sclerosis: a randomized controlled trial. Clinical rehabilitation 28(3): 264-274	- Intervention Intervention is a group based cognitive rehabilitation therapy and not an intervention that fits one of the 7 protocol intervention groups.
Grewal, D, Baldini, D, Liou-Johnson, V et al. (2023) B - 52 Effects of rTMS Treatment on Attention Measured by the CANTAB Rapid Visual Information Processing Module. Archives of clinical neuropsychology 38(7): 1416	- Publication type Conference poster.
Gromisch, Elizabeth S, Turner, Aaron P, Neto, Lindsay O et al. (2024) Improving prospective memory in persons with multiple sclerosis via telehealth: A randomized feasibility study. Multiple sclerosis and related disorders 88: 105718	- Country Study conducted in the US.
Gryfe, P.; Sexton, A.; McGibbon, C.A. (2022) Using gait robotics to improve symptoms of Parkinson's disease: an open-label, pilot randomized controlled trial. European journal of physical and rehabilitation medicine 58(5): 723-737	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Guimaraes, R., Pereira, M., Piovesana, L. et al. (2020) The influence of physical activities on cognition in small groups of Parkinson's disease patients. Movement Disorders Clinical Practice 7(supplement1): 43	- Publication type Conference abstract.

Study	Reason for exclusion
Gumley, D., Lurie, P., Phipps, K. et al. (2011) A clinical intervention for children with processing speed deficits following diagnosis and treatment of a brain tumour. Developmental Medicine and Child Neurology 53(suppl3): 47	- Publication type Conference abstract.
Hailey, D (2003) Hyperbaric oxygen therapy - recent findings on evidence for its effectiveness. Update.	- Publication date Study published before 2013
Hajela, N., Flynn, S., Kurchian, C. et al. (2020) Effectiveness of Brain Training Games in Improving Cognitive Function in People with Persistent Mild Traumatic Brain Injury/Concussion. Archives of Physical Medicine and Rehabilitation 101(12): e138	- Publication type Conference poster.
Hallock, H., Collins, D., Lampit, A. et al. (2016) Cognitive training for post-acute traumatic brain injury: A systematic review and meta-analysis. Frontiers in Human Neuroscience 10(oct2016): 537	- Study design (adults) Systematic review with 6/15 randomised controlled trials, and 9/15 non-randomised. Randomised controlled trials which were published 2013 or later, were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Hamalainen, P. (2013) Does neuropsychological rehabilitation help?. Multiple Sclerosis 19(11suppl1): 27	- Publication type Oral presentation.
Hamzah, N, Narayanan, V, Ramli, N et al. (2018) A preliminary report on the effect of cognitive rehabilitation therapy in improving cognitive function of attention following mild traumatic brain injury: a randomised controlled trial. Annals of physical and rehabilitation medicine	- Publication type Conference abstract.
Han, K.; Chapman, S.B.; Krawczyk, D.C. (2018) Cognitive training improves neural efficiency in TBI. Journal of Neurotrauma 35(16): a12	- Publication type Conference abstract.
Han, K., Davis, R.A., Chapman, S.B. et al. (2017) Strategy-based reasoning training modulates cortical thickness and resting-state functional connectivity in adults with chronic traumatic brain injury. Brain and Behavior 7(5): e00687	- Country Study conducted in the US.
Hancock, L., Bruce, J., Thelen, J. et al. (2012) Computerised cognitive training in MS: Preliminary outcomes for working memory, information processing speed, and executive functioning. Multiple Sclerosis 18(4suppl1): 176	- Publication type Conference abstract.
Hancock, L.M., Bruce, J.M., Bruce, A.S. et al. (2015) Processing speed and working memory training in multiple sclerosis: a double-blind randomized controlled pilot study. Journal of clinical and experimental neuropsychology 37(2): 113-127	- Country Study conducted in the US.
Handrakis, J.P., Ni Guan, Z., Nulty, J.W. et al. (2017) Effect of Heat Exposure on Cognition in Persons with Tetraplegia. Journal of Neurotrauma 34(24): 3372-3380	- Country Study conducted in the US.
Haneef, Z., Gavvala, J.R., Combs, H.L. et al. (2022) Brain Stimulation Using Responsive Neurostimulation	- Country Study conducted in the US.

Study	Reason for exclusion
Improves Verbal Memory: A Crossover Case-Control Study. Neurosurgery 90(3): 306-312	
Hara, T., Shanmugalingam, A., McIntyre, A. et al. (2021) The Effect of Non-Invasive Brain Stimulation (NIBS) on Executive Functioning, Attention and Memory in Rehabilitation Patients with Traumatic Brain Injury: a Systematic Review and Meta-analysis. Brain Stimulation 14(6): 1716-1717	- Publication type Conference abstract.
Hara, T., Shanmugalingam, A., McIntyre, A. et al. (2021) Evidence for NIBS in facilitating rehabilitation of cognitive function after stroke. Brain Stimulation 14(6): 1716	- Publication type Conference abstract.
Hara, T., Shanmugalingam, A., McIntyre, A. et al. (2021) The effect of non-invasive brain stimulation (Nibs) on executive functioning, attention and memory in rehabilitation patients with traumatic brain injury: A systematic review. Diagnostics 11(4): 627	- Country Systematic review with 1/5 conducted in Brazil, 1/5 in South Korea 1/5 in Italy, 1/5 in the US, and 1/5 in Poland. Italian and Polish studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Hardy, K.; Bonner, M.; Willard, V. (2010) Computerized cognitive training for survivors of pediatric cancer. Pediatric Blood and Cancer 55(5): 776-777	- Publication type Conference abstract.
Hardy, K.K., Willard, V.W., Allen, T.M. et al. (2013) Working memory training in survivors of pediatric cancer: A randomized pilot study. Psycho-Oncology 22(8): 1856-1865	- Country Study conducted in the US.
Harro, C.C., Shoemaker, M.J., Frey, O. et al. (2014) The effects of speed-dependent treadmill training and rhythmic auditory-cued overground walking on balance function, fall incidence, and quality of life in individuals with idiopathic Parkinson's disease: A randomized controlled trial. NeuroRehabilitation 34(3): 541-556	- Country Study conducted in the US.
Hartoonian, N.; Beier, M.; Bombardier, C. (2013) Impact of exercise on cognition in multiple sclerosis. Multiple Sclerosis 19(11suppl1): 440-441	- Publication type Conference abstract.
Hashimoto, H., Takabatake, S., Miyaguchi, H. et al. (2015) Effects of dance on motor functions, cognitive functions, and mental symptoms of Parkinson's disease: A quasi-randomized pilot trial. Complementary Therapies in Medicine 23(2): 210-219	- Country Study conducted in Japan.
Haslam, C. and McDonald, A. (2012) Google calendar: A memory aid to manage prospective memory deficits following acquired brain injury. Brain Impairment 13(1): 180	- Publication type Conference abstract.
Haynes, S., Ryan, E., Wood, H. et al. (2013) Rehabilitation of cognitive changes in breast cancer survivors. Psycho-Oncology 22(suppl2): 115-116	- Publication type Conference abstract.
He, P.K., Wang, L.M., Chen, J.N. et al. (2022) Repetitive transcranial magnetic stimulation (rTMS) fails to improve cognition in patients with parkinson's disease: a Meta-analysis of randomized controlled trials. International Journal of Neuroscience 132(3): 269-282	- Publication date Systematic review with 6/12 studies published 2013 or later and 6/12 pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been

Study	Reason for exclusion
	separately located by the literature search and screened.
He, Z-P; Zeng, L-G; Huang, H-Y (2005) Effect of oxygen inhalation and cognitive rehabilitation training on the cognitive function of patients with convalescent brain injury. Chinese journal of clinical rehabilitation 9(12): 42-43	- Paper unavailable Not available in English language.
Hearn, R., Selfe, J., Cordero, M.I. et al. (2022) The effects of active rehabilitation on symptoms associated with tau pathology: An umbrella review. Implications for chronic traumatic encephalopathy symptom management. PLoS ONE 17(7july): e0271213	- Population Condition does not fit 1 of the 5 protocol condition groups – Encephalopathy.
Hernandez, T., McFadden, K., Healy, K. et al. (2010) Functional benefits of a non-pharmacological treatment for adult TBI. Brain Injury 24(3): 336	- Publication type Conference abstract.
Hewitt, J; Evans, JJ; Dritschel, B (2006) Theory driven rehabilitation of executive functioning: improving planning skills in people with traumatic brain injury through the use of an autobiographical episodic memory cueing procedure. Neuropsychologia 44(8): 1468-1474	- Publication date Published before 2013.
Hewitt, J; Evans, JJ; Dritschel, B (2007) Theory driven rehabilitation of executive functioning: improving planning skills in persons with traumatic brain injury through the use of an autobiographical episodic memory cueing procedure. Neuropsychologia 44: 1468-1474	- Publication date Published before 2013.
Hildebrandt, H.; Bussmann-Mork, B.; Schwendemann, G. (2006) Group therapy for memory impaired patients: A partial remediation is possible. Journal of Neurology 253(4): 512-519	- Publication date Published before 2013.
Hildebrandt, H., Gehrmann, A., Modden, C. et al. (2011) Enhancing memory performance after organic brain disease relies on retrieval processes rather than encoding or consolidation. Journal of Clinical and Experimental Neuropsychology 33(2): 257-270	- Population Sample comprised entirely of adults, the majority of which the authors describe as stroke patients (ABIs caused by stroke, proportions not reported) which is out of scope for this guideline and treatment effects are not reported by injury type.
Hildebrandt, H., Lanz, M., Hahn, H.K. et al. (2007) Cognitive training in MS: Effects and relation to brain atrophy. Restorative Neurology and Neuroscience 25(1): 33-43	- Publication date Published before 2013.
Hill, A.T., McModie, S., Fung, W. et al. (2019) Impact of prefrontal intermittent theta-burst stimulation on working memory and executive function in Parkinson's disease: A double-blind sham-controlled pilot study. Brain Research: 146506	- Outcomes No global or overall outcomes reported (for example, subscales of outcomes not reported).
Hindle, J.V., Petrelli, A., Clare, L. et al. (2013) Nonpharmacological enhancement of cognitive function in Parkinson's disease: A systematic review. Movement Disorders 28(8): 1034-1049	- Publication date Systematic review with all included studies published before 2013. Therefore no studies checked against protocol.
Hindle, J.V., Watermeyer, T.J., Roberts, J. et al. (2018) Goal-orientated cognitive rehabilitation for dementias associated with parkinson's disease-a pilot randomised	- Population

Study	Reason for exclusion
controlled trial. International Journal of Geriatric Psychiatry 33(5): 718-728	Population outside scope of protocol: dementia associated with Parkinson's disease.
Hocking, M.C., Paltin, I., Quast, L.F. et al. (2019) Acceptability and Feasibility in a Pilot Randomized Clinical Trial of Computerized Working Memory Training and Parental Problem-Solving Training With Pediatric Brain Tumor Survivors. Journal of pediatric psychology 44(6): 669-678	- Country Study conducted in the US.
Hoffman, Lisa, Burt, Nicholas D, Piniella, Nicholas R et al. (2023) Efficacy and Feasibility of Remote Cognitive Remediation Therapy in Parkinson's Disease: A Randomized Controlled Trial. Parkinson's disease 2023: 6645554	- Country Study conducted in the US.
Hojan, K. (2015) Effectiveness of integrated multidisciplinary rehabilitation in brain tumor patients: A controlled clinical study. Archives of Physical Medicine and Rehabilitation 96(10): e63-e64	- Publication type Conference abstract.
Hollis, A., Zewdie, E., Kuo, H. et al. (2019) Pediatric transcranial static magnetic field stimulation to improve motor learning: the PSTIM trial. Brain Stimulation 12(2): 526	- Publication type Conference abstract.
Holmqvist, A., Bartfai, A., Markovic, G. et al. (2020) Does Intensive Training of Attention Influence Cognitive Fatigability in Patients With Acquired Brain Injury?. Archives of Physical Medicine and Rehabilitation 101(11): e89	- Population Condition is stroke for over 78% of participants.
Holmqvist, A., Bartfai, A., Markovic, G. et al. (2021) Does Intensive Training of Attention Influence Cognitive Fatigability in Patients With Acquired Brain Injury?. Frontiers in Neuroscience 15: 656876	- Population Sample comprised entirely of adults, less than 66% of which are in scope for the guideline. The majority of acquired brain injuries were caused by stroke.
Hong, Xian Li, Cheng, Ling Jie, Feng, Ruo Chen et al. (2024) Effect of physio-cognitive dual-task training on cognition in pre-ageing and older adults with neurocognitive disorders: A meta-analysis and meta-regression of randomized controlled trial. Archives of gerontology and geriatrics 116: 105161	- Population Systematic review including participants out of protocol (people living with Dementia or mild cognitive impairment). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Hoogerwerf, A.E.W., Bol, Y., Lobbestael, J. et al. (2017) Mindfulness-based cognitive therapy for severely fatigued multiple sclerosis patients: A waiting list controlled study. Journal of rehabilitation medicine 49(6): 497-504	- Study design (adults) Ineligible study design (non-randomised study).
Hoy, K.E., Mcqueen, S., Elliot, D. et al. (2019) A Pilot Investigation of Repetitive Transcranial Magnetic Stimulation for Post-Traumatic Brain Injury Depression: Safety, Tolerability, and Efficacy. Journal of Neurotrauma 36(13): 2092-2098	- Intervention Transcranial magnetic stimulation with the aim of improving depressive symptoms. Not an intervention that fits one of the 7 protocol intervention groups.
Hsu, C.L., Best, J.R., Davis, J.C. et al. (2018) Aerobic exercise promotes executive functions and impacts functional neural activity among older adults with vascular cognitive impairment. British journal of sports medicine 52(3): 184-191	- Population Sample comprised of older adults with vascular cognitive impairment which is not within scope for this guideline (and no

Study	Reason for exclusion
	conditions that are in scope for the guideline).
Hsu, C.L., Wang, S., Bolandzadeh, N. et al. (2015) Aerobic exercise promotes executive functioning and associated functional neuroplasticity. International Journal of Stroke 10(suppl4): 83	- Publication type Conference abstract.
Hsu, Wan-Yu, Zanto, Theodore, Park, Jee Eun et al. (2023) Effects of transcranial alternating current stimulation on cognitive function in people with multiple sclerosis: A randomized controlled trial. Multiple sclerosis and related disorders 80: 105090	- Country Study conducted in the US.
Huang, L., Yin, X., Li, W. et al. (2021) Effects of Acupuncture on Vascular Cognitive Impairment with No Dementia: A Randomized Controlled Trial. Journal of Alzheimer's Disease 81(4): 1391-1401	- Country Study conducted in China.
Hubacher, M., Kappos, L., Opwis, K. et al. (2011) Can treatment effects of IFNB-1b on cognition be enhanced by additional cognitive training?. Multiple Sclerosis 17(10suppl1): 400-s401	- Publication date Published before 2013.
Hubacher, M., Kappos, L., Weier, K. et al. (2015) Case-based fMRI analysis after cognitive rehabilitation in MS: A novel approach. Frontiers in Neurology 6(mar): 78	- Country Study conducted in the US
Hubacher, M., Weier, K., Opwis, K. et al. (2012) Working memory training in patients treated with INFB-1b-Effects on cognitive performance, functional MRI and resting state networks. Multiple Sclerosis 18(4suppl1): 408	- Publication type Conference poster.
Hudes, R., Baptist-Mohseni, N., Dimech, C. et al. (2022) Evaluating the Effectiveness of Compensatory Memory Interventions in Adults With Acquired Brain Injury: A Systematic Review and Meta-Analysis of Memory and Everyday Outcomes. Neuropsychology 36(4): 243-265	- Publication date Systematic review with 8/22 studies published 2013 or later and 14/22 studies pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Huynh, Katharine, Nategh, Leila, Jamadar, Sharna et al. (2023) Cognition-oriented treatments and physical exercise on cognitive function in Huntington's disease: a systematic review. Journal of neurology 270(4): 1857-1879	- Study design (adults) Systematic review with 6/17 randomised controlled trials, 8/17 single-arm studies, and 3/17 non-randomised studies. Randomised controlled trials, which were published 2013 or later were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Hwang, H.-F., Chen, C.-Y., Wei, L. et al. (2019) Effects of Computerized Cognitive Training and Tai Chi on Cognitive Performance in Older Adults with Traumatic Brain Injury. Journal of Head Trauma Rehabilitation	- Country Study conducted in Taiwan.
Hypher, R., Brandt, A.E., Skovlund, E. et al. (2022) Metacognitive Strategy Training Versus Psychoeducation for Improving Fatigue in Children and Adolescents With Acquired Brain Injuries: A Randomized Controlled Trial. Neuropsychology	- Outcomes No relevant outcomes reported. Study reported measures of fatigue.

Study	Reason for exclusion
Iaffaldano, P., Simone, M., Viterbo, R.G. et al. (2016) Computer-assisted rehabilitation of attention in pediatric onset multiple sclerosis and attention deficit hyperactivity disorder. Neurology 86(16suppl1)	- Publication type Conference abstract.
Iaffaldano, P., Viterbo, R.G., Fazio, L. et al. (2016) Superior and middle frontal gyrus activity during N-Back correlates with the effect of computer-assisted cognitive rehabilitation. Multiple Sclerosis 22(supplement3): 42	- Publication type Conference abstract.
Iaffaldano, P., Viterbo, R.G., Fazio, L. et al. (2015) Computer-assisted rehabilitation of attention in patients with multiple sclerosis increases functional activity in the left prefrontal cortex. Multiple Sclerosis 23(11suppl1): 649	- Publication type Conference poster.
Ignatova, V.; Haralanov, L.; Todorova, L. (2021) Efficacy of computer based cognitive rehabilitation in multiple sclerosis according to frequency of training sessions. Journal of the Neurological Sciences 429(supplement): 118096	- Publication type Conference abstract.
Inagawa, T., Yokoi, Y., Narita, Z. et al. (2019) Safety and Feasibility of Transcranial Direct Current Stimulation for Cognitive Rehabilitation in Patients With Mild or Major Neurocognitive Disorders: A Randomized Sham-Controlled Pilot Study. Frontiers in Human Neuroscience 13: 273	- Country Study conducted in Japan.
Ishida, J., Murai, T., Ueda, K. et al. (2021) Utility of a novel tablet computer software for memory impairment in participants with brain injuries: A randomized control trial. Neuropsychological rehabilitation: 1-18	- Country Study conducted in Japan.
ISRCTN11489327 (2018) Can 1 month of daily computer training help improve memory and attention in people who have had a brain injury?.	- Paper unavailable
Jabalera, M.; Prats, L.; Lusilla, P. (2012) Attention disorders after traumatic brain injury (TBI): A systematic review of treatment combining stimulants and cognitive remediation. European Psychiatry 27(suppl1)	- Publication type Conference abstract.
Jackson, J.C., Clune, J., Hoenig, H. et al. (2010) The returning to everyday tasks utilizing rehabilitation networks (RETURN) trial: A pilot, feasibility trial including in-home cognitive rehabilitation of ICU survivors. American Journal of Respiratory and Critical Care Medicine 181(1meetingabstracts)	- Publication type Conference abstract.
Jacoby, M., Averbuch, S., Sacher, Y. et al. (2013) Effectiveness of executive functions training within a virtual supermarket for adults with traumatic brain injury: a pilot study. IEEE transactions on neural systems and rehabilitation engineering : a publication of the IEEE Engineering in Medicine and Biology Society 21(2): 182-190	- Country Study conducted in Israel.
Jagtap, P., Chawa, M., Pasovic, V. et al. (2020) A Review of Transcranial Magnetic Stimulation for Cognitive Impairment: Evidence for Expansion of Clinical Indications. Brain Stimulation 13(6): 1855	- Publication type Conference abstract.

Study	Reason for exclusion
Jak, A.J., Jurick, S., Crocker, L.D. et al. (2019) SMART-CPT for veterans with comorbid post-traumatic stress disorder and history of traumatic brain injury: A randomised controlled trial. Journal of Neurology, Neurosurgery and Psychiatry 90(3): 333-341	- Country Study conducted in the US.
Jamieson, M., O'Neill, B., Cullen, B. et al. (2016) The efficacy of a smartphone reminder app with unsolicited prompts (UPs) for people with memory impairments after ABI: A single-case-experimental-design study. Brain Injury 30(56): 564	- Publication type Conference abstract.
Janeslatt, G.; Kottorp, A.; Granlund, M. (2014) Evaluating intervention using time aids in children with disabilities. Scandinavian journal of occupational therapy 21(3): 181-190	- Population Condition does not fit 1 of the 5 protocol condition groups.
Janssen, A., Boster, A., Lee, H. et al. (2015) The effects of video-game training on broad cognitive transfer in multiple sclerosis: A pilot randomized controlled trial. Journal of clinical and experimental neuropsychology 37(3): 285-302	- Country Study conducted in the US.
Jarvis, C.; Sangarapillai, K.; Almeida, Q.J. (2022) Feasibility of online PD SAFExTM exercise rehabilitation for symptom improvements of Parkinson's disease: A pilot study. NeuroRehabilitation 50(1): 57-63	- Study design (adults) Ineligible study design (non-randomised study).
Jiang, H (2005) Long-term effect of early intervention on the intellectual development of infants with brain injury in perinatal period. Chinese journal of clinical rehabilitation 9(24): 101-103	- Paper unavailable
Jiang, X., Dahmani, S., Bronshteyn, M. et al. (2022) Cingulate transcranial direct current stimulation in adults with HIV. PLoS ONE 17(6june): e0269491	- Country Study conducted in the US.
Jimenez-Morales, R.M., Broche-Perez, Y., Macias-Delgado, Y. et al. (2021) Cognitive rehabilitation program in patients with multiple sclerosis: A pilot study. Neurologia	- Country Study conducted in Cuba.
Jimenez-Morales, RM, Herrera-Jimenez, LF, Macias-Delgado, Y et al. (2017) Cognitive training combined with aerobic exercises in multiple sclerosis patients: a pilot study. Revista de neurologia 64(11): 489-495	- Other protocol criteria Non-English language study.
Johansson, B. and Tornmalm, M. (2012) Working memory training for patients with acquired brain injury: effects in daily life. Scandinavian journal of occupational therapy 19(2): 176-183	- Study design (adults) Ineligible study design (non-randomised study).
Johansson, M.E., Cameron, I.G.M., Van der Kolk, N.M. et al. (2022) Aerobic Exercise Alters Brain Function and Structure in Parkinson's Disease: A Randomized Controlled Trial. Annals of Neurology 91(2): 203-216	- Outcomes No relevant outcomes reported. Reports measures of brain activity and eye movements.
Jones, W.E.; Benge, J.F.; Scullin, M.K. (2021) Preserving prospective memory in daily life: A systematic review and meta-analysis of mnemonic strategy, cognitive training, external memory aid, and combination interventions. Neuropsychology 35(1): 123-140	- Study design (adults) Systematic review with no included randomised controlled trials (only qualitative studies). Therefore no studies were checked against protocol.

Study	Reason for exclusion
Jonsdottir, J., Gervasoni, E., Bowman, T. et al. (2018) Intensive multimodal training to improve gait resistance, mobility, balance and cognitive function in persons with multiple sclerosis: A pilot randomized controlled trial. Frontiers in Neurology 9: 800	- Comparator Active comparator not within the same intervention group- strength training.
Jonsdottir, J., Gervasoni, E., Lencioni, T. et al. (2014) Positive effects of multi-modal intensive aerobic training on mobility and cognitive functions of persons with multiple sclerosis, with corresponding neuromodular reorganization of leg muscle synergies. Multiple Sclerosis 20(7): 968	- Publication type Conference abstract.
Jung, S.H., Hasegawa, N., Mancini, M. et al. (2020) Effects of the agility boot camp with cognitive challenge (ABC-C) exercise program for Parkinson's disease. npj Parkinson's Disease 6(1): 31	- Country Study conducted in the US.
Justo-Henriques, S I, Carvalho, J O, Perez-Saez, E et al. (2022) Randomized trial of individual reminiscence therapy for older adults with cognitive impairment: a 3-month responder analysis. Revista de neurologia 74(4): 107-116	- Publication type Conference abstract.
Justo-Henriques, S.I.; Perez-Saez, E.; Alves Apostolo, J.L. (2021) Multicentre randomised controlled trial about the effect of individual reminiscence therapy in older adults with neurocognitive disorders. International Journal of Geriatric Psychiatry 36(5): 704-712	- Population Mixed sample comprised entirely of adults (including people with Alzheimer's) of which less than 66% are in scope for this guideline and treatment effects are not reported separately for groups that are in scope.
Justo-Henriques, S.I., Perez-Saez, E., Apostolo, J.L.A. et al. (2021) Effectiveness of a randomized controlled trial of individual reminiscence therapy on cognition, mood and quality of life in azorean older adults with neurocognitive disorders. Journal of Clinical Medicine 10(22): 5395	- Population Condition does not fit 1 of the 5 protocol condition groups. (In most participants condition is dementia or Alzheimer’s disease).
Justo-Henriques, S.I., Perez-Saez, E., Marques-Castro, A.E. et al. (2022) Effectiveness of a year-long individual cognitive stimulation program in Portuguese older adults with cognitive impairment. Neuropsychology, development, and cognition. Section B, Aging, neuropsychology and cognition: 1-15	- Population Majority of patients (around 90%) had conditions that are out of scope for this guideline such as Alzheimer's and vascular dementia.
Kalbe, E., Folkerts, A.-K., Ophey, A. et al. (2020) Enhancement of executive functions but not memory by multidomain group cognitive training in patients with Parkinson's disease and mild cognitive impairment: A multicenter randomized controlled trial. Parkinson's Disease 2020: 4068706	- Comparator Active comparator not within the same intervention group - exercise intervention.
Kalron, A.; Shalmoni, N.; Achiron, A. (2020) Immediate effect of stroboscopic visual training on cognition, gait and balance in people with MS. Multiple Sclerosis Journal 26(2suppl): 24-25	- Publication type Conference abstract.
Kalron, A. and Zeilig, G. (2015) Efficacy of exercise intervention programs on cognition in people suffering from multiple sclerosis, stroke and Parkinson's disease: A systematic review and meta-analysis of current evidence. NeuroRehabilitation 37(2): 273-289	- Country Study conducted in Israel.

Study	Reason for exclusion
Kampling, H.; Brendel, L.K.; Mittag, O. (2019) (Neuro)Psychological Interventions for Non-Motor Symptoms in the Treatment of Patients with Parkinson's Disease: a Systematic Umbrella Review. Neuropsychology review 29(2): 166-180	- Study design (adults) Ineligible study design (umbrella review).
Kan, R.L.D., Xu, G.X.J., Shu, K.T. et al. (2022) Effects of non-invasive brain stimulation in multiple sclerosis: systematic review and meta-analysis. Therapeutic Advances in Chronic Disease 13	- Outcomes Systematic review reporting no relevant outcomes. Reports measures of fatigue and muscle spasticity. No included studies reported any relevant outcomes. Therefore no studies were checked against protocol criteria.
Kang, E.K.; Kim, D.Y.; Paik, N.J. (2012) Transcranial direct current stimulation of the left prefrontal cortex improves attention in patients with traumatic brain injury: a pilot study. Journal of rehabilitation medicine : official journal of the UEMS European Board of Physical and Rehabilitation Medicine 44(4): 346-350	- Publication date Study published before 2013.
Karver, C.L., Wade, S.L., Cassedy, A. et al. (2014) Cognitive reserve as a moderator of responsiveness to an online problem-solving intervention for adolescents with complicated mild-to-severe traumatic brain injury. Child Neuropsychology 20(3): 343-357	- Country Study conducted in the US.
Kasatkin, V., Karelin, A., Shurupova, M. et al. (2020) Assessment of the effectiveness of motor training for cognitive and motor functions in children surviving posterior fossa tumors. Pediatric Blood and Cancer 67(suppl4)	- Publication type Conference abstract.
Kashezhev, AG, Sinkin, MV, Kulikov, AG et al. (2019) Impact of rhythmic transcranial magnetic stimulation on the dynamics of motor and non-motor manifestations of Parkinson's disease. Voprosy kurortologii, fizioterapii, i lechebnoi fizicheskoi kultury 96(6): 17-21	- Paper unavailable Not available in English language.
Kaup, A.R., Schachtner, J., Byers, A.L. et al. (2019) MOBILE COGNITIVE INTERVENTION IN OLDER VETERANS WITH TRAUMATIC BRAIN INJURY: RESULTS FROM THE BRAVE (BRAIN AGING IN VETERANS) TRAINING PILOT STUDY. Alzheimer's and Dementia 15(7supplement): p253-p254	- Publication type Conference abstract.
Kaushik, Kavita, Sharma, Nidhi, Kumar, Parveen et al. (2024) Noninvasive neuromodulatory effect on cognition in individuals with traumatic brain injury: A single-blinded, two-arm parallel randomized clinical trial. Turkish journal of physical medicine and rehabilitation 70(1): 105-114	- Country Study conducted in India.
Kennedy, B.L., Withrington, N., Dupre, P.-J. et al. (2015) Treasure in therapeutic neurogaming for cognitive rehabilitation. Archives of Physical Medicine and Rehabilitation 96(10): e30-e31	- Publication type Conference abstract.
Kennedy, J.E., Cooper, D.B., Curtiss, G. et al. (2022) Research Letter: Long-Term Outcomes Following Cognitive Rehabilitation for Mild Traumatic Brain Injury: A 5-Year Follow-Up of a Cohort From the SCORE Randomized Clinical Trial. The Journal of head trauma rehabilitation	- Publication type Conference abstract.

Study	Reason for exclusion
Kennedy, M.R.T., Coelho, C., Turkstra, L. et al. (2008) Intervention for executive functions after traumatic brain injury: A systematic review, meta-analysis and clinical recommendations. Neuropsychological Rehabilitation 18(3): 257-299	- Publication date Published before 2013.
Kessler, A.F., Krause, K., Al-Shameri, B. et al. (2018) The bremen trial: Patients with benign meningioma - Is rehabilitation really necessary?. Neuro-Oncology 20(supplement3): iii223	- Publication type Conference abstract.
Kettlewell, J.; das Nair, R.; Radford, K. (2019) A systematic review of personal smart technologies used to improve outcomes in adults with acquired brain injuries. Clinical rehabilitation 33(11): 1705-1712	- Outcomes Systematic review reporting no relevant outcomes. Reports measures of independence, goal attainment/function, and fatigue. No included studies reported any relevant outcomes. Therefore no studies were checked against protocol criteria.
Khedr, E.M., Mohamed, K.O., Ali, A.M. et al. (2020) The effect of repetitive transcranial magnetic stimulation on cognitive impairment in Parkinson's disease with dementia: Pilot study. Restorative neurology and neuroscience 38(1): 55-66	- Country Study conducted in Egypt.
Killgore, W.D., Alkozei, A., Knight, S. et al. (2018) Daily morning blue light exposure enhances executive functioning in individuals with mild traumatic brain injury. Sleep 41(supplement1): a381	- Publication type Conference abstract.
Killgore, W.D., Shane, B.R., Vanuk, J.R. et al. (2017) Short wavelength light therapy facilitates recovery from mild traumatic brain injury. Sleep 40(supplement1): a426-a427	- Publication type Conference abstract.
Killgore, W.D.S., Vanuk, J.R., Shane, B.R. et al. (2020) A randomized, double-blind, placebo-controlled trial of blue wavelength light exposure on sleep and recovery of brain structure, function, and cognition following mild traumatic brain injury. Neurobiology of Disease 134: 104679	- Country Study conducted in the US.
Kim, H.S., Lim, K.-B., Yoo, J. et al. (2021) The efficacy of computerized cognitive rehabilitation in improving attention and executive functions in acquired brain injury patients, in acute and postacute phase. European journal of physical and rehabilitation medicine 57(4): 551-559	- Country Study conducted in South Korea.
Kim, J. and Ownby, R. (2022) (PO-095) Effects of Trans-Cranial Direct Current Stimulation and Game-Based Cognitive Training on Functional Capacity of Older Persons Living With HIV-Associated Neurocognitive Disorder. Journal of the Academy of Consultation-Liaison Psychiatry 63(supplement): 45	- Publication type Conference abstract.
Kim, Ryul, Lee, Tae Lee, Lee, Hanall et al. (2023) Effects of physical exercise interventions on cognitive function in Parkinson's disease: An updated systematic review and meta-analysis of randomized controlled trials. Parkinsonism & related disorders 117: 105908	- Intervention Systematic review with all (21/21) studies investigating exercise interventions not interventions aimed at improving cognitive function.
King, L., Jung, S.H., Mancini, M. et al. (2019) Cognitively challenging exercise improved executive	- Publication type Conference abstract.

Study	Reason for exclusion
function in Parkinson's disease. Journal of Parkinson's Disease 9(1): 139	
Kirton, A., Andersen, J., Herrero, M. et al. (2014) Enhancing function in perinatal stroke hemiparesis with brain stimulation and constraint: The plastic champs trial. Stroke 45(12): e266	- Publication type Conference abstract.
Kirton, A., Andersen, J., Herrero, M. et al. (2014) Brain stimulation and constraint for perinatal stroke hemiparesis: The plastic champs trial. Annals of Neurology 76(suppl18): 177-s178	- Publication type Conference abstract.
Kirton, A., Andersen, J., Herrero, M. et al. (2015) Brain stimulation and constraint for perinatal stroke hemiparesis: The PLASTIC CHAMPS trial. European Journal of Paediatric Neurology 19(suppl1): 10	- Publication type Conference abstract.
Kirton, A., Ciechanski, P., Zewdie, E. et al. (2016) Transcranial direct current stimulation for children with perinatal stroke and hemiparesis: A randomized, controlled trial. Stroke 47(suppl1)	- Publication type Conference abstract.
Kirton, A., Ciechanski, P., Zewdie, E. et al. (2015) Transcranial direct current stimulation for perinatal stroke hemiparesis: Interim analysis of a randomized, controlled clinical trial. Annals of Neurology 78(suppl19): 158	- Publication type Conference abstract.
Kirton, A., Ciechanski, P., Zewdie, E. et al. (2017) Transcranial direct current stimulation for children with perinatal stroke and hemiparesis. Neurology 88(3): 259-267	- Outcomes Does not report data required to calculate effect sizes.
Kjeldgaard Nielsen, D., Forchhammer, H., Teasdale, T.W. et al. (2014) EHMTI-0162. Cognitive behavioural treatment for the chronic posttraumatic headache patient: A randomised controlled trial. Journal of Headache and Pain 15(suppl1)	- Population Ineligible population. All participants were people with post-traumatic headache, which is not relevant according to protocol population criteria.
Kmiecik, M.J.; Krawczyk, D.; Chapman, S. (2015) Executive functioning in traumatic brain injury: A detailed investigation of the Hayling test. Archives of Physical Medicine and Rehabilitation 96(10): e97-e98	- Publication type Conference poster.
Koul, S., Billings, B., Sterling, S. et al. (2019) Interventional first-person video game training reduces fall risk in Parkinson's disease by improving gait, contrast sensitivity, visual acuity and cognition. Neurology 92(15supplement1)	- Publication type Conference abstract.
Krasny-Pacini, A.; Chevignard, M.; Evans, J. (2014) Goal Management Training for rehabilitation of executive functions: a systematic review of effectiveness in patients with acquired brain injury. Disability and rehabilitation 36(2): 105-116	- Population Systematic review including participants who are out of protocol (12/12 people with stroke).
Krasny-Pacini, A.; Evans, J.; Chevignard, M. (2014) Goal management training for rehabilitation of executive functions: A systematic review of effectiveness in patients with acquired brain injury. Annals of Physical and Rehabilitation Medicine 57(suppl1): e67	- Publication type Conference abstract.
Kucuk, F., Kara, B., Coskuner Poyraz, E. et al. (2015) Comparison of the effects of clinical pilates and	- Publication type Conference abstract.

Study	Reason for exclusion
exercise treatment in multiple sclerosis patients: A single blind randomised study. Fizyoterapi Rehabilitasyon 26(2): 62	
Kucuk, Fadime, Kara, Bilge, Poyraz, Esra Coskuner et al. (2016) Improvements in cognition, quality of life, and physical performance with clinical Pilates in multiple sclerosis: a randomized controlled trial. Journal of physical therapy science 28(3): 761-8	- Country Study conducted in Turkey.
Kumar Goothy, S.S., Gawarikar, S., Choudhary, A. et al. (2022) Effectiveness of electrical vestibular nerve stimulation as adjunctive therapy to improve the cognitive functions in patients with Parkinson's disease. Journal of Basic and Clinical Physiology and Pharmacology	- Country Study conducted in India.
Kumar, H., Mondal, B., Choudhury, S. et al. (2020) Long-term effect of non-invasive Vagus Nerve Stimulation in Parkinson's disease patients. Movement Disorders 35(suppl1): 135	- Publication type Conference abstract.
Kumar, K.S., Samuelkamaleshkumar, S., Viswanathan, A. et al. (2017) Cognitive rehabilitation for adults with traumatic brain injury to improve occupational outcomes. Cochrane Database of Systematic Reviews 2017(6): cd007935	- Publication date Systematic review with 2/9 studies conducted 2013 or later and 7/9 pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Kuo, H., Litzenberger, J., Nettel-Aguirre, A. et al. (2017) Physiological predictors of response to constraint and brain stimulation in children with hemiparetic cerebral palsy. Developmental Medicine and Child Neurology 59(supplement3): 67-68	- Publication type Conference abstract.
Kurowski, B.G., Taylor, H.G., McNally, K.A. et al. (2020) Online Family Problem-Solving Therapy (F-PST) for Executive and Behavioral Dysfunction After Traumatic Brain Injury in Adolescents: A Randomized, Multicenter, Comparative Effectiveness Clinical Trial. The Journal of head trauma rehabilitation 35(3): 165-174	- Country Study conducted in the US.
Kurowski, B.G., Wade, S.L., Kirkwood, M.W. et al. (2013) Online problem-solving therapy for executive dysfunction after child traumatic brain injury. Pediatrics 132(1): e158-e166	- Country Study conducted in the US.
Kurowski, BG, Wade, SL, Kirkwood, MW et al. (2014) Long-term benefits of an early online problem-solving intervention for executive dysfunction after traumatic brain injury in children: a randomized clinical trial. JAMA pediatrics 168(6): 523-531	- Country Study conducted in the US.
Kwok, Jojo Yan Yan, Choi, Edmond Pui Hang, Wong, Janet Yuen Ha et al. (2023) A randomized clinical trial of mindfulness meditation versus exercise in Parkinson's disease during social unrest. NPJ Parkinson's disease 9(1): 7	- Country Study conducted in Hong Kong.
Laatsch, L., Dodd, J., Brown, T. et al. (2020) Evidence-based systematic review of cognitive rehabilitation, emotional, and family treatment studies for children	- Outcomes Systematic review reporting 30/54 with relevant outcomes and 24/54 with no

Study	Reason for exclusion
with acquired brain injury literature: From 2006 to 2017. Neuropsychological rehabilitation 30(1): 130-161	relevant outcomes. Reports measures on emotional treatments for children with acquired brain injury. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Lage, C., Wiles, K., Shergill, S.S. et al. (2016) A systematic review of the effects of low-frequency repetitive transcranial magnetic stimulation on cognition. Journal of Neural Transmission 123(12): 1479-1490	- Publication date Systematic review with 2/20 studies published 2013 or later, and 18/20 published pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Lageman, S.K.; Cash, T.V.; Mickens, M.N. (2013) Initial results of a clinical trial comparing a neurocognitive intervention to supportive therapy in individuals with Parkinson's disease. Journal of Parkinson's Disease 3(suppl1): 105	- Publication type Conference abstract.
Lam, B., Wong, A., Au, L.W. et al. (2021) The benefit and risk of a 24-week aerobic exercise training in older adults with subclinical sporadic cerebral small vessel disease. European Stroke Journal 6(1suppl): 272	- Publication type Conference abstract.
Lamargue, D., Koubiyr, I., Deloire, M. et al. (2020) Effect of cognitive rehabilitation on neuropsychological and semiecological testing and on daily cognitive functioning in multiple sclerosis: The REACTIV randomized controlled study. Journal of the Neurological Sciences 415: 116929	- Comparator Active comparator (psychoeducation, relaxation, physical activity coaching and cognitive stimulation with a focus on memory) not within the same intervention group. Not within scope of the comparison groups defined in the protocol.
Lamargue-Hamel, D., Deloire, M., Saubusse, A. et al. (2017) Specific rehabilitation improves information processing speed and attention in MS: A randomized trial against nonspecific training with semi-ecological evaluation. Multiple Sclerosis Journal 23(3supplement1): 287-288	- Publication type Conference abstract.
Lambez, B. and Vakil, E. (2021) The effectiveness of memory remediation strategies after traumatic brain injury: Systematic review and meta-analysis. Annals of Physical and Rehabilitation Medicine 64(5): 101530	- Publication date Systematic review with 2/16 studies published 2013 or later, and 14/16 published pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Lampit, A. (2018) INVESTIGATING HETEROGENEITY ACROSS CLINICAL TRIALS TO GUIDE CLINICAL IMPLEMENTATION OF COGNITIVE TRAINING. Alzheimer's and Dementia 14(7supplement): p1626-p1627	- Publication type Conference abstract.
Lampit, A., Heine, J., Finke, C. et al. (2019) Computerized Cognitive Training in Multiple Sclerosis: A Systematic Review and Meta-analysis. Neurorehabilitation and Neural Repair 33(9): 695-706	- Comparator Systematic review with the 11/20 studies comparing the intervention to an active comparator and not one of the protocol

Study	Reason for exclusion
	comparators. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Lanesman, T.H. and Schrieff, L.E. (2021) Implementation of an attention training programme with a sample of children who have sustained traumatic brain injuries in South Africa: A pilot study. Neuropsychological rehabilitation 31(9): 1466-1494	- Country Study conducted in South Africa.
Langeskov-Christensen, M., Grondahl Hvid, L., Boye Jensen, H. et al. (2019) High-intensity aerobic exercise does not improve cognitive performance in people with multiple sclerosis: A randomised controlled trial. Multiple Sclerosis Journal 25(supplement2): 900-901	- Publication type Conference abstract.
Langeskov-Christensen, M., Hvid, L.G., Jensen, H.B. et al. (2021) Efficacy of high-intensity aerobic exercise on cognitive performance in people with multiple sclerosis: A randomized controlled trial. Multiple Sclerosis Journal 27(10): 1585-1596	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Lannin, N., Carr, B., Allaous, J. et al. (2014) A randomized controlled trial of the effectiveness of handheld computers for improving everyday memory functioning in patients with memory impairments after acquired brain injury. Clinical rehabilitation 28(5): 470-481	- Outcomes No relevant outcomes reported. Report measured achievement of personal goals, memory in frequency of forgetting, and internal and external strategies.
Lannin, N.A., Schmidt, J., Carr, B. et al. (2014) Occupational therapy training to use handheld personal digital assistant (PDA) devices to address memory and planning difficulties after acquired brain injury: A randomised controlled trial. Stroke 45(12): e296	- Publication type Conference abstract.
Larson, E., Guernon, A., Manypenny, C. et al. (2017) Computerized cognitive rehabilitation outcome in neurological populations: A systematic review of recent research. Brain Injury 31(67): 919-920	- Publication type Conference abstract.
Latella, D., Maggio, M.G., Maresca, G. et al. (2022) Effects of domotics on cognitive, social and personal functioning in patients with Parkinson's disease: A pilot study. Assistive technology : the official journal of RESNA 34(4): 423-428	- Intervention Home automation/technological adaptations. Not an intervention that fits one of the 7 protocol intervention groups.
Lau, J., Regis, C., Burke, C. et al. (2022) Immersive Technology for Cognitive-Motor Training in Parkinson's Disease. Frontiers in Human Neuroscience 16: 863930	- Country Study conducted in the US.
Lawrence, B.; Gasson, N.; Loftus, A. (2016) Can we remediate mild cognitive impairment in Parkinson's disease? A randomized placebo-controlled trial of cognitive training and transcranial direct current stimulation. Journal of Parkinson's Disease 6(supplement1): 145-146	- Publication type Conference abstract.
Lawrence, B.J., Gasson, N., Bucks, R.S. et al. (2017) Cognitive Training and Noninvasive Brain Stimulation for Cognition in Parkinson's Disease: A Meta-analysis. Neurorehabilitation and Neural Repair 31(7): 597-608	- Publication date Systematic review with 4/14 studies published 2013 or later and 10/14 pre-2013. Potentially relevant studies were checked against protocol criteria and

Study	Reason for exclusion
	were either not relevant or had been separately located by the literature search and screened.
Le Fel, J., Joly, F., Rovira, K. et al. (2013) Cancer and cognitive impairments induced by chemotherapy: Effects of cognitive rehabilitation. Supportive Care in Cancer 21(suppl1): 293-s294	- Publication type Conference abstract.
Leavitt, V.M., Cirnigliaro, C., Cohen, A. et al. (2014) Aerobic exercise increases hippocampal volume and improves memory in multiple sclerosis: Preliminary findings. Neurocase 20(6): 695-697	- Country Study conducted in the US.
Lee, J.E., Titcomb, T.J., Bisht, B. et al. (2021) A Modified MCT-Based Ketogenic Diet Increases Plasma beta-Hydroxybutyrate but Has Less Effect on Fatigue and Quality of Life in People with Multiple Sclerosis Compared to a Modified Paleolithic Diet: A Waitlist-Controlled, Randomized Pilot Study. Journal of the American College of Nutrition 40(1): 13-25	- Country Study conducted in the US.
Lemoncello, R., Sohlberg, M.M., Fickas, S. et al. (2011) A randomised controlled crossover trial evaluating Television Assisted Prompting (TAP) for adults with acquired brain injury. Neuropsychological Rehabilitation 21(6): 825-846	- Country Study conducted in the US.
Leocadi, M., Canu, E., Sarasso, E. et al. (2022) Physiotherapy with Dual-TasksImproves Cognition and Resting-State Functional Connectivity in Parkinson 's Disease with Postural Instability andGait Disorders. Neurology 98(18suppl)	- Publication type Conference abstract.
Leon Ruiz, M., Sospedra, M., Arce Arce, S. et al. (2022) Current evidence on the potential therapeutic applications of transcranial magnetic stimulation in multiple sclerosis: A systematic review of the literature. Neurologia 37(3): 199-215	- Paper unavailable Not available in English language.
Lesniak, M.; Polanowska, K.; Seniow, J. (2013) Repeated anodal tDCS coupled with cognitive training for patients with severe traumatic brain injury-a pilot RCT. Clinical Neurophysiology 124(10): e179-e180	- Publication type Conference abstract.
Leung, I.H.K., Hill, N.T.M., Hallock, H. et al. (2017) Convergence and divergence across meta-analyses studying computerised cognitive training in older adults. Alzheimer's and Dementia 13(7): p524-p525	- Publication type Conference abstract.
Leung, I.H.K., Walton, C.C., Hallock, H. et al. (2015) Cognitive training in Parkinson disease: A systematic review and meta-analysis. Neurology 85(21): 1843-1851	- Comparator Systematic review with the 5/7 studies comparing the intervention to an active comparator and not one of the protocol comparators. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Levine, B, Schweizer, TA, O'Connor, C et al. (2011) Rehabilitation of executive functioning in patients with frontal lobe brain damage with goal management training. Frontiers in human neuroscience 5(9): 1-9	- Publication date Published before 2013.

Study	Reason for exclusion
Lew, H.L., Rosen, P.N., Thomander, D. et al. (2009) The potential utility of driving simulators in the cognitive rehabilitation of combat-returnees with traumatic brain injury. Journal of Head Trauma Rehabilitation 24(1): 51-56	- Publication date Published before 2013.
Li, Gen, You, Qiuping, Hou, Xiao et al. (2023) The effect of exercise on cognitive function in people with multiple sclerosis: a systematic review and meta-analysis of randomized controlled trials. Journal of neurology 270(6): 2908-2923	- Intervention Systematic review with 11/21 studies investigating aerobic exercise intervention not aimed at improving cognitive function. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Li, Kunbin, Wang, Yan, Wu, Zhiyuan et al. (2023) Effectiveness of active exergames for improving cognitive function in patients with neurological disabilities: A systematic review and meta-analysis. Games for Health 12(3): 198-210	- Country Systematic review with 1/21 studies conducted in Brazil, 6/21 in Korea, 3/21 in the US, 2/21 in Taiwan, 1/21 in Sweden, 2/21 in Italy, 1/21 in Israel, 1/21 in Turkey, 1/21 in Switzerland, 1/21 in Australia, 1/21 in Spain, and 1/21 in Pakistan. Australian, Spanish, Swiss, Italian and Swedish studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Li, Yan, Hu, Yule, Pozzato, Ilaria et al. (2024) Efficacy of Interventions to Improve Cognitive Function in Adults with Spinal Cord Injury: A Systematic Review. Journal of neurotrauma	- Country Systematic review with 2/8 studies conducted in the US, 1/8 in Thailand, 1/8 in Iran, 1/8 in Brazil, 1/8 in Chile, 1/8 in Italy, and 1/8 in Canada. Italian and Canadian studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Liang, H, You, G, Liao, L et al. (2015) Clinical observation of cognitive impairment after traumatic brain injury treated with acupuncture and cognitive training. Zhongguo zhen jiu [Chinese acupuncture & moxibustion] 35(9): 865-868	- Other protocol criteria Not available in English language.
Libin, A., Scholten, J., Schladen, M.M. et al. (2014) Conceptualizing and exploring war-induced neurological trauma through a personalized psychosocial approach. Archives of Physical Medicine and Rehabilitation 95(10): e58	- Publication type Conference abstract.
Lieben, C.K., Blokland, A., Deutz, N.E. et al. (2018) Intake of tryptophan-enriched whey protein acutely enhances recall of positive loaded words in patients with multiple sclerosis. Clinical Nutrition 37(1): 321-328	- Study design (adults) Ineligible study design (non-randomised study).
Lifshitz Ben Basat, A., Gvion, A., Vatine, J.-J. et al. (2016) Transcranial direct current stimulation to improve naming abilities of persons with chronic aphasia: A preliminary study using individualized based protocol. Journal of Neurolinguistics 38: 1-13	- Population Ineligible population. Participants were adults with stroke.

Study	Reason for exclusion
Lim, J., Greenspoon, D., Hunt, A. et al. (2020) Rehabilitation interventions in Rett syndrome: a scoping review. Developmental Medicine and Child Neurology 62(8): 906-916	- Other protocol criteria Ineligible study design (scoping review).
Lima, A.M.A., De Campos Cordeiro Hirata, F., De Bruin, G.S. et al. (2012) The influence of playing a non-reward game on motor ability and executive function in Parkinson's disease. Behavioural Neurology 25(2): 119-125	- Publication date Published before 2013.
Lincoln N, B, Bradshaw L, E, Constantinescu, CS et al. (2020) Cognitive Rehabilitation for Attention and Memory in people with Multiple Sclerosis (CRAMMS).	- Publication type Conference abstract.
Lincoln, NB, Yuill, F, Holmes, J et al. (2011) Evaluation of an adjustment group for people with multiple sclerosis and low mood: a randomized controlled trial. Multiple sclerosis (Houndmills, Basingstoke, England) 17(10): 1250-1257	- Publication date Published before 2013.
Lindelov, J.K., Dall, J.O., Kristensen, C.D. et al. (2016) Training and transfer effects of N-back training for brain-injured and healthy subjects. Neuropsychological rehabilitation 26(56): 895-909	- Comparator Active comparator (visual search training) not within the same intervention group. Not within scope of the comparison groups defined in the protocol.
Lindelov, J.K.; Overgaard, R.; Overgaard, M. (2017) Improving working memory performance in brain-injured patients using hypnotic suggestion. Brain 140(4): 1100-1103	- Population Mixed sample comprised entirely of adults of which less than 66% (majority of acquired brain injuries were caused by stroke) are in scope for this guideline and treatment effects are not reported separately for groups that are in scope.
Linden, M., Hawley, C., Blackwood, B. et al. (2016) Technological aids for the rehabilitation of memory and executive functioning in children and adolescents with acquired brain injury. Cochrane Database of Systematic Reviews 2016(7): cd011020	- Publication date Systematic review with all included studies published before 2013. Therefore no studies checked against protocol.
Lindsey, H.M., Lazar, M., Mercuri, G. et al. (2022) The effects of plasticity-based cognitive rehabilitation on resting-state functional connectivity in chronic traumatic brain injury: A pilot study. NeuroRehabilitation 51(1): 133-150	- Country Study conducted in the US.
Liu, H.-H., Wang, R.-Y., Cheng, S.-J. et al. (2022) Effects of square-stepping exercise on executive function in individuals with Parkinson's disease: A randomized controlled pilot study. Geriatric nursing (New York, N.Y.) 47: 273-279	- Country Study conducted in Taiwan.
Liu, M., Qian, Q., Wang, W. et al. (2022) Improvement in language function in patients with aphasia using computer-assisted executive function training: A controlled clinical trial. PM and R 14(8): 913-921	- Country Study conducted in China.
Liu, X., Liu, H., Liu, Z. et al. (2021) Transcranial Direct Current Stimulation for Parkinson's Disease: A Systematic Review and Meta-Analysis. Frontiers in Aging Neuroscience 13: 746797	- Outcomes Systematic review reporting no relevant outcomes. Reports measures of physical function. No included studies with relevant outcomes were reported. Therefore no studies were checked against protocol criteria.

Study	Reason for exclusion
Liu-Ambrose, T., Davis, J., Best, J.R. et al. (2015) Vascular cognitive impairment and aerobic exercise: A 6-month randomized controlled trial. Alzheimer's and Dementia 11(7suppl1): p323-p324	- Publication type Conference abstract.
Lloyd, J; Riley, GA; Powell, TE (2009) Errorless learning of novel routes through a virtual town in people with acquired brain injury. Neuropsychological rehabilitation 19(1): 98-109	- Study design (adults) Ineligible study design (non-randomised study).
Locke, D.E.C., Cerhan, J.H., Wu, W. et al. (2008) Cognitive rehabilitation and problem-solving to improve quality of life of patients with primary brain tumors: A pilot study. Journal of Supportive Oncology 6(8): 383-391	- Country Study conducted in the US.
Lofgren, N., Conradsson, D., Rennie, L. et al. (2016) Highly challenging gait and balance training can improve cognitive processing during dual-task conditions in elderly with Parkinson's disease. Journal of Parkinson's Disease 6(supplement1): 212-213	- Publication type Conference abstract.
Longley, W.A.; Tate, R.L.; Brown, R.F. (2020) Neuropsychological assessment feedback helps patients with varying levels of cognitive functioning to 'get on with the business of living': Cognitive impairment subgroup analysis of a randomised controlled trial (RCT) in patients living with multiple sclerosis (MS). Brain Impairment 21(suppl3): 315-316	- Publication type Conference abstract.
Longley, W.A.; Tate, R.L.; Brown, R.F. (2022) The psychological benefits of neuropsychological assessment feedback as a psycho-educational therapeutic intervention: A randomized-controlled trial with cross-over in multiple sclerosis. Neuropsychological rehabilitation: 1-30	- Intervention Unclear intervention. Insufficient information provided about what cognitive domains are being targeted.
Lopez-Soley, E., Solana, E., Martinez-Heras, E. et al. (2020) Phase ii trial of cognitive rehabilitation in patients with multiple sclerosis: preliminary results. Multiple Sclerosis Journal 26(3suppl): 508-509	- Publication type Conference abstract.
Lowe, J., Goodman, C., Larson, E. et al. (2019) Safety and Feasibility of tDCS with Computerized Attention Training after TBI. Archives of Physical Medicine and Rehabilitation 100(10): e118	- Publication type Conference abstract.
Lu, R., Lu, W., Chen, X. et al. (2021) Effect of rehabilitation training based on the ICF concept on the recovery of construction workers with craniocerebral trauma: a randomized study. Annals of palliative medicine 10(6): 6510-6517	- Country Study conducted in China.
Lucka, E., Lucki, M., Cybulski, M. et al. (2022) The Use of the ICF Classification Sheet to Assess Cognitive-Behavioral Disorders and Verbal Communication in Patients after Ischemic and Hemorrhagic Stroke during Rehabilitation. International Journal of Environmental Research and Public Health 19(19): 12127	- Population Ineligible population. All participants were people who had experienced a stroke, which is not relevant according to protocol population criteria.
Lundqvist, A., Grundstrm, K., Samuelsson, K. et al. (2010) Computerized training of working memory in a group of patients suffering from acquired brain injury. Brain Injury 24(10): 1173-1183	- Population Mixed sample comprised entirely of adults of which less than 66% are in scope for this guideline (majority of acquired brain injuries were caused by

Study	Reason for exclusion
	stroke) and treatment effects are not reported separately for groups that are in scope.
Lynch, C. and LaGasse, A.B. (2016) Training Endogenous Task Shifting Using Music Therapy: A Feasibility Study. Journal of music therapy 53(3): 279-307	- Country Study conducted in the US.
Mabbott, D., Riggs, L., Piscione, J. et al. (2014) Training the brain to repair itself: An exercise trial in pediatric brain tumor survivors. Neuro-Oncology 16(suppl5): v136	- Publication type Conference abstract.
Maggio, M.G., Torrisi, M., Buda, A. et al. (2020) Effects of robotic neurorehabilitation through lokomat plus virtual reality on cognitive function in patients with traumatic brain injury: A retrospective case-control study. International Journal of Neuroscience 130(2): 117-123	- Study design (adults) Retrospective case-control study.
Maggio, Maria Grazia, Luca, Antonina, Cicero, Calogero Edoardo et al. (2024) Effectiveness of telerehabilitation plus virtual reality (Tele-RV) in cognitive e social functioning: A randomized clinical study on Parkinson's disease. Parkinsonism & related disorders 119: 105970	- Other protocol criteria Insufficient information about what cognitive domains are being targeted by the active control condition (and comparison between other arms not being within scope of protocol as addressing different cognitive domains)
Mahan, S.; Rous, R.; Adlam, A. (2017) Systematic Review of Neuropsychological Rehabilitation for Prospective Memory Deficits as a Consequence of Acquired Brain Injury. Journal of the International Neuropsychological Society : JINS 23(3): 254-265	- Publication date Systematic review with 7/11 included studies published before 2013 and 4/11 studies published in 2013 or later. Potentially relevant studies were checked against protocol criteria and were not relevant as intervention was not aimed at improving cognitive function.
Mahmood, Z., Clark, J.M.R., Jak, A.J. et al. (2021) Predictors of Intervention Adherence in Compensatory Cognitive Training for Veterans with a History of Mild Traumatic Brain Injury. Journal of Head Trauma Rehabilitation 36(1): 20-24	- Other protocol criteria Paper does not report sufficient methodological detail (such as research question, sampling, data collection and data analysis) to evaluate risk of bias/ study quality.
Mahmoud, LSE-D; Shady, NAELRA; Hafez, ES (2018) Motor imagery training with augmented cues of motor learning on cognitive functions in patients with Parkinsonism. International journal of therapy and rehabilitation 25(1): 13-19	- Country Study conducted in Egypt.
Mahncke, H.W., Degutis, J., Levin, H. et al. (2021) A randomized clinical trial of plasticity-based cognitive training in mild traumatic brain injury. Brain 144(7): 1994-2008	- Country Study conducted in the US.
Man, D. (2012) Virtual reality-based prospective memory training program for traumatic brain injury. Neurorehabilitation and Neural Repair 26(6): 687-688	- Publication type Conference abstract.
Man, D.W.K.; Poon, W.S.; Lam, C. (2013) The effectiveness of artificial intelligent 3-D virtual reality vocational problem-solving training in enhancing employment opportunities for people with traumatic brain injury. Brain Injury 27(9): 1016-1025	- Country Study conducted in Hong Kong.

Study	Reason for exclusion
Man, D.W.K., Soong, W.Y.L., Tam, S.F. et al. (2006) Self-efficacy outcomes of people with brain injury in cognitive skill training using different types of trainer-trainee interaction. Brain Injury 20(9): 959-970	- Publication date Published before 2013.
Manca, R., Mitolo, M., Sharrack, B. et al. (2018) Cognitive stimulation in patients with relapsing-remitting multiple sclerosis: Effects on cognition, quality of life and mr functional connectivity. Neurology 90(15supplement1)	- Publication type Conference abstract.
Manca, R., Mitolo, M., Venneri, A. et al. (2018) The effects of default mode network functional connectivity modulation on cognition and quality of life of people with relapsing-remitting multiple sclerosis. Multiple Sclerosis Journal 24(2supplement): 315-316	- Publication type Conference abstract.
Manca, R., Mitolo, M., Wilkinson, I. et al. (2021) A network-based cognitive training induces cognitive improvements and neuroplastic changes in patients with relapsing-remitting multiple sclerosis: An exploratory case-control study. Neural Regeneration Research 16(6): 1111-1120	- Study design (adults) Ineligible study design (non-randomised study)
Manenti, R., Cotelli, M.S., Cobelli, C. et al. (2018) Transcranial direct current stimulation combined with cognitive training for the treatment of Parkinson Disease: A randomized, placebo-controlled study. Brain Stimulation 11(6): 1251-1262	- Paper unavailable British library unable to supply.
Manglani, H.R., Samimy, S., Schirda, B. et al. (2020) Effects of 4-week mindfulness training versus adaptive cognitive training on processing speed and working memory in multiple sclerosis. Neuropsychology 34(5): 591-604	- Country Study conducted in the US.
Mani, A., Chohedri, E., Ravanfar, P. et al. (2018) Efficacy of group cognitive rehabilitation therapy in multiple sclerosis. Acta Neurologica Scandinavica 137(6): 589-597	- Country Study conducted in Iran.
Manser, Patrick and de Bruin, Eling D (2024) "Brain-IT": Exergame training with biofeedback breathing in neurocognitive disorders. Alzheimer's & dementia : the journal of the Alzheimer's Association	- Population Population were participants with Alzheimer and dementia.
Marcinkowska, A.B., Mankowska, N.D., Kot, J. et al. (2022) Impact of Hyperbaric Oxygen Therapy on Cognitive Functions: a Systematic Review. Neuropsychology review 32(1): 99-126	- Intervention Systematic review with studies investigating oxygen therapy and not specifically aimed at targeting cognitive function. Therefore no studies were checked against protocol criteria.
Maria Netto, Tania, Greca, Denise Vieira, Zimmermann, Nicolle et al. (2010) Working memory intervention programs for adults: A systematic review. Dementia & neuropsychologia 4(3): 222-231	- Publication date Systematic review with all included studies published before 2013. Therefore no studies checked against protocol.
Markovic, G., Bartfai, A., Schult, M.-L. et al. (2014) Training of attention in the early phase after brain injury. Archives of Physical Medicine and Rehabilitation 95(10): e49-e50	- Publication type Conference abstract.
Markovic, G., Borg, K., Schult, M.-L. et al. (2013) The use of Statistical Process Control (SPC) for describing patterns of improvement at an early stage after	- Publication type Conference abstract.

Study	Reason for exclusion
Acquired Brain Injury (ABI). A pilot study. Brain Impairment 14(1): 194-195	
Markovic, G.; Elg, M.; Bartfai, A. (2020) Who Will Benefit from Early Targeted Attention Training After Acquired Brain Injury? Early Attention Assessment as Predictor of Intervention Outcome. Archives of Physical Medicine and Rehabilitation 101(11): e45	- Publication type Conference poster.
Markovic, G., Schult, M.-L., Elg, M. et al. (2019) Beneficial effects of early attention process training after acquired brain injury: A randomized controlled trial. Journal of rehabilitation medicine	- Population Mixed sample comprised entirely of adults of which less than 66% are in scope for this guideline (majority of acquired brain injuries were caused by stroke) and treatment effects are not reported separately for groups that are in scope.
Marotta, N., Calafiore, D., Curci, C. et al. (2022) Integrating virtual reality and exergaming in cognitive rehabilitation of patients with Parkinson disease: a systematic review of randomized controlled trials. European journal of physical and rehabilitation medicine	- Intervention Systematic review with 6/10 studies investigating exercise based interventions including exergaming, robot assisted gait training and Wii games which did not target specific aspects of cognition, 2/10 studies with outcomes that did not specifically target aspects of cognition, 1/10 study with active control that does not meet protocol criteria and 1/10 study that was relevant and has been added to this review.
Martinez, D., Kmiecik, M., Chapman, S. et al. (2016) Observing changes in cognition, mood, and white matter in chronic TBI using multiple factor analysis after cognitive intervention. Archives of Physical Medicine and Rehabilitation 97(10): e75	- Publication type Conference abstract.
Martinez, D., Krawczyk, D., Rodgers, B.N. et al. (2015) Cognitive improvements after TBI intervention measured by multiple correspondence analysis. Archives of Physical Medicine and Rehabilitation 96(10): e95	- Publication type Conference abstract.
Maruyama, B. and Novakovic-Agopian, T. (2020) Improvement in Executive Functioning after Goal-Oriented Attentional Self-Regulation Training Predicts Reduction in PTSD Hyperarousal Symptoms Among Veterans With Comorbid PTSD and Mild TBI. Archives of Physical Medicine and Rehabilitation 101(11): e53-e54	- Publication type Conference abstract.
Mattioli, F., Bellomi, F., Stampatori, C. et al. (2013) Transcranial direct current stimulation (tDCS) efficacy in treating information processing impairment of multiple sclerosis patients. Neurology 80(1meetingabstracts)	- Publication type Conference abstract.
Mattioli, F., Bellomi, F., Stampatori, C. et al. (2013) Two weeks tDCS effects on cognitive impairment of patients with MS over six months follow-up. Multiple Sclerosis 19(11suppl1): 439-440	- Publication type Conference abstract.
Mattioli, F., Bellomi, F., Stampatori, C. et al. (2016) Two years follow up of domain specific cognitive	- Comparator

Study	Reason for exclusion
training in relapsing remitting multiple sclerosis: A randomized clinical trial. Frontiers in Behavioral Neuroscience 10(feb): 28	Active comparator that was not within scope of the comparison groups defined in the protocol.
Mattioli, F., Stampatori, C., Bellomi, F. et al. (2012) Specific versus aspecific intensive cognitive training in MS: Preliminary results of the SMICT study. (#88). Multiple Sclerosis 18(5): 48	- Publication type Conference abstract.
Mattioli, F., Stampatori, C., Bellomi, F. et al. (2015) A RCT comparing specific intensive cognitive training to aspecific psychological intervention in RRMS: The SMICT study. Frontiers in Neurology 6(jan): 278	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Mattioli, F., Stampatori, C., Rocca, M.A. et al. (2009) Cognitive training in multiple sclerosis: An fMRI study. Journal of Neurology 256(suppl2): 240	- Publication date Published before 2013.
Mattioli, F., Stampatori, C., Scarpazza, C. et al. (2012) Persistence of the effects of attention and executive functions intensive rehabilitation in relapsing remitting multiple sclerosis. Multiple Sclerosis and Related Disorders 1(4): 168-173	- Publication date Published before 2013.
Matveeva, MV, Samoilova, YG, Zhukova, NG et al. (2019) Different types of cognitive rehabilitation in patients with type 2 diabetes. Zhurnal nevrologii i psikhiatrii imeni S.S. Korsakova 119(8): 12-17	- Paper unavailable Not available in English language.
Maxamatjanova, N. (2019) Cognitive disorders and their rehabilitation in parkinson's diseases. Journal of the Neurological Sciences 405(supplement): 125	- Publication type Conference abstract.
Mazo, Guillaume, Pantaleo, Stephanie, van der Oord, Arianne et al. (2024) Rehabilitation of working memory after acquired brain injury and multiple sclerosis: A systematic review. Neuropsychological rehabilitation: 1-39	- Population Systematic review including participants who are in protocol (8/35 people with multiple sclerosis, 3/35 people with traumatic brain injury, 8/35 people with acquired brain injury), and out of protocol (15/35 adults with stroke, 1/35 people with tumours). Studies including participants with multiple sclerosis, traumatic brain injury, and acquired brain injury were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Mazur-Mosiewicz, A., Carlson, H., Dykeman, J. et al. (2013) Cognitive rehabilitation after epilepsy surgery: What is the evidence?. Epilepsy Currents 13(suppl1): 304	- Publication type Conference abstract.
McCamish, J., Samson, A., Vrongistinos, K. et al. (2013) The effects of cardiovascular exercise on cognitive function in individuals with Parkinson's disease (PD). Movement Disorders 28(suppl1): 200-s201	- Publication type Conference abstract.
McDermott, A., Zaporojan, L., McNamara, P. et al. (2017) The effects of a 16-week aerobic exercise programme on cognitive function in people living with HIV. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV 29(6): 667-674	- Population Condition does not fit 1 of the 5 protocol condition groups. HIV not leading to HIV-associated neurocognitive disorder (HAND).

Study	Reason for exclusion
McDonald, A., Haslam, C., Yates, P. et al. (2011) Google calendar: A new memory aid to compensate for prospective memory deficits following acquired brain injury. Neuropsychological Rehabilitation 21(6): 784-807	- Publication date Published before 2013.
McDonald, B., Flashman, L., Arciniegas, D. et al. (2016) Cognitive therapy with and without methylphenidate after traumatic brain injury (TBI): Which is better?. Brain Injury 30(56): 692-693	- Publication type Conference abstract.
McDonald, B., Ford, J., Flashman, L. et al. (2017) Neural substrate of working memory improvement following methylphenidate and cognitive-behavioural therapy for cognitive symptoms after traumatic brain injury (TBI). Brain Injury 31(67): 950-951	- Publication type Conference abstract.
McDonald, B.C., Flashman, L.A., Arciniegas, D.B. et al. (2017) Methylphenidate and memory and attention adaptation training for persistent cognitive symptoms after traumatic brain injury: A randomized, placebo-controlled trial. Neuropsychopharmacology 42(9): 1766-1775	- Country Study published in the US.
McDonnell, M.N.; Smith, A.E.; MacKintosh, S.F. (2011) Aerobic exercise to improve cognitive function in adults with neurological disorders: A systematic review. Archives of Physical Medicine and Rehabilitation 92(7): 1044-1052	- Intervention Systematic review with studies investigating exercise intervention and not specifically targeting any aspects of cognition. Therefore no studies were checked against protocol criteria.
McFadden, K.L., Healy, K.M., Dettmann, M.L. et al. (2011) Acupressure's efficacy as a non-pharmacological intervention for traumatic brain injury (TBI). Journal of Neuropsychiatry and Clinical Neurosciences 23(2): 11	- Publication type Conference abstract.
McFadden, K.L., Healy, K.M., Dettmann, M.L. et al. (2011) Acupressure as a non-pharmacological intervention for traumatic brain injury (tbi). Journal of Neurotrauma 28(1): 21-34	- Publication date Published before 2013.
McGlinchey, R., Rosenblatt, A., Mercado, R. et al. (2014) Internet-based cognitive training enhances attention and functional outcomes in OEF/OIF/ OND veterans. Brain Injury 28(56): 624-625	- Publication type Conference abstract.
McLeod, C., Delambo, A., Turner, T. et al. (2019) Kickboxing and cognition in parkinson's disease. Neurology 92(15supplement1)	- Publication type Conference abstract.
Messinis, L., Kosmidis, M.H., Nasios, G. et al. (2019) Computer assisted cognitive training improves neuropsychological functions and cognitive fatigue in patients with secondary progressive Multiple Sclerosis: A randomized controlled trial. Multiple Sclerosis Journal 25(supplement2): 798	- Publication type Conference abstract.
Messinis, L., Nousia, A., Kosmidis, M.H. et al. (2015) Efficacy of a computer-assisted neuropsychological training programme in cognitive performance of patients with relapsing remitting Multiple Sclerosis. Journal of the Neurological Sciences 357(suppl1): e354-e355	- Publication type Conference abstract.

Study	Reason for exclusion
Metzler-Baddeley, Claudia, Cantera, Jaime, Coulthard, Elizabeth et al. (2014) Improved Executive Function and Callosal White Matter Microstructure after Rhythm Exercise in Huntington's Disease. Journal of Huntington's disease 3(3): 273-83	- Study design (adults) Not comparative/before and after study.
Mhizha-Murira, J.R.; DasNair, R.; Drummond, A. (2018) Implementing cognitive rehabilitation for people with multiple sclerosis: translating research into clinical practice. Multiple Sclerosis Journal 24(2supplement): 954	- Publication type Conference abstract.
Mhizha-Murira, J.R.; Roshan, D.N.; Avril, D. (2018) Implementing cognitive rehabilitation for people with multiple sclerosis: Bridging the gap between research and clinical practice. Multiple Sclerosis Journal 24(6): 857	- Publication type Conference abstract.
Mihuta, M.E.; Green, H.J.; Shum, D.H.K. (2018) Web-based cognitive rehabilitation for survivors of adult cancer: A randomised controlled trial. Psycho-Oncology 27(4): 1172-1179	- Population Population outside scope of protocol: People with non-neurological cancers; reason for cognitive complaints with memory or concentration is unclear.
Miller, Elzbieta, Morel, Agnieszka, Redlicka, Justyna et al. (2018) Pharmacological and Non-pharmacological Therapies of Cognitive Impairment in Multiple Sclerosis. Current neuropharmacology 16(4): 475-483	- Study design (adults) Not a systematic review - no methodology reported which would allow critical appraisal.
Minen, M.; Jinich, S.; Vallespir Ellett, G. (2019) Behavioral Therapies and Mind-Body Interventions for Posttraumatic Headache and Post-Concussive Symptoms: A Systematic Review. Headache 59(2): 151-163	- Population Systematic review including participants out of protocol (people with posttraumatic headache or post-concussive symptoms). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Miotto, E.C., Evans, J.J., Souza De Lucia, M.C. et al. (2009) Rehabilitation of executive dysfunction: A controlled trial of an attention and problem solving treatment group. Neuropsychological Rehabilitation 19(4): 517-540	- Publication date Published before 2013.
Mishra, R.K. and Thrasher, A.T. (2022) Effect of concurrent transcranial direct current stimulation on instrumented timed up and go task performance in people with Parkinson's disease: A double-blind and cross-over study. Journal of Clinical Neuroscience 100: 184-191	- Country Study conducted in the US.
Mitolo, M.; Venneri, A.; Sharrack, B. (2015) A network-based cognitive rehabilitation in patients with multiple sclerosis and mild cognitive impairment. Neurology 84(suppl14)	- Publication type Conference abstract.
Mitolo, M., Venneri, A., Wilkinson, I.D. et al. (2015) Cognitive rehabilitation in multiple sclerosis: A systematic review. Journal of the Neurological Sciences 354(12): 1-9	- Publication date Systematic review with 3/33 studies published 2013 or later, and 30/33 pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.

Study	Reason for exclusion
Mochizuki-Kawai, Hiroko, Kotani, Izumi, Mochizuki, Satoshi et al. (2018) Structured floral arrangement program benefits in patients with neurocognitive disorder. Frontiers in Psychology 9	- Country Study conducted in Japan.
Mohakud, K. and Sahoo, S. (2018) Efficacy of meta-cognitive strategy training on functional performance and community reintegation of patients with chronic acquired brain injury. Neurorehabilitation and Neural Repair 32(45): 397	- Publication type Conference abstract.
Mohammadian Nejad, Ehsan, Amouzadeh, Effat, Kashipazha, Davood et al. (2023) The effect of atomoxetine on cognitive function in patients with multiple sclerosis. Current journal of neurology 22(3): 149-154	- Country Study conducted in Iran.
Molhemi, F., Mehravar, M., Monjezi, S. et al. (2022) Effects of exergaming on cognition, lower limb functional coordination, and stepping time in people with multiple sclerosis: a randomized controlled trial. Disability and rehabilitation: 1-9	- Country Study conducted in Iran.
Molhemi, F., Monjezi, S., Mehravar, M. et al. (2020) Effects of virtual reality training on coordination, executive function, and reaction time in people with multiple sclerosis. Multiple Sclerosis Journal 26(3suppl): 75-76	- Publication type Conference abstract.
Moller, M.C.; Lexell, J.; Wilbe Ramsay, K. (2021) Effectiveness of specialized rehabilitation after mild traumatic brain injury: A systematic review and meta-analysis. Journal of rehabilitation medicine 53(2): jrm00149	- Population Systematic review including participants who are in protocol (1/9 people with traumatic brain injury with a duration of more than 3 months) and out of protocol (8/9 people with traumatic brain injury less than 3 months). The study including participants with traumatic brain injury with a duration of more than 3 months was checked against protocol criteria and added to this review.
Montana, J.I., Tuena, C., Serino, S. et al. (2019) Neurorehabilitation of spatial memory using virtual environments: A systematic review. Journal of Clinical Medicine 8(10): 1516	- Population Systematic review including participants out of protocol (adults with stroke and people living with Alzheimer's disease). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Moore, K.S., Peterson, D.A., O'Shea, G. et al. (2008) The effectiveness of music as a mnemonic device on recognition memory for people with multiple sclerosis. Journal of Music Therapy 45(3): 307-329	- Publication date Published before 2013.
Morrison, S.A., Fazeli, P.L., Gower, B. et al. (2020) Cognitive Effects of a Ketogenic Diet on Neurocognitive Impairment in Adults Aging With HIV: A Pilot Study. The Journal of the Association of Nurses in AIDS Care : JANAC 31(3): 312-324	- Country Study conducted in the US.
Moss, S., Allsop, L., Stockley, R. et al. (2015) Virtual reality in a community setting: Is this the way forward?. International Journal of Stroke 10(suppl5): 75	- Publication type Conference abstract.

Study	Reason for exclusion
Mossberg, K. (2012) Improved cognitive function immediately after aerobic exercise in patients with traumatic brain injury. Brain Injury 26(45): 561-562	- Publication type Conference abstract.
Motl, Robert W, Kidwell-Chandler, Ariel, Sandroff, Brian M et al. (2023) Randomized controlled trial of the behavioral intervention for physical activity in multiple sclerosis project: Social cognitive theory variables as mediators. Multiple sclerosis and related disorders 78: 104933	- Country Study conducted in the US
Moumdjian, L., Sarkamo, T., Leone, C. et al. (2017) Effectiveness of music-based interventions on motricity or cognitive functioning in neurological populations: a systematic review. European journal of physical and rehabilitation medicine 53(3): 466-482	- Intervention Systematic review including interventions out of protocol (not aimed at cognitive function). No studies checked against protocol criteria as did not include any interventions included in protocol.
Mousavi, S., Zare, H., Etemadifar, M. et al. (2018) Memory rehabilitation for the working memory of patients with multiple sclerosis (MS). Journal of clinical and experimental neuropsychology 40(4): 405-410	- Country Study conducted in Iran.
Mousavi, S; Zare, H; Etemadifar, M (2020) Evaluating the effectiveness of cognitive rehabilitation on everyday memory in multiple sclerosis patients. Neuropsychological rehabilitation 30(6): 1013-1023	- Country Study conducted in Iran.
Munari, D., Fonte, C., Varalta, V. et al. (2020) Effects of robot-assisted gait training combined with virtual reality on motor and cognitive functions in patients with multiple sclerosis: A pilot, single-blind, randomized controlled trial. Restorative Neurology and Neuroscience 38(2): 151-154	- Intervention Robot-assisted gait training intervention. Not an intervention that fits one of the 7 protocol intervention groups.
Mura, G., Carta, M.G., Sancassiani, F. et al. (2018) Active exergames to improve cognitive functioning in neurological disabilities: a systematic review and meta-analysis. European journal of physical and rehabilitation medicine 54(3): 450-462	- Population Systematic review including participants out of protocol (adults with stroke and people living with Alzheimer's disease). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Murray, D.; Sacheli, M.; Stoessl, A.J. (2013) Exercise for the mind: Investigating the effects of exercise on cognition in Parkinson's disease. Journal of Parkinson's Disease 3(suppl1): 106-107	- Intervention Systematic review with studies investigating exercise intervention and not specifically targeting any aspects of cognition. Therefore no studies were checked against protocol criteria.
Murray, Danielle K, Sacheli, Matthew A, Eng, Janice J et al. (2014) The effects of exercise on cognition in Parkinson's disease: a systematic review. Translational neurodegeneration 3(1): 5	- Outcomes Systematic review with no meta-analysis and only a narrative description of results, so no relevant outcomes. Included studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Nackaerts, E., Heremans, E., Smits-Engelsman, B.C.M. et al. (2014) Intensive motor learning improves handwriting skills in patients with Parkinson's disease. Movement Disorders 29(suppl1): 254	- Publication type Conference abstract.

Study	Reason for exclusion
Nackaerts, E., Heremans, E., Vervoort, G. et al. (2016) Relearning of Writing Skills in Parkinson's Disease After Intensive Amplitude Training. Movement Disorders 31(8): 1209-1216	- Outcomes No relevant outcomes reported. Reports measures of handwriting skills.
Nair, RD and Lincoln, NB (2006) A comparison of the effectiveness of two types of cognitive rehabilitation strategies for memory deficits following brain damage: a single blind randomised control trial. Journal of the international neuropsychological society 12(suppls2): 4	- Publication type Conference abstract.
Nakamura, Z., Ali, N., Crouch, A. et al. (2022) IMPACT OF COGNITIVE REHABILITATION ON COGNITIVE FUNCTION AND FUNCTIONAL OUTCOMES IN ADULT CANCER SURVIVORS: A SYSTEMATIC REVIEW. Supportive Care in Cancer 30(supplement1): 73	- Publication type Conference abstract.
Nam, J.-H. and Kim, H. (2018) How assistive devices affect activities of daily living and cognitive functions of people with brain injury: a meta-analysis. Disability and rehabilitation. Assistive technology 13(3): 305-311	- Publication date Systematic review with 3/8 studies published 2013 or later, and 5/8 published pre-2013. Potentially relevant studies were checked against protocol criteria. Studies published 2013 or later were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Nauta, Ilse M, Bertens, Dirk, Fasotti, Luciano et al. (2023) Cognitive rehabilitation and mindfulness reduce cognitive complaints in multiple sclerosis (REMIND-MS): A randomized controlled trial. Multiple sclerosis and related disorders 71: 104529	- Comparator Active comparator not within the same intervention group -cognitive rehabilitation that does not fit any of the 7 interventions in protocol criteria.
Nazaribadie, M., Ghaleiha, A., Ahmadpanah, M. et al. (2020) Effectiveness of detached mindfulness intervention on cognitive functions in multiple sclerosis patients, results from a randomized controlled study. Pakistan Journal of Medical and Health Sciences 14(4): 2022-2029	- Country Study conducted in Iran.
NAZARIBADIE, M., GHALEIHA, A., AHMADPANAH, M. et al. (2021) Metacognitive model of mindfulness can improve executive function in multiple sclerosis patients. Pakistan Journal of Medical and Health Sciences 15(1): 590-597	- Country Study conducted in Iran.
Nelson, L., MacDonald, M., Glover, C. et al. (2012) Effects of interactive metronome therapy on neuropsychological test performance and electrocortical functional connectivity following blast related brain injury. Brain Injury 26(45): 648-649	- Publication type Conference abstract
Nelson, L.A., MacDonald, M., Stall, C. et al. (2013) Effects of interactive metronome therapy on cognitive functioning after blast-related brain injury: A randomized controlled pilot trial. Neuropsychology 27(6): 666-679	- Country Study conducted in the US.
Nezakatolhosseini, Maryam; Esfarjani, Fahimeh; Dinani Zohreh, Mohamadi (2014) The effect of pilates training on Memory Quotient (MQ) in multiple sclerosis patients. Advances cognit sci 16(46464): 32-41	- Publication type Conference abstract.

Study	Reason for exclusion
Niemeier, J., Kreutzer, J., Williams-Gary, K. et al. (2012) Efficacy of a brief, manualized, acute neurobehavioral and cognitive intervention with persons who have traumatic brain injury. Brain Injury 26(45): 338	- Publication type Conference abstract.
Niemeier, J.P., Kreutzer, J.S., Marwitz, J.H. et al. (2011) Efficacy of a brief acute neurobehavioural intervention following traumatic brain injury: A preliminary investigation. Brain Injury 25(78): 680-690	- Publication date Published before 2013.
Niewrzol, P., Wylie, G., Yue, G. et al. (2020) Changes in mobility and brain connectivity following over-ground robotic exoskeleton rehabilitation in persons with MS. Multiple Sclerosis Journal 26(3suppl): 74	- Publication type Conference abstract.
Niu, Y., Wan, C., Zhou, B. et al. (2019) Breath Qigong Improves Recognition in Seniors With Vascular Cognitive Impairment. Alternative therapies in health and medicine 25(1): 20-26	- Population Ineligible population. Study examines people with vascular cognitive impairment. Not relevant according to protocol population criteria.
Nousia, A., Martzoukou, M., Tsouris, Z. et al. (2020) The Beneficial Effects of Computer-Based Cognitive Training in Parkinson's Disease: A Systematic Review. Archives of clinical neuropsychology : the official journal of the National Academy of Neuropsychologists 35(4): 434-447	- Comparator Systematic review with 3/7 studies with active comparator that was not within scope of the comparison groups defined in the protocol, 1/7 conducted in the US, 1/7 with intervention that did not target specific aspects of cognition, 1/7 with outcomes that did not target specific aspects of cognition and 1/7 that was relevant and added to the current review.
Nousia, Anastasia, Martzoukou, Maria, Liampas, Ioannis et al. (2022) The Effectiveness of Non-Invasive Brain Stimulation Alone or Combined with Cognitive Training on the Cognitive Performance of Patients With Traumatic Brain Injury: Alpha Systematic Review. Archives of clinical neuropsychology : the official journal of the National Academy of Neuropsychologists 37(2): 497-512	- Intervention Systematic review with 7/10 studies with interventions which did not target specific aspects of cognition. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Novakovic-Agopian, T. (2015) Executive function training in veterans with chronic TBI: Short and longer term outcomes. Archives of Physical Medicine and Rehabilitation 96(10): e82	- Publication type Conference abstract.
Novakovic-Agopian, T., Abrams, G., Chen, A. et al. (2014) Goal-oriented executive function training in veterans with chronic TBI: Short and longer term outcomes. Brain Injury 28(56): 819-820	- Publication type Conference abstract.
Novakovic-Agopian, T., Chen, A., Abrams, G. et al. (2012) Goal-oriented attention regulation training in veterans with chronic TBI. Neurology 78(1meetingabstract)	- Publication type Conference abstract.
Novakovic-Agopian, T., Chen, A., Rome, S. et al. (2010) Rehabilitation of executive functioning with training in attention regulation applied to individually defined goals: A pilot study bridging theory, assessment and treatment. Brain Injury 24(3): 436	- Publication type Conference abstract.

Study	Reason for exclusion
Novakovic-Agopian, T., Chen, A.J.-W., Rome, S. et al. (2011) Rehabilitation of executive functioning with training in attention regulation applied to individually defined goals: A pilot study bridging theory, assessment, and treatment. Journal of Head Trauma Rehabilitation 26(5): 325-338	- Publication date Published before 2013.
Novakovic-Agopian, T., Posecion, L., Kornblith, E. et al. (2021) Goal-Oriented Attention Self-Regulation Training Improves Executive Functioning in Veterans with Post-Traumatic Stress Disorder and Mild Traumatic Brain Injury. Journal of Neurotrauma 38(5): 582-592	- Country Study conducted in in the US.
Novakovic-Agopian, Tatjana, Chen, Anthony J-W, Rome, Scott et al. (2011) Rehabilitation of executive functioning with training in attention regulation applied to individually defined goals: a pilot study bridging theory, assessment, and treatment. The Journal of head trauma rehabilitation 26(5): 325-38	- Publication date Published before 2013.
O'Brien, A.R., Chiaravalloti, N., Goverover, Y. et al. (2008) Evidenced-Based Cognitive Rehabilitation for Persons With Multiple Sclerosis: A Review of the Literature. Archives of Physical Medicine and Rehabilitation 89(4): 761-769	- Publication date Published before 2013.
O'Neil, M.E., Cameron, D., Shirley, K. et al. (2021) Change in Learning and Memory Partially Mediates Effects of Compensatory Cognitive Training on Self-Reported Cognitive Symptoms. Journal of Head Trauma Rehabilitation	- Country Study conducted in the US.
O'Neil-Pirozzi, T., Glenn, M., Goldstein, R. et al. (2012) A controlled treatment study of a novel group intervention for memory impairment. Brain Injury 26(45): 369-370	- Publication type Conference abstract.
O'Neil-Pirozzi, T.M., Strangman, G.E., Goldstein, R. et al. (2010) A controlled treatment study of internal memory strategies (I-MEMS) following traumatic brain injury. Journal of Head Trauma Rehabilitation 25(1): 43-51	- Study design (adults) Ineligible study design (non-randomised study).
Ohrvall, A., Hofgren, C., Bergqvist, L. et al. (2021) CO-OP approach improves activity performance and participation in children with cerebral palsy and spina bifida. Developmental Medicine and Child Neurology 63(suppl3): 15-16	- Publication type Conference abstract.
Olivares Perez, T., Bermudez Hernandez, M., Hernandez Perez, M.A. et al. (2018) A randomized trial of cognitive behavioural therapy for improving psychological distress and cognitive impairments in multiple sclerosis. Multiple Sclerosis Journal 24(2supplement): 238-239	- Publication type Conference abstract.
	- Study design Systematic review (adult population) with no included randomised controlled trials. Therefore no studies were checked against protocol.
Oneil-Pirozzi, T.M.; Kennedy, M.R.T.; Sohlberg, M.M. (2016) Evidence-based practice for the use of internal	- Publication date

Study	Reason for exclusion
strategies as a memory compensation technique after brain injury: A systematic review. Journal of Head Trauma Rehabilitation 31(4): e1-e11	Systematic review with 46/46 studies published before 2013. Therefore, no studies checked against protocol.
Orel, Olga (2014) Training of attention in patients with remitting-relapsing multiple sclerosis. Applied Psychology Bulletin 270(62): 59-64	- Country Study conducted in Iran.
Ownby, R. and Acevedo, A. (2021) Cognitive training with and without transcranial direct current stimulation in older adults with HIV-related cognitive deficits: Delayed impact on mood. Brain Stimulation 14(6): 1700	- Publication type Conference abstract.
Ownby, R. and Acevedo, A. (2020) Cognitive training and tDCS in older adults with HIV-associated neurocognitive disorders. Clinical Neurophysiology 131(4): e89	- Publication type Conference abstract.
Ownby, R.L. and Acevedo, A. (2016) Apilot study of cognitive training with and without transcranial direct current stimulation to improve cognition in older persons with HIV-related cognitive impairment. Neuropsychiatric Disease and Treatment 12: 2745-2754	- Country Study conducted in the US.
Ownby, R.L. and Kim, J. (2021) Computer-Delivered Cognitive Training and Transcranial Direct Current Stimulation in Patients With HIV-Associated Neurocognitive Disorder: A Randomized Trial. Frontiers in Aging Neuroscience 13: 766311	- Country Study conducted in the US.
Ownsworth, T., Fleming, J., Tate, R. et al. (2017) Do people with severe traumatic brain injury benefit from making errors? a randomised controlled trial of error-based learning and errorless learning. Brain Impairment 18(3): 342-343	- Publication type Conference abstract.
Ownsworth, T., Fleming, J., Tate, R. et al. (2017) Do People With Severe Traumatic Brain Injury Benefit From Making Errors? A Randomized Controlled Trial of Error-Based and Errorless Learning. Neurorehabilitation and Neural Repair 31(12): 1072-1082	- Intervention Intervention aimed at improving skill generalisation and self-awareness. Not an intervention that fits one of the 7 protocol intervention groups.
Ozkul, C., Guclu-Gunduz, A., Eldemir, K. et al. (2020) Combined exercise training improves cognitive functions in multiple sclerosis patients with cognitive impairment: A single-blinded randomized controlled trial. Multiple Sclerosis and Related Disorders 45: 102419	- Country Study conducted in Turkey.
Pacheco, N., Mollayeva, S., Colantonio, A. et al. (2019) A SYSTEMATIC REVIEW AND META-ANALYSIS OF INTERVENTIONS' EFFECTS ON COGNITION IN ADULTS WITH TRAUMATIC SPINAL CORD INJURIES. Alzheimer's and Dementia 15(7supplement): p1590	- Publication type Conference abstract.
Palm, U., Segmiller, F.M., Epple, A.N. et al. (2016) Transcranial direct current stimulation in children and adolescents: a comprehensive review. Journal of Neural Transmission 123(10): 1219-1234	- Population Systematic review including participants out of protocol (children with psychiatric disorders). No studies checked against protocol criteria as did not include any

Study	Reason for exclusion
	participants with chronic neurological disorders included in protocol.
Panerai, S, Tasca, D, Musso, S et al. (2016) Group intensive cognitive activation in patients with major or mild neurocognitive disorder. Frontiers in behavioral neuroscience 10(febnopagination)	- Study design (adults) Ineligible study design (non-randomised study).
Paris, A.P., Saleta, H.G., de la Cruz Crespo Maraver, M. et al. (2011) Blind randomized controlled study of the efficacy of cognitive training in Parkinson's disease. Movement Disorders 26(7): 1251-1258	- Publication date Published before 2013.
Parisi, L., Rocca, M.A., Copetti, M. et al. (2013) Modifications of functional connectivity of the anterior cingulum correlate with medium-term effects of cognitive rehabilitation in patients with multiple sclerosis. Journal of Neurology 260(suppl1): 58-s59	- Publication type Conference abstract.
Parisi, L., Rocca, M.A., Mattioli, F. et al. (2013) Changes in brain resting state functional connectivity predict the persistence of cognitive rehabilitation effects in patients with multiple sclerosis. Multiple Sclerosis 19(11suppl1): 554-555	- Publication type Conference abstract.
Parisi, L., Rocca, M.A., Valsasina, P. et al. (2012) Cognitive rehabilitation modulates the functional connectivity of the anterior cingulate cortex in patients with multiple sclerosis. Journal of Neurology 259(1suppl1): 212	- Publication date Published before 2013.
Parisi, L., Rocca, M.A., Valsasina, P. et al. (2014) Cognitive rehabilitation correlates with the functional connectivity of the anterior cingulate cortex in patients with multiple sclerosis. Brain Imaging and Behavior 8(3): 387-393	- Outcomes No relevant outcomes. Reports measures of brain activity.
Park, H.Y.; Maitra, K.; Martinez, K.M. (2015) The Effect of Occupation-based Cognitive Rehabilitation for Traumatic Brain Injury: A Meta-analysis of Randomized Controlled Trials. Occupational therapy international 22(2): 104-116	- Publication date Systematic review with 9/9 studies published before 2013. Therefore, no studies checked against protocol
Pedulla, L., Tacchino, A., Vassallo, C. et al. (2015) Adaptive versus non-adaptive cognitive rehabilitation training based on working memory: Effects on people with multiple sclerosis. Multiple Sclerosis 21(4): 507-508	- Publication type Conference abstract.
Pelosin, E., Ponte, C., Putzolu, M. et al. (2021) Motor-Cognitive Treadmill Training With Virtual Reality in Parkinson's Disease: The Effect of Training Duration. Frontiers in Aging Neuroscience 13: 753381	- Study design (adults) Not comparative - follow-up data for one arm of larger multi-arm randomised controlled trial.
Pena, J., Ibarretxe-Bilbao, N., Garcia-Gorostiaga, I. et al. (2014) Improving functional disability and cognition in parkinson disease randomized controlled trial. Neurology 83(23): 2167-2174	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Penati, R.; Schieppati, M.; Nardone, A. (2020) Cognitive performance during gait is worsened by overground but enhanced by treadmill walking. Gait and Posture 76: 182-187	- Population Only included healthy participants/no people with a chronic neurological disorder were included.

Study	Reason for exclusion
Penner, I.-K. (2018) Potential of exercise and cognitive training. Multiple Sclerosis Journal 24(2supplement): 38	- Publication type Conference abstract.
Pennington, D.L., Cano, M.T., Harris, E. et al. (2021) Exercise and virtual reality working memory training impact cognition among heavy drinking veterans with traumatic brain injury: A pilot randomized controlled trial. Alcoholism: Clinical and Experimental Research 45(suppl1): 256a	- Publication type Conference abstract.
Pennington, D.L., Reavis, J.V., Cano, M.T. et al. (2022) The Impact of Exercise and Virtual Reality Executive Function Training on Cognition Among Heavy Drinking Veterans With Traumatic Brain Injury: A Pilot Feasibility Study. Frontiers in Behavioral Neuroscience 16: 802711	- Country Study conducted in the US.
Peny-Dahlstrand, M., Hofgren, C., Lindquist, B. et al. (2022) The Cognitive Orientation to daily Occupational Performance (CO-OP) Approach is superior to ordinary treatment for achievement of goals and transfer effects in children with cerebral palsy and spina bifida - a randomized controlled trial. Disability and rehabilitation: 1-10	- Population Population outside scope of protocol: 71% of participants had cerebral palsy.
Pereira, A.P.S., Marinho, V., Gupta, D. et al. (2019) Music Therapy and Dance as Gait Rehabilitation in Patients With Parkinson Disease: A Review of Evidence. Journal of Geriatric Psychiatry and Neurology 32(1): 49-56	- Intervention Systematic review with studies investigating gait rehabilitation and not specifically targeting any aspects of cognition. Therefore no studies were checked against protocol criteria.
Perez Martin, M.Y., Gonzalez Platas, M., Eguia Del Rio, P. et al. (2016) Randomized, blinded, controlled study to assess the efficacy of a cognitive training program in patients with multiple sclerosis (MS). Multiple Sclerosis 22(supplement3): 701-702	- Publication type Conference abstract.
Petrelli, A., Kaesberg, S., Barbe, M.T. et al. (2015) Cognitive training in Parkinson's disease reduces cognitive decline in the long term. European Journal of Neurology 22(4): 640-647	- Outcomes No relevant outcomes reported. Reports measures of overall cognitive function/presence of cognitive impairment.
Piccardi, L, Nico, D, Bureca, I et al. (2006) Efficacy of visuo-spatial training in right-brain damaged patients with spatial hemineglect and attention disorders. Cortex; a journal devoted to the study of the nervous system and behavior 42(7): 973-982	- Publication date Published before 2013.
Picelli, A, Varalta, V, Melotti, C et al. (2016) Effects of treadmill training on cognitive and motor features of patients with mild to moderate Parkinson's disease: a pilot, single-blind, randomized controlled trial. Functional neurology 31(1): 25-31	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Piil, K, Juhler, M, Jakobsen, J et al. (2016) Controlled rehabilitative and supportive care intervention trials in patients with high-grade gliomas and their caregivers: a systematic review. BMJ supportive & palliative care 6(1): 27-34	- Publication date Systematic review with all included studies published before 2013. Therefore no studies checked against protocol.
Pilloni, G., Coghe, G., Porta, M. et al. (2019) Combined physical activity and transcranial direct current	- Publication type

Study	Reason for exclusion
stimulation reduce dual task cost of gait in people with multiple sclerosis. Multiple Sclerosis Journal 25(7): 1055	Conference abstract.
Pilloni, G., Shaw, M., Sherman, K. et al. (2020) Manual dexterity improves with cognitive remediation in relapsing but not in progressive multiple sclerosis. Multiple Sclerosis Journal 26(3suppl): 639-640	- Publication type Conference abstract.
Pimentel Piemonte, M.E., Mendes, F., Pompeu, J.E. et al. (2011) Improvement of gait, functional and cognitive performance in patients with parkinson's disease after motor and cognitive training. Physiotherapy (United Kingdom) 97(suppl1): es1002	- Publication type Conference abstract.
Plechata, A.; Nekovarova, T.; Fajnerova, I. (2021) What is the future for immersive virtual reality in memory rehabilitation? A systematic review. NeuroRehabilitation 48(4): 389-412	- Population Systematic review including participants out of protocol (adults with stroke). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Plzakova, V.; Enstrom, D.; Nikolai, T. (2019) The efficiency of group cognitive rehabilitation to patients with Parkinson's disease in comparison to relaxation therapy: Pilot data. Movement Disorder 34(supplement2): 895	- Publication type Conference abstract.
Pompeu, J.E., Mendes, F.A., Silva, K.G. et al. (2012) Functional improvement in patients with Parkinson's disease after balance and cognitive training in real or virtual environments. Movement Disorders 27(suppl1): 134-s135	- Publication type Conference abstract.
Pompeu, J.E., Mendes, F.A.D.S., Silva, K.G.D. et al. (2012) Effect of Nintendo WiiTMBased motor and cognitive training on activities of daily living in patients with Parkinson's disease: A randomised clinical trial. Physiotherapy (United Kingdom) 98(3): 196-204	- Publication date Published before 2013.
Pompeu, J.E., Silva, K.G., Freitas, T.B. et al. (2016) Effect of European physiotherapy guideline for Parkinson's disease and Microsoft Kinect adventures games training on postural control, cognition and quality of life: Randomized clinical trial. Movement Disorders 31(supplement2): 184	- Publication type Conference abstract.
Pottgen, J., Friede, T., Lau, S. et al. (2022) Managing neuropsychological impairment in multiple sclerosis - Controlled study on a standardized metacognitive intervention (MaTiMS). Multiple Sclerosis and Related Disorders 59: 103687	- Study design (adults) Ineligible study design (non-randomised study).
Powell, L.E., Glang, A., Ettel, D. et al. (2012) Systematic instruction for individuals with acquired brain injury: Results of a randomised controlled trial. Neuropsychological Rehabilitation 22(1): 85-112	- Country Study conducted in the US.
Preminger, S., Eliav, R., Blumenfeld, B. et al. (2016) Cognitive training with adaptive motion-based video games for improving executive functions following acquired brain injury. Archives of Physical Medicine and Rehabilitation 97(10): e56	- Publication type Conference abstract.

Study	Reason for exclusion
Pritchett, K., Pritchett, R.C., Stark, L. et al. (2019) Effect of Vitamin D supplementation on 25(OH)D Status in elite athletes with spinal cord injury. International Journal of Sport Nutrition and Exercise Metabolism 29(1): 18-23	- Country Study conducted in the US.
Prochazkova, M., Tintera, J., Spanhelova, S. et al. (2021) Brain activity changes following neuroproprioceptive "facilitation, inhibition" physiotherapy in multiple sclerosis: a parallel group randomized comparison of two approaches. European journal of physical and rehabilitation medicine 57(3): 356-365	- Outcomes No relevant outcomes reported. Reports measures of brain activity.
Prouskas, S.E., Chiaravalloti, N.D., Kant, N. et al. (2019) Cognitive rehabilitation in patients with advanced progressive multiple sclerosis: Possible within limits?. Multiple Sclerosis Journal 25(supplement2): 85	- Publication type Conference abstract.
Pupikova, M. and Rektorova, I. (2020) Non-pharmacological management of cognitive impairment in Parkinson's disease. Journal of Neural Transmission 127(5): 799-820	- Intervention Systematic review including studies investigating exercise based interventions or cognition based interventions which did not target specific aspects of cognition (11/44 exercise based, 4/44 cognition based). An additional 11/44 studies had an active control that was not in the protocol, 4/44 additional studies with population of Parkinson's disease related mild cognitive impairment or 1/44 with lewy body dementia, 7/44 additional studies published prior to 2013, additional studies were conducted in country not in protocol (2/44 in US, 2/44 in Israel) or did not target specific aspects of cognition 2/44.
Pusswald, G., Mildner, C., Zebenholzer, K. et al. (2014) A neuropsychological rehabilitation program for patients with Multiple Sclerosis based on the model of the ICF. NeuroRehabilitation 35(3): 519-527	- Outcomes No relevant outcomes reported. Outcomes reported are either not global measures of cognitive domains specified in the protocol or there is insufficient information about scales to determine if they are standardised and validated.
Quinn de Launay, K., Cheung, S.T., Riggs, L. et al. (2022) The effect of transcranial direct current stimulation on cognitive performance in youth with persistent cognitive symptoms following concussion: a controlled pilot study. Brain Injury 36(1): 39-51	- Population Ineligible population. Study examines adolescents with cognitive persistent post-concussion symptoms with not details on time since injury provided..
R, Butler (2008) A clinical trial of cognitive remediation with childhood cancer survivors. Pediatric blood & cancer 50(5suppelemt): 8-9	- Publication type Conference abstract.
Rademacher, A., Joisten, N., Proschinger, S. et al. (2020) Cognitive Impairment Impacts Exercise Effects on Cognition in Multiple Sclerosis. Frontiers in Neurology 11: 619500	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.

Study	Reason for exclusion
Radford, K., Lah, S., Thayer, Z. et al. (2012) Improving memory in outpatients with neurological disorders using a group-based training program. Journal of the International Neuropsychological Society 18(4): 738-748	- Publication date Published before 2013.
Radomski, Mary Vining, Anheluk, Mattie, Bartzen, M Penny et al. (2016) Effectiveness of Interventions to Address Cognitive Impairments and Improve Occupational Performance After Traumatic Brain Injury: A Systematic Review. The American journal of occupational therapy : official publication of the American Occupational Therapy Association 70(3): 7003180050p1-9	- Publication date Systematic review with 2/37 studies published at or after 2013 and 35/37 published before 2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Raikes, A.C., Dailey, N.S., Vanuk, J.R. et al. (2020) Improved daytime sleepiness following daily morning blue light therapy is associated with altered resting-state network connectivity. Sleep 43(suppl1): a442	- Publication type Conference abstract.
Rakhimova, M. (2020) A critical review of cognitive rehabilitation effects on cognition and brain in Parkinson's disease. Parkinsonism and Related Disorders 79(supplement1): e125	- Publication type Conference abstract.
Rakic, J., Jantz, T., Davis, R. et al. (2014) Cognitive correlates of abstract reasoning in chronic mild TBI. Archives of Physical Medicine and Rehabilitation 95(10): e62	- Publication type Conference abstract.
Ramio I Torrenta, L.L., Gich, J., Menendez, R. et al. (2010) Efficacy of a cognitive rehabilitation programme: "EM line! project". Multiple Sclerosis 16(10suppl1): 124	- Publication type Conference abstract.
Ramirez-Hernandez, D., Wong, D., Ownsworth, T. et al. (2021) Which training methods are effective for learning new smartphone memory apps after acquired brain injury? A pilot randomized controlled trial comparing trial and error, systematic instruction and error-based learning. Neuropsychological rehabilitation: 1-34	- Population Sample comprised entirely of adults, less than 66% of which are in scope for the guideline. The majority of acquired brain injuries were caused by stroke.
Rantanen, K., Vierikko, E., Eriksson, K. et al. (2020) Neuropsychological group rehabilitation on neurobehavioral comorbidities in children with epilepsy. Epilepsy and Behavior 103: 106386	- Population Ineligible population. Study examines children with epilepsy.
Raskin, S.A., Smith, M.P., Mills, G. et al. (2019) Prospective memory intervention using visual imagery in individuals with brain injury. Neuropsychological rehabilitation 29(2): 289-304	- Country Study conducted in the US.
Raymer, A.M., Roitsch, J., Redman, R. et al. (2018) Critical appraisal of systematic reviews of executive function treatments in TBI. Brain Injury 32(1314): 1601-1611	- Publication date Systematic review with 13/19 included systematic reviews published before 2013. 2/19 were published in 2013 and 4/19 published after 2013. Systematic reviews published 2013 or later were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Recla, M., Molteni, E., Manfredi, V. et al. (2020) Feasibility randomized trial for an intensive memory-	- Population

Study	Reason for exclusion
focused training program for school-aged children with acquired brain injury. Brain Sciences 10(7): 1-20	Does not meet threshold for chronic condition: less than 3 months between injury and assessment.
Reddy, R., Rajan, J., Bagavathula, I.D. et al. (2010) Neurofeedback training to ameliorate deficits of executive functions and quality of life in patients with traumatic brain injury - An Indian perspective. Brain Injury 24(3): 123	- Publication type Conference abstract.
Reitano, M., Dini, M., Ruggiero, F. et al. (2021) Effectiveness of a novel cognitive rehabilitation program based on mindfulness and reminiscence in patients with Parkinson's disease and mild cognitive impairment: A pilot study. Movement Disorder 36(suppl1): 493	- Publication type Conference abstract.
Renner, A., Baetge, S.J., Filser, M. et al. (2019) Non-pharmacological intervention trial for the management of neuropsychological deficits in patients with progressive multiple sclerosis. Multiple Sclerosis Journal 25(supplement2): 795-796	- Publication type Conference abstract.
Renner, Alina, Batge, Sharon Jean, Filser, Melanie et al. (2023) Non-pharmacological randomized intervention trial for the management of neuropsychological symptoms in outpatients with progressive multiple sclerosis. Applied neuropsychology. Adult: 1-13	- Comparator Active comparator not within the same intervention group -cognitive rehabilitation that does not fit any of the 7 interventions in protocol criteria.
Resch, C., Rosema, S., Hurks, P. et al. (2018) Searching for effective components of cognitive rehabilitation for children and adolescents with acquired brain injury: A systematic review. Brain Injury 32(6): 679-692	- Publication date Systematic review with 9/20 studies published 2013 or after, and 11/20 pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Reuter, I., Mehnert, S., Sammer, G. et al. (2012) Efficacy of a multimodal cognitive rehabilitation including psychomotor and endurance training in parkinsons disease. Journal of Aging Research 2012: 235765	- Publication date Published before 2013.
Richard, N.M., Bernstein, L.J., Mason, W.P. et al. (2015) Rehabilitation of cognitive dysfunction in brain tumor patients. Journal of Clinical Oncology 33(15suppl1)	- Publication type Conference abstract.
Richard, N.M., Bernstein, L.J., Mason, W.P. et al. (2016) Cognitive rehabilitation for brain tumor survivors: A pilot study. Journal of Clinical Oncology 34(3suppl1)	- Publication type Conference abstract.
Richard, N.M., Bernstein, L.J., Mason, W.P. et al. (2019) Cognitive rehabilitation for executive dysfunction in brain tumor patients: a pilot randomized controlled trial. Journal of Neuro-Oncology 142(3): 565-575	- Outcomes Outcome measures not validated: composite scores calculated by averaging z scores on multiple measures.
Richard, N.M., Mason, W.P., Shultz, D. et al. (2018) Cognitive rehabilitation in neuro-oncology: Program development and evaluation. Canadian Journal of Neurological Sciences 45(supplement3): 9	- Publication type Conference abstract.

Study	Reason for exclusion
Richter, K.M., Modden, C., Eling, P. et al. (2018) Improving everyday memory performance after acquired brain injury: An RCT on recollection and working memory training. Neuropsychology 32(5): 586-596	- Population Mixed sample comprised entirely of adults of which less than 66% are in scope for this guideline (the majority of acquired brain injuries were caused by stroke) and treatment effects are not reported separately for groups that are in scope.
Richter, K.M., Modden, C., Eling, P. et al. (2015) Working memory training and semantic structuring improves remembering future events, not past events. Neurorehabilitation and Neural Repair 29(1): 33-40	- Population Mixed sample comprised entirely of adults of which less than 66% are in scope for this guideline (the majority of acquired brain injuries were caused by stroke) and treatment effects are not reported separately for groups that are in scope.
Rilo, O., Pena, J., Natalia, O. et al. (2016) Cognitive improvement and functional connectivity changes after integrative group-based cognitive rehabilitation in multiple sclerosis. Multiple Sclerosis 22(supplement3): 41	- Publication type Conference abstract.
Rilo, O., Pena, J., Ojeda, N. et al. (2015) Integrative group-based cognitive rehabilitation efficacy in multiple sclerosis. Multiple Sclerosis 23(11suppl1): 230-231	- Publication type Conference poster.
Robert, P., Manera, V., Derreumaux, A. et al. (2020) Efficacy of a Web App for Cognitive Training (MeMo) Regarding Cognitive and Behavioral Performance in People With Neurocognitive Disorders: Randomized Controlled Trial. Journal of medical Internet research 22(3): e17167	- Outcomes Does not report comparative data (intervention versus control), only reports subgroups of the intervention group in the original randomised controlled trial.
Rocca, M.A., Riccitelli, G., Mattioli, F. et al. (2011) Cognitive rehabilitation and functional brain activity in multiple sclerosis. Journal of Neurology 258(suppl1): 18	- Publication date Published before 2013.
Rodella, C, Bernini, S, Panzarasa, S et al. (2022) A double-blind randomized controlled trial combining cognitive training (CoRe) and neurostimulation (tDCS) in the early stages of cognitive impairment. Aging clinical and experimental research 34(1): 73-83	- Outcomes Insufficient presentation of results (data presented as z statistics, which have been excluded due to concerns about accuracy).
Rodgers, S.H., Schutze, R., Gasson, N. et al. (2019) Modified Mindfulness-Based Cognitive Therapy for Depressive Symptoms in Parkinson's Disease: a Pilot Trial. Behavioural and cognitive psychotherapy 47(4): 446-461	- Intervention Mindfulness-based cognitive therapy designed to reduce psychological distress. Not an intervention that fits one of the 7 protocol intervention groups.
Rodriguez-Rajo, P., Garcia-Rudolph, A., Sanchez-Carrion, R. et al. (2022) Computerized social cognitive training in the subacute phase after traumatic brain injury: A quasi-randomized controlled trial. Applied neuropsychology. Adult: 1-14	- Study design (adults) Non-randomised study.
Rodriguez-Rajo, P., Leno Colorado, D., Ensenat-Cantallops, A. et al. (2018) Rehabilitation of social cognition impairment after traumatic brain injury: A systematic review. Neurologia	- Publication type Non-English language study.

Study	Reason for exclusion
Roelofs, R.L., Wingbermuhle, E., Kessels, R.P. et al. (2019) Social cognitive training for adults with noonan syndrome: A feasibility study. Neuropsychiatric Disease and Treatment 15: 611-626	- Study design (adults) Ineligible study design (non-randomised study).
Roesch, A.D., Gschwandtner, U., Handabaka, I. et al. (2021) Effects of Rhythmic Interventions on Cognitive Abilities in Parkinson's Disease. Dementia and Geriatric Cognitive Disorders 50(4): 372-386	- Study design (adults) Ineligible study design (non-randomised study).
Rohling, M.L., Faust, M.E., Beverly, B. et al. (2009) Effectiveness of Cognitive Rehabilitation Following Acquired Brain Injury: A Meta-Analytic Re-Examination of Cicerone et al.'s (2000, 2005) Systematic Reviews. Neuropsychology 23(1): 20-39	- Publication date Published before 2013.
Roholt, L. (2015) The effects of sensory stimulation-based, re-orientation strategies on patient outcome for brain injured adults with reduced level of consciousness. Neurocritical Care 23(1suppl1): 262	- Publication type Conference abstract.
Rosti-Otajarvi, E.M. and Hamalainen, P.I. (2014) Neuropsychological rehabilitation for multiple sclerosis. Cochrane Database of Systematic Reviews 2014(2): cd009131	- Publication date Systematic review with all included studies published before 2013.Therefore no studies checked against protocol.
Rupp, C.I., Kemmler, G., Kurz, M. et al. (2011) Cognitive remediation therapy in alcohol dependence. Alcohol and Alcoholism 46(suppl1): i55	- Publication type Conference abstract.
Russo, R., Innes-Wong, C.H., Leffman, S. et al. (2020) What are the benefits of robotic-assisted rehabilitation compared to conventional therapy: A randomised controlled cross-over clinical trial in children with acquired brain injury. Developmental Medicine and Child Neurology 62(suppl4): 38	- Publication type Conference abstract.
Saard, M., Pertens, L., Bachmann, M. et al. (2016) Supporting the basic learning skills of children with acquired brain injury: Cognitive neurorehabilitation as a long-term remediation. Brain Injury 30(56): 736	- Publication type Conference abstract.
Sabel, M., Sjolund, A., Broeren, J. et al. (2017) Effects of physically active video gaming on cognition and activities of daily living in childhood brain tumor survivors: A randomized pilot study. Neuro-Oncology Practice 4(2): 98-110	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Sabel, M., Sjolund, A., Broeren, J. et al. (2015) Active video gaming improves motor and process skills in survivors of childhood brain tumors. Pediatric Blood and Cancer 62(supplement4): 307	- Publication type Conference abstract.
Sacco K, Galetto V, Dimitri D et al. (2016) Concomitant Use of Transcranial Direct Current Stimulation and Computer-Assisted Training for the Rehabilitation of Attention in Traumatic Brain Injured Patients: Behavioral and Neuroimaging Results. Frontiers in behavioral neuroscience 10: 57	- Outcomes Not possible to calculate effect sizes from data provided in report.
Sadeghi Bahmani, D., Razazian, N., Alikhani, M. et al. (2018) Work out training, coordination training and an active control condition improved subjective sleep, fatigue and symptoms of depression and anxiety	- Publication type Conference abstract.

Study	Reason for exclusion
among female patients with multiple sclerosis (MS). Multiple Sclerosis Journal 24(2supplement): 955-956	
Sadeghi, M, Kordi, M, Devos, H et al. (2022) VR-Cognitive Games are Complementary to Physical training for an Optimum Rehabilitation Strategy in Multiple Sclerosis. Archives of physical medicine and rehabilitation 103(12): e145-e145	- Publication type Conference abstract.
Sammer, Gebhard, Reuter, Iris, Hullmann, Katharina et al. (2006) Training of executive functions in Parkinson's disease. Journal of the neurological sciences 248(12): 115-9	- Publication date Published before 2013.
Samuelson, K.W., Engle, K., Abadjian, L. et al. (2020) Cognitive Training for Mild Traumatic Brain Injury and Posttraumatic Stress Disorder. Frontiers in Neurology 11: 569005	- Country Study conducted in the US.
Sandroff, B.M.; Johnson, C.L.; Motl, R.W. (2017) Exercise training effects on memory and hippocampal viscoelasticity in multiple sclerosis: a novel application of magnetic resonance elastography. Neuroradiology 59(1): 61-67	- Country Study conducted in the US.
Sandroff, B.M., Wylie, G.R., Baird, J.F. et al. (2021) Effects of walking exercise training on learning and memory and hippocampal neuroimaging outcomes in MS: A targeted, pilot randomized controlled trial. Contemporary Clinical Trials 110: 106563	- Country Study conducted in the US.
Sandroff, B.M., Wylie, G.R., Johnson, C.L. et al. (2016) Treadmill walking exercise training effects on processing speed and thalamic resting-state functional connectivity in multiple sclerosis: A pilot study. Multiple Sclerosis 22(supplement3): 398	- Publication type Conference abstract.
Sandry, J., Chiou, K.S., DeLuca, J. et al. (2016) Individual Differences in Working Memory Capacity Predicts Responsiveness to Memory Rehabilitation After Traumatic Brain Injury. Archives of Physical Medicine and Rehabilitation 97(6): 1026-1029e1	- Country Study conducted in the US.
Santos, F.H., Mosbacher, J.A., Menghini, D. et al. (2021) Effects of transcranial stimulation in developmental neurocognitive disorders: A critical appraisal. Prog. Brain Res. 264: 1-40	- Population Systematic review including participants out of protocol (people with attention-deficit/hyperactivity disorder, developmental dyslexia, and developmental dyscalculia). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Sargenius Landahl, K., Schult, M.-L., Borg, K. et al. (2021) Comparison of attention process training and activity-based attention training after acquired brain injury: A randomized controlled study. Journal of rehabilitation medicine 53(10october): jrm00235	- Population Mixed sample comprised entirely of adults of which less than 66% are in scope for this guideline (the majority of acquired brain injuries were caused by stroke) and treatment effects are not reported separately for groups that are in scope.
Sargenius, Hanna L, Andersson, Stein, Haugen, Ingvild et al. (2023) Cognitive rehabilitation in paediatric	- Comparator

Study	Reason for exclusion
acquired brain injury-A 2-year follow-up of a randomised controlled trial. Frontiers in neurology 14: 1173480	Active comparator (psychoeducation) not within the same intervention group. Not within scope of the comparison groups defined in the protocol
Schirda, B., Duraney, E., Lee, H.K. et al. (2020) Mindfulness training for emotion dysregulation in multiple sclerosis: A pilot randomized controlled trial. Rehabilitation Psychology 65(3): 206-218	- Country Study conducted in the US.
Schmidt, J., Fleming, J., Ownsworth, T. et al. (2013) Video feedback on functional task performance improves self-awareness after traumatic brain injury: A randomized controlled trial. Neurorehabilitation and Neural Repair 27(4): 316-324	- Intervention Video feedback intervention aimed at improving self-awareness. Not an intervention that fits one of the 7 protocol intervention groups.
Schwartz, A.E., Van Walsem, M.R., Brean, A. et al. (2019) Therapeutic Use of Music, Dance, and Rhythmic Auditory Cueing for Patients with Huntington's Disease: A Systematic Review. Journal of Huntington's Disease 8(4): 393-420	- Study design (adults) Systematic review (adult population) with no included randomised controlled trials. Therefore no studies were checked against protocol.
Sciancalepore, F., Tariciotti, L., Remoli, G. et al. (2022) Computer-Based Cognitive Training in Children with Primary Brain Tumours: A Systematic Review. Cancers 14(16): 3879	- Country Systematic review with 1/9 conducted in Sweden, and 8/9 conducted in the US. The Swedish study was already checked for inclusion but excluded due to intervention.
Seebacher, Barbara, Helmlinger, Birgit, Pinter, Daniela et al. (2024) Actual and Imagined Music-Cued Gait Training in People with Multiple Sclerosis: A Double-Blind Randomized Parallel Multicenter Trial. Neurorehabilitation and neural repair: 15459683241260724	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Seguin, M., Lahaie, A., Matte-Gagne, C. et al. (2018) Ready! Set? Let's Train!: Feasibility of an intensive attention training program and its beneficial effect after childhood traumatic brain injury. Annals of Physical and Rehabilitation Medicine 61(4): 189-196	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Shah, M.; Bajaj, B.; Ali, I. (2021) Effect of transcranial direct current stimulation (tDCS) on locomotor function in patients with parkinson's disease. Movement Disorder 36(suppl1): 147-s148	- Publication type Conference abstract.
Shahlapour, S.; Sedaghat, M.; Pashang, S. (2021) Comparison of the effect of lazarus multimodal approach and cognitive-behavioral therapy on psychological distress, working memory, and anxiety in patients with multiple sclerosis. Razavi International Journal of Medicine 9(3): 5-12	- Country Study conducted in Iran.
Shahpouri, M.M., Barekatain, M., Tavakoli, M. et al. (2020) Comparison of cognitive rehabilitation versus donepezil therapy on memory performance, attention, quality of life, and depression among multiple sclerosis patients. Neurology Research International 2020: 8874424	- Country Study conducted in Iran.
Shahpouri, M, Barekatain, M, Tavakoli, M et al. (2019) Evaluation of cognitive rehabilitation on the cognitive performance in multiple sclerosis: a randomized	- Country Study conducted in Iran.

Study	Reason for exclusion
controlled trial. Journal of research in medical sciences 24(1)	
Sharbafshaaer, M., Trojsi, F., Bonavita, S. et al. (2022) Integrated Cognitive Rehabilitation Home-Based Protocol to Improve Cognitive Functions in Multiple Sclerosis Patients: A Randomized Controlled Study. Journal of Clinical Medicine 11(12): 3560	- Country Study conducted in Iran.
Sharifi, A.; Yazdanbakhsh, K.; Momeni, K. (2019) The effectiveness of computer-based cognitive rehabilitation in executive functions in patients with multiple sclerosis. Journal of Kermanshah University of Medical Sciences 23(1): e83092	- Country Study conducted in Iran
Sharma, K., Agarwal, S., Mania, D. et al. (2018) Remotely supervised transcranial direct current stimulation (RSTDCS) to mitigate fatigue and cognitive decline: A novel protocol for Parkinson's disease. Movement Disorders 33(supplement1): 48-s49	- Publication type Conference abstract.
Shatil, E., Metzer, A., Horvitz, O. et al. (2010) Home-based personalized cognitive training in MS patients: A study of adherence and cognitive performance. NeuroRehabilitation 26(2): 143-153	- Publication date Published before 2013.
Shaw, D.R. (2016) A systematic review of pediatric cognitive rehabilitation in the elementary and middle school systems. NeuroRehabilitation 39(1): 119-123	- Publication date Systematic review with 17/18 studies published pre-2013 and 1/18 published 2013 or later. The study published 2013 or later was checked against protocol criteria and was not relevant.
Shaw, M., Dobbs, B., Ladensack, D. et al. (2018) Transcranial direct current stimulation (tDCS) enhances cognitive remediation outcomes in multiple sclerosis: Results from a randomized clinical trial of telerehabilitation with 40 at-home treatment sessions. Multiple Sclerosis Journal 24(2supplement): 521	- Publication type Conference abstract.
Shen, J. (2021) An Innovative Patient-Centered Virtual Reality Intervention for Pediatric TBI Cognitive Rehabilitation: Preliminary Efficacy. Archives of Physical Medicine and Rehabilitation 102(4): e6	- Publication type Conference poster.
Shen, J., Lundine, J.P., Koterba, C. et al. (2022) VR-Based Cognitive Rehabilitation for Children With Traumatic Brain Injuries: Feasibility and Safety. Rehabilitation Psychology	- Country Study conducted in the US.
Shum, D., Fleming, J., Gill, H. et al. (2011) A randomized controlled trial of prospective memory rehabilitation in adults with traumatic brain injury. Journal of rehabilitation medicine : official journal of the UEMS European Board of Physical and Rehabilitation Medicine 43(3): 216-223	- Publication date Published before 2013.
Siciliano, R.E., Thigpen, J.C., Desjardins, L. et al. (2022) Working memory training in pediatric brain tumor survivors after recent diagnosis: Challenges and initial effects. Applied neuropsychology. Child 11(3): 412-421	- Country Study conducted in the US.
Sigmundsdottir, L.; Longley, W.A.; Tate, R.L. (2016) Computerised cognitive training in acquired brain	- Study design (adults)

Study	Reason for exclusion
injury: A systematic review of outcomes using the International Classification of Functioning (ICF). Neuropsychological rehabilitation 26(56): 673-741	Systematic review with 35/96 randomised controlled trials, 31/96 non-randomised controlled trials, 16/96 case series, and 14/96 case studies. Randomised controlled trials which were published 2013 or later, were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Sigurdsson, Hilmar P, Raw, Rachael, Hunter, Heather et al. (2021) Noninvasive vagus nerve stimulation in Parkinson's disease: current status and future prospects. Expert review of medical devices 18(10): 971-984	- Study design (adults) Ineligible study design. Literature review.
Sihvonen, A.J., Siponkoski, S.-T., Martinez-Molina, N. et al. (2022) Neurological Music Therapy Rebuilds Structural Connectome after Traumatic Brain Injury: Secondary Analysis from a Randomized Controlled Trial. Journal of Clinical Medicine 11(8): 2184	- Outcomes Insufficient presentation of results (data presented as r statistics, which have been excluded due to concerns about accuracy).
Silva, J., Pereira, M., Piovesara, L. et al. (2019) The influence of physical activities on cognition in small group of Parkinson's Disease patients. Movement Disorder 34(supplement2): 663	- Publication type Conference abstract
Silva, R., Abrunheiro, S., Cardoso, D. et al. (2018) Effectiveness of multisensory stimulation in managing neuropsychiatric symptoms in older adults with major neurocognitive disorder: A systematic review. JBI Database of Systematic Reviews and Implementation Reports 16(8): 1663-1708	- Population Systematic review including participants out of protocol (adults with dementia and/or Alzheimer disease). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Silva, R., Bobrowicz-Campos, E., Cardoso, D. et al. (2020) Effects of caregiver-provided individual cognitive interventions on cognition, social functioning and quality of life in older adults with major neurocognitive disorders: A systematic review. JBI Evidence Synthesis 18(4): 743-806	- Publication date Systematic review with 3/10 studies published 2013 or after and 7/10 pre-2013. Potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Simani, Leila, Roozbeh, Mahrooz, Shojaei, Maziyar et al. (2022) The effectiveness of anodal tDCS and cognitive training on cognitive functions in multiple sclerosis; a randomized, double-blind, parallel-group study. Multiple sclerosis and related disorders 68: 104392	- Country Study conducted in Iran.
Simone, M., Viterbo, R.G., Margari, L. et al. (2018) Computer-assisted rehabilitation of attention in pediatric multiple sclerosis and ADHD patients: A pilot trial. BMC Neurology 18(1): 82	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Singh, N.; Gugnani, A.; Parasher, R.K. (2022) A Framework for Cognitive Rehabilitation for Cancer Survivor Reporting Cognitive Deficits: A Systematic Review. NeuroQuantology 20(10): 9432-9442	- Country Study conducted in India.
Sjo, N.M., Weidner, S., Spellerberg, S. et al. (2005) Cognitive training in local setting: Two methodological	- Publication type Conference abstract.

Study	Reason for exclusion
versions. Developmental Neurorehabilitation 10(4): 271	
Smallfield, S. and Heckenlaible, C. (2017) Effectiveness of Occupational Therapy Interventions to Enhance Occupational Performance for Adults With Alzheimer's Disease and Related Major Neurocognitive Disorders: A Systematic Review. The American journal of occupational therapy : official publication of the American Occupational Therapy Association 71(5): p1-7105180010	- Population Systematic review including participants out of protocol (adults with Alzheimer's disease). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Smart, C.M., Karr, J.E., Areshenkoff, C.N. et al. (2017) Non-Pharmacologic Interventions for Older Adults with Subjective Cognitive Decline: Systematic Review, Meta-Analysis, and Preliminary Recommendations. Neuropsychology review 27(3): 245-257	- Population Systematic review including participants out of protocol (healthy older adults). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Snowden, T., Ohlhauser, L., Mayoh, B. et al. (2022) TRAIN YOUR BRAIN: A PATIENT-PARTNERED STUDY TO DETERMINE IF THREE-DIMENSIONAL MULTIPLE-OBJECT TRACKING IMPROVES COGNITIVE FUNCTION IN INDIVIDUALS WITH MODERATE TO SEVERE BRAIN INJURY. Journal of Neurotrauma 39(1112): a14-a15	- Publication type Conference abstract.
Son, H.G. and Choi, E.-O. (2018) The Effects of Mindfulness Meditation-Based Complex Exercise Program on Motor and Nonmotor Symptoms and Quality of Life in Patients with Parkinson's Disease. Asian Nursing Research 12(2): 145-153	- Country Study conducted in South Korea.
Sood, Nikita Tuli, Godfrey, Celia, Krasts, Daina et al. (2024) Rehabilitation of Executive Function in Pediatric Traumatic Brain Injury (REPeaT): Outcomes of a pilot randomized controlled trial. Neuropsychology 38(5): 392-402	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Soong, W., Tam, S.F., Man, W.K. et al. (2005) A pilot study on the effectiveness of tele-analogy-based problem-solving training for people with brain injuries. International journal of rehabilitation research. Internationale Zeitschrift fur Rehabilitationsforschung. Revue internationale de recherches de readaptation 28(4): 341-347	- Country Study conducted in Hong Kong.
Sousa, Nariana Mattos Figueiredo, Neri, Ana Cristina da Mata, Brandi, Ivar Viana et al. (2021) Impact of cognitive intervention on cognitive symptoms and quality of life in idiopathic Parkinson's disease: a randomized and controlled study. Dementia & neuropsychologia 15(1): 51-59	- Country Study conducted in Brazil.
Spikman, J.M. (2013) A therapeutic approach to improve self-awareness in brain injury patients with executive dysfunction. Behavioural Neurology 27(3): 330	- Publication type Conference abstract.
Spreij, L.A., Visser-Meily, J.M.A., van Heugten, C.M. et al. (2014) Novel insights into the rehabilitation of memory post acquired brain injury: A systematic review. 8(dec): 993	- Publication date Systematic review with 6/15 studies published 2013 or after, and 9/15 studies pre-2013. Potentially relevant studies

Study	Reason for exclusion
	were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Stablum, F., Umilta, C., Mazzoldi, M. et al. (2007) Rehabilitation of endogenous task shift processes in closed head injury patients. Neuropsychological Rehabilitation 17(1): 1-33	- Publication date Published before 2013.
Stanmore, E., Stubbs, B., Vancampfort, D. et al. (2017) The effect of active video games on cognitive functioning in clinical and non-clinical populations: A meta-analysis of randomized controlled trials. Neuroscience and Biobehavioral Reviews 78: 34-43	- Population Systematic review including participants out of protocol (healthy adults, adults with cognitive impairments, adults with schizophrenia No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Storzbach, D., Twamley, E.W., Roost, M.S. et al. (2017) Compensatory cognitive training for operation enduring freedom/operation iraqi freedom/operation new dawn veterans with mild traumatic brain injury. Journal of Head Trauma Rehabilitation 32(1): 16-24	- Country Study published in the US.
Straudi, S., Severini, G., Sabbagh Charabati, A. et al. (2017) The effects of video game therapy on balance and attention in chronic ambulatory traumatic brain injury: an exploratory study. BMC neurology 17(1): 86	- Outcomes Not global (n-back reaction times and false answers).
Strouwen, C, Molenaar, EALM, Münks, L et al. (2019) Determinants of Dual-Task Training Effect Size in Parkinson Disease: who Will Benefit Most?. Journal of neurologic physical therapy 43(1): 3-11	- Outcomes No relevant outcomes reported. Reports measures of physical outcomes such as walking performance and correlations with cognition at baseline.
Stuckenschneider, T., Askew, C.D., Meneses, A.L. et al. (2019) The effect of different exercise modes on domain-specific cognitive function in patients suffering from Parkinson's disease: A systematic review of randomized controlled trials. Journal of Parkinson's Disease 9(1): 73-95	- Country Systematic review with 2/11 of the included studies conducted in Canada, 1/11 in Sweden, 1/11 in Italy, 2/11 in US, 1/11 in Japan, 3/11 in Brazil and 1/11 in Taiwan. Studies from Canada, Sweden and Italy were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Studerus-Germann, A.M., Engel, D.C., Stienen, M.N. et al. (2017) Three versus seven days to return-to-work after mild traumatic brain injury: a randomized parallel-group trial with neuropsychological assessment. International Journal of Neuroscience 127(10): 900-908	- Intervention Intervention is a resting intervention. Not an intervention that fits one of the 7 protocol intervention groups.
Stuifbergen, A.K., Becker, H., Perez, F. et al. (2012) A randomized controlled trial of a cognitive rehabilitation intervention for persons with multiple sclerosis. Clinical rehabilitation 26(10): 882-893	- Country Study conducted in the US.
Stuifbergen, A.K., Becker, H., Perez, F. et al. (2018) Computer-assisted cognitive rehabilitation in persons with multiple sclerosis: Results of a multi-site randomized controlled trial with six month follow-up. Disability and Health Journal 11(3): 427-434	- Country Study conducted in the US.

Study	Reason for exclusion
Stürz, K, Hartmann, S, Eder-Pelzer, B et al. (2011) Computer assisted cognitive training advances mood and psychological wellbeing - a comparison to paper pencil training relating to neuropsychological parameters, mood and cognitions. Neuropsychiatrie : Klinik, Diagnostik, Therapie und Rehabilitation 25(2): 85-92	- Publication type Non-English language study.
Suarez-Garcia, D.M.A., Birba, A., Zimerman, M. et al. (2021) Rekindling action language: A neuromodulatory study on parkinson's disease patients. Brain Sciences 11(7): 887	- Country Study conducted in Colombia.
Suarez-Garcia, D.M.A., Grisales-Cardenas, J.S., Zimerman, M. et al. (2020) Transcranial Direct Current Stimulation to Enhance Cognitive Impairment in Parkinson's Disease: A Systematic Review and Meta-Analysis. Frontiers in Neurology 11: 597955	-Country Systematic review with 1/8 of the included studies conducted in Australia, 2/8 in Italy, 1/8 in Spain, 1/8 in US, 1/8 in Taiwan and 2/8 in Brazil. Studies from Australia, Italy and Spain were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Sujatha, B.; Sarumathi, S.; Tinu Priya, R. (2019) Effect of endurance exercise on attention and depression in Parkinson's disease patients-a new approach. International Journal of Research in Pharmaceutical Sciences 10(3): 1592-1595	- Country Study conducted in India.
Svaerke, K.; Loekkegaard, A.; Niemeijer, M. (2019) The Effects of Computer Based Cognitive Rehabilitation on working memory in patients with Parkinson's disease: A Systematic Review. Movement Disorder 34(supplement2): 453-s454	- Publication type Conference abstract.
Svaerke, K.; Niemeijer, M.; Lokkegaard, A. (2020) The Effects of Computer-Based Cognitive Rehabilitation on Working Memory in Patients with Parkinson's Disease: A Systematic Review. Journal of Parkinson's Disease 10(1): 47-57	- Study design (adults) Systematic review with no included randomised controlled trials. Therefore no studies were checked against protocol.
Svaerke, K., Niemeijer, M., Mogensen, J. et al. (2018) The effects of computer based cognitive rehabilitation in patients with visuospatial neglect following stroke, brain tumor, brain injury or operation sequelae: A systematic review. European Stroke Journal 3(1supplement1): 618	- Publication type Conference abstract.
Svaerke, K., Pyke, S.B., Tjoernlund, M. et al. (2022) Effects of computer-based cognitive rehabilitation on working memory in patients with acquired brain injury in the chronic phase, a pilot-study. Brain Injury 36(4): 503-513	- Population Mixed sample comprised entirely of adults of which less than 66% are in scope for this guideline (the majority of acquired brain injuries were caused by stroke) and treatment effects are not reported separately for groups that are in scope.
Tacchino, A., Pedulla, L., Bonzano, L. et al. (2020) Adaptive WM training in MS. Why is it effective? Working memory rehabilitation in MS. Multiple Sclerosis Journal 26(2suppl): 44	- Publication type Conference abstract.

Study	Reason for exclusion
Tatla, S.K., Sauve, K., Jarus, T. et al. (2014) The effects of motivating interventions on rehabilitation outcomes in children and youth with acquired brain injuries: A systematic review. Brain Injury 28(8): 1022-1035	- Publication date Systematic review with 1/10 studies published in 2013 or after and 9/10 published before 2013. The study published in 2013 was did not meet protocol criteria for study design as this was a case study.
Teel, Elizabeth, Brossard-Racine, Marie, Corbin-Berrigan, Laurie-Ann et al. (2021) Perceptual Cognitive Training Does Not Improve Clinical Outcomes at 4 and 12 Weeks Following Concussion in Children and Adolescents: A Randomized Controlled Trial. The Journal of head trauma rehabilitation 36(2): e97-e107	- Outcomes No relevant outcomes reported. Reports measures of concussion and post-concussion symptoms.
Teo, S.H., Fong, K.N.K., Chen, Z. et al. (2020) Cognitive and psychological interventions for the reduction of post-concussion symptoms in patients with mild traumatic brain injury: a systematic review. Brain Injury 34(10): 1305-1321	- Country Study conducted in Singapore.
Terra, M., Barboza, N., De Almeida, I. et al. (2019) Does cognitive-motor training improve the balance in Parkinson's disease? Randomized clinical trial. Movement Disorder 34(supplement2): 274-s276	- Publication type Conference abstract.
Tesar, N.; Bandion, K.; Baumhackl, U. (2005) Efficacy of a neuropsychological training programme for patients with multiple sclerosis - A randomised controlled trial. Wiener Klinische Wochenschrift 117(2122): 747-754	- Publication date Published before 2013.
Thaut, M.H., Peterson, D.A., McIntosh, G.C. et al. (2014) Music mnemonics aid verbal memory and induce learning - Related brain plasticity in multiple sclerosis. Frontiers in Human Neuroscience 8(june): 395	- Country Study conducted in the US.
Thaut, MH, Gardiner, JC, Holmberg, D et al. (2009) Neurologic music therapy improves executive function and emotional adjustment in traumatic brain injury rehabilitation. Annals of the New York Academy of Sciences 1169: 406-416	- Study design (adults) Ineligible study design (non-randomised study).
Theadom, A., Barker-Collo, S., Jones, K.M. et al. (2018) MLC901 (NeuroAiD IITM) for cognition after traumatic brain injury: a pilot randomized clinical trial. European Journal of Neurology 25(8): 1055-e82	- Intervention Intervention is a pharmaceutical intervention. Not an intervention that fits one of the 7 protocol intervention groups.
Thiagarajan, P. and Ciuffreda, K.J. (2014) Effect of oculomotor rehabilitation on accommodative responsivity in mild traumatic brain injury. Journal of Rehabilitation Research and Development 51(2): 175-191	- Study design (adults) Ineligible study design (non-randomised study).
Thiagarajan, P., Ciuffreda, K.J., Capo-Aponte, J.E. et al. (2014) Oculomotor neurorehabilitation for reading in mild traumatic brain injury (mTBI): An integrative approach. NeuroRehabilitation 34(1): 129-146	- Country Study conducted in the US.
Thibaut, A., Ledoux, D., Demertzi, A. et al. (2012) Improvement of consciousness after transcranial direct current stimulation-a sham-controlled double blind study. Brain Injury 26(45): 655	- Publication type Conference abstract.

Study	Reason for exclusion
Thickpenny-Davis, K.L. and Barker-Collo, S.L. (2007) Evaluation of a structured group format memory rehabilitation program for adults following brain injury. Journal of Head Trauma Rehabilitation 22(5): 303-313	- Publication date Published before 2013.
Thomas, R.E., Alves, J., Magalhaes, R. et al. (2017) Systematic review of therapy for concussion and mild brain injury. Canadian Family Physician 63(2supplement1): 94	- Publication type Conference abstract.
Tommasi, G., Fiorio, M., Yelnik, J. et al. (2015) Disentangling the role of cortico-basal ganglia loops in top-down and bottom-up visual attention: An investigation of attention deficits in parkinson disease. Journal of Cognitive Neuroscience 27(6): 1215-1237	- Study design (adults) Not a randomised controlled trial/does not evaluate effectiveness of an intervention.
Tornas, S., Lovstad, M., Solbakk, A.-K. et al. (2016) Rehabilitation of Executive Functions in Patients with Chronic Acquired Brain Injury with Goal Management Training, External Cuing, and Emotional Regulation: A Randomized Controlled Trial. Journal of the International Neuropsychological Society : JINS 22(4): 436-452	- Comparator Active comparator (psychoeducation) not within the same intervention group. Not within scope of the comparison groups defined in the protocol.
Tornas, S., Lovstad, M., Solbakk, A.-K. et al. (2016) Goal Management Training Combined With External Cuing as a Means to Improve Emotional Regulation, Psychological Functioning, and Quality of Life in Patients With Acquired Brain Injury: A Randomized Controlled Trial. Archives of Physical Medicine and Rehabilitation 97(11): 1841-1852	- Comparator Active comparator (psychoeducation) not within the same intervention group. Not within scope of the comparison groups defined in the protocol.
Tornas, S., Lovstad, M., Solbakk, A.-K. et al. (2019) Use It or Lose It? A 5-Year Follow-up Study of Goal Management Training in Patients with Acquired Brain Injury. Journal of the International Neuropsychological Society : JINS 25(10): 1082-1087	- Study design (adults) Non-randomised follow up study.
Tornas, S., Stubberud, J., Solbakk, A.-K. et al. (2019) Moderators, mediators and nonspecific predictors of outcome after cognitive rehabilitation of executive functions in a randomised controlled trial. Neuropsychological rehabilitation 29(6): 844-865	- Outcomes Insufficient presentation of results (data presented as f-statistics).
Torres-Vela, J., Jimenez-Morales, M., Casado-Caballero, V. et al. (2016) Benefits of a cognitive rehabilitation program in relapsingremitting multiple sclerosis patients. Multiple Sclerosis 22(supplement3): 264-265	- Publication type Conference abstract.
Towe, S.L., Hartsock, J.T., Xu, Y. et al. (2021) Web-Based Cognitive Training to Improve Working Memory in Persons with Co-Occurring HIV Infection and Cocaine Use Disorder: Outcomes from a Randomized Controlled Trial. AIDS and behavior 25(5): 1542-1551	- Country Study conducted in the US.
Towe, Sheri L; Patel, Puja; Meade, Christina S (2017) The Acceptability and Potential Utility of Cognitive Training to Improve Working Memory in Persons Living With HIV: A Preliminary Randomized Trial. The Journal of the Association of Nurses in AIDS Care : JANAC 28(4): 633-643	- Country Study conducted in the US.
Tracy, E. and Melhorn, E. (2019) Occupational Therapy's Role in the Management of Non-Motor	- Publication type Conference abstract.

Study	Reason for exclusion
Symptoms in Parkinson's Disease. Archives of Physical Medicine and Rehabilitation 100(12): e215-e216	
Tramontana, M.G., Cowan, R.L., Zald, D. et al. (2014) Traumatic brain injury-related attention deficits: Treatment outcomes with lisdexamfetamine dimesylate (Vyvanse). Brain Injury 28(11): 1461-1472	- Intervention Intervention is a pharmaceutical intervention. Not an intervention that fits one of the 7 protocol intervention groups.
Trung, J., Hanganu, A., Jobert, S. et al. (2018) Transcranial magnetic stimulation increases cognition globally and longitudinally in Parkinson's disease. Movement Disorders 33(supplement2): 569-s570	- Publication type Conference poster.
Trung, Jessica, Hanganu, Alexandru, Jobert, Stevan et al. (2019) Transcranial magnetic stimulation improves cognition over time in Parkinson's disease. Parkinsonism & related disorders 66: 3-8	- Outcomes Insufficient presentation of results (data presented as z statistics, which have been excluded due to concerns about accuracy).
Tsaousides, T. (2011) Integrating problem solving and emotional regulation skills in a day treatment program for individuals with traumatic brain injury. Brain Impairment 12(suppl1): 50	- Publication type Conference abstract.
Twamley, E.W., Jak, A.J., Delis, D.C. et al. (2014) Cognitive symptom management and rehabilitation therapy (CogSMART) for veterans with traumatic brain injury: Pilot randomized controlled trial. Journal of Rehabilitation Research and Development 51(1): 59-70	- Country Study conducted in the US.
Twamley, E.W., Thomas, K.R., Gregory, A.M. et al. (2015) CogSMART compensatory cognitive training for traumatic brain injury: Effects over 1 year. Journal of Head Trauma Rehabilitation 30(6): 391-401	- Country Study conducted in the US.
Vaia, S., Iavarone, A., Moschiano, F. et al. (2022) Computer-aided cognitive training in patients with neurocognitive vascular impairment: effects on cognition, depression and behavior. Journal of Gerontology and Geriatrics 70(2): 99-104	- Population Did not include patients under 18 years, and vascular neurocognition in adults is out of scope.
Vakili, Alexandra and Langdon, Robyn (2016) Cognitive rehabilitation of attention deficits in traumatic brain injury using action video games: a controlled trial.	- Outcomes Insufficient presentation of results (No standard deviations reported).
Van 'T Hooft, I., Andersson, K., Bergman, B. et al. (2007) Sustained favorable effects of cognitive training in children with acquired brain injuries. NeuroRehabilitation 22(2): 109-116	- Publication date Published before 2013.
Van Balkom, T., Berendse, H., Werf, Y.V.D. et al. (2020) The cognitive training in Parkinson study (COGTIPS), a randomized controlled trial. Movement Disorders 35(suppl1): 428-s429	- Publication type Conference abstract.
van Balkom, T.D., Berendse, H.W., van der Werf, Y.D. et al. (2022) Effect of eight-week online cognitive training in Parkinson's disease: A double-blind, randomized, controlled trial. Parkinsonism and Related Disorders 96: 80-87	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
van Balkom, T.D., van den Heuvel, O.A., Berendse, H.W. et al. (2022) Eight-week multi-domain cognitive training does not impact large-scale resting-state brain	- Outcomes

Study	Reason for exclusion
networks in Parkinson's disease. NeuroImage: Clinical 33: 102952	No relevant outcomes reported. Reports measures of brain network connectivity and topology.
van Balkom, Tim D, van den Heuvel, Odile A, Berendse, Henk W et al. (2023) Long-term effects of cognitive training in Parkinson's disease: A randomized, controlled trial. Clinical parkinsonism & related disorders 9: 100204	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Van De Weijer, S.C.F., Duits, A.A., Bloem, B.R. et al. (2020) Feasibility of a Cognitive Training Game in Parkinson's Disease: The Randomized Parkin'Play Study. European Neurology 83(4): 426-432	- Outcomes Outcome measures not validated: composite scores calculated by averaging z scores on multiple measures.
van de Wouw, C L, Visser, M, Gorter, J W et al. (2024) Systematic review of the effectiveness of innovative, gamified interventions for cognitive training in paediatric acquired brain injury. Neuropsychological rehabilitation 34(2): 268-299	- Study design (CYP) Systematic review with 3/7 randomised controlled trials, 2/7 single-group pilot studies, and 2/7 case studies. Randomised controlled trials, which were published 2013 or after were checked against protocol criteria and had been separately located by the literature search and screened.
van der Linden, S.D., Rutten, G.-J.M., Dirven, L. et al. (2021) eHealth cognitive rehabilitation for brain tumor patients: results of a randomized controlled trial. Journal of Neuro-Oncology 154(3): 315-326	- Outcomes Insufficient presentation of results (No standard deviations reported).
Van Der Vaart, T., Overwater, I.E., Oostenbrink, R. et al. (2015) Treatment of cognitive deficits in genetic disorders: A systematic review of clinical trials of diet and drug treatments. JAMA Neurology 72(9): 1052-1060	- Publication date Systematic review with all included studies published before 2013. Therefore no studies checked against protocol.
Van Heugten, C.; Wolters Gregorio, G.; Wade, D. (2012) Evidence-based cognitive rehabilitation after acquired brain injury: A systematic review of content of treatment. Neuropsychological Rehabilitation 22(5): 653-673	- Publication date Published before 2013.
Van Hout, M.S.E., Wekking, E.M., Berg, I.J. et al. (2008) Psychosocial and cognitive rehabilitation of patients with solvent-induced chronic toxic encephalopathy: A randomised controlled study. Psychotherapy and Psychosomatics 77(5): 289-297	- Publication date Published before 2013.
Van Pelt, Amelia E, Lipow, Matthew I, Scott, J Cobb et al. (2020) Interventions for Children with Neurocognitive Impairments in Resource-Limited Settings: A Systematic Review. Children and youth services review 118	- Country Systematic review with all included studies conducted in low/middle income countries.
Van Vleet, T., Bonato, P., Fabara, E. et al. (2020) Alertness Training Improves Spatial Bias and Functional Ability in Spatial Neglect. Annals of Neurology 88(4): 747-758	- Country Study conducted in the US.
Van't Hooft, I., Andersson, K., Bergman, B. et al. (2005) Beneficial effect from a cognitive training programme on children with acquired brain injuries demonstrated in a controlled study. Brain Injury 19(7): 511-518	- Publication date Published before 2013.

Study	Reason for exclusion
Vance, D.E., Fazeli, P.L., Azuero, A. et al. (2021) Can Individualized-Targeted Computerized Cognitive Training Benefit Adults with HIV-Associated Neurocognitive Disorder? The Training on Purpose Study (TOPS). AIDS and behavior 25(12): 3898-3908	- Country Study conducted in the US.
Vance, D.E., Fazeli, P.L., Cheatwood, J. et al. (2018) Can HIV-associated neurocognitive disorder (HAND) be treated with computerized cognitive training? Evidence from a systematic review. Antiviral Therapy 23(supplement1): a68	- Publication type Conference abstract.
Vance, D.E., Fazeli, P.L., Cheatwood, J. et al. (2019) Computerized Cognitive Training for the Neurocognitive Complications of HIV Infection: A Systematic Review. The Journal of the Association of Nurses in AIDS Care : JANAC 30(1): 51-72	- Population Systematic review including participants out of protocol (studies examined people with neurocognitive complications of HIV infection). No studies checked against protocol criteria as did not include any participants with chronic neurological disorders included in protocol.
Vance, David E, Pope, Caitlin N, Fazeli, Pariya L et al. (2022) A Randomized Clinical Trial on the Impact of Individually Targeted Computerized Cognitive Training on Quality of Life Indicators in Adults With HIV-Associated Neurocognitive Disorder in the Southeastern United States. The Journal of the Association of Nurses in AIDS Care : JANAC 33(3): 295-310	- Country Study conducted in the US.
Vannorsdall, T.D., Venkatesan, A., Courtney, S. et al. (2015) Reducing mental fatigue and improving working memory in multiple sclerosis with transcranial direct current stimulation (tDCS): A pilot study. Annals of Neurology 78(suppl19): 21-s22	- Publication type Conference abstract.
Vanuk, J.R., Shane, B.R., Bajaj, S. et al. (2017) Short-wavelength light therapy as a way of improving sleep, cognition, and functional connectivity following a mild traumatic brain injury. Sleep 40(supplement1): a437	- Publication type Conference abstract.
Varalta, V., Poiese, P., Recchia, S. et al. (2021) Physiotherapy versus consecutive physiotherapy and cognitive treatment in people with Parkinson's disease: A pilot randomized cross-over study. Journal of Personalized Medicine 11(8): 687	- Study design (adults) Crossover randomised trial in patients with Parkinson's disease, with results from the first period of the interventions not reported separately.
Vardy, J.L., Pond, G.R., Bell, M.L. et al. (2022) A randomised controlled trial evaluating two cognitive rehabilitation approaches for cancer survivors with perceived cognitive impairment. Journal of cancer survivorship : research and practice	- Population Ineligible population. Study examines adult cancer survivors (breast, colorectal, gyneacological) with cognitive symptoms. Not relevant according to procotol population criteria.
Vas, A., Chapman, S., Krawczyk, D. et al. (2010) Executive control training to enhance frontal plasticity in traumatic brain injury. Brain Injury 24(3): 207-208	- Publication type Conference abstract.
Vas, A.K., Chapman, S.B., Cook, L.G. et al. (2011) Higher-order reasoning training years after traumatic brain injury in adults. Journal of Head Trauma Rehabilitation 26(3): 224-239	- Publication date Published before 2013.
Vazquez-Marrufo, M., Galvao-Carmona, A., Borges, M. et al. (2014) Neuropsychological and	- Publication type

Study	Reason for exclusion
neurophysiological assessment of a cognitive rehabilitation program for multiple sclerosis patients. Multiple Sclerosis 20(1suppl1): 427	Conference abstract.
Vd Weijer, S., Kuijf, M., Duits, A. et al. (2018) Feasibility of a health game on cognition in Parkinson's disease: Interim analyses of the Parkin'Play Study. Movement Disorders 33(supplement2): 588	- Publication type Conference abstract.
Ventura, M.I., Ross, J.M., Lanni, K.E. et al. (2015) Improving cognitive functioning and quality of life through Dance for PD: A pilot intervention trial. Movement Disorders 30(suppl1): 351	- Publication type Conference abstract
Vilou, I., Bakirtzis, C., Artemiadis, A. et al. (2020) Computerized cognitive rehabilitation for treatment of cognitive impairment in multiple sclerosis: An explorative study. Journal of Integrative Neuroscience 19(2): 341-347	- Outcomes Data provided are not sufficient/clear enough to extract effect sizes.
Virk, S., Williams, T., Brunsdon, R. et al. (2015) Cognitive remediation of attention deficits following acquired brain injury: A systematic review and meta-analysis. NeuroRehabilitation 36(3): 367-377	- Publication date Systematic review with all included studies published before 2013. Therefore no studies checked against protocol.
Vlagsma, T.T., Duits, A.A., Dijkstra, H.T. et al. (2020) Effectiveness of ReSET; a strategic executive treatment for executive dysfunctioning in patients with Parkinson's disease. Neuropsychological rehabilitation 30(1): 67-84	- Comparator Active comparator not within same protocol group.
Voelbel, G.T., Lindsey, H.M., Mercuri, G. et al. (2021) The effects of neuroplasticity-based auditory information processing remediation in adults with chronic traumatic brain injury. NeuroRehabilitation 49(2): 267-278	- Country Study conducted in the US.
Vogt, A., Kappos, L., Calabrese, P. et al. (2009) Working memory training in patients with multiple sclerosis - Comparison of two different training schedules. Restorative Neurology and Neuroscience 27(3): 225-235	- Study design (adults) Ineligible study design (non-randomised study).
Vogt, A, Kappos, L, Stocklin, M et al. (2008) BrainStim - Evaluation of a new computerised working memory training tool for MS-patients. Neurologie und rehabilitation 14(2): 93-101	- Paper unavailable Not available in English language.
Vostry, M.; Fischer, S.; Lankova, B. (2020) The Effect of combined therapy on the support and development of social skills of people with multiple sclerosis in senior age. Neuroendocrinology Letters 41(5): 270-274	- Study design (adults) Ineligible study design (non-randomised study).
Vriend, C., van Balkom, T.D., Berendse, H.W. et al. (2021) Cognitive Training in Parkinson's Disease Induces Local, Not Global, Changes in White Matter Microstructure. Neurotherapeutics 18(4): 2518-2528	- Outcomes No relevant outcomes reported. Reports measures of structural changes in the brain.
Wade, S.L., Kaizar, E.E., Narad, M. et al. (2018) Online family problem-solving treatment for pediatric traumatic brain injury. Pediatrics 142(6): e20180422	- Country Study conducted in the US.
Wade, S.L., Kurowski, B.G., Kirkwood, M.W. et al. (2015) Online problem-solving therapy after traumatic brain injury: A randomized controlled trial. Pediatrics 135(2): e487-e495	- Country Study conducted in the US.

Study	Reason for exclusion
Wade, S.L., Taylor, H.G., Yeates, K.O. et al. (2018) Online Problem Solving for Adolescent Brain Injury: A Randomized Trial of 2 Approaches. Journal of developmental and behavioral pediatrics : JDBP 39(2): 154-162	- Country Study conducted in the US.
Wade, S.L., Walz, N.C., Carey, J. et al. (2012) A Randomized trial of teen online problem solving: Efficacy in improving caregiver outcomes after brain injury. Health Psychology 31(6): 767-776	- Country Study conducted in the US.
Wade, S.L., Walz, N.C., Carey, J. et al. (2010) A randomized trial of teen online problem solving for improving executive function deficits following pediatric traumatic brain injury. Journal of Head Trauma Rehabilitation 25(6): 409-415	- Publication date Published before 2013.
Wade, Shari L, Narad, Megan E, Moscato, Emily L et al. (2020) A Survivor's Journey: Preliminary efficacy of an online problem-solving therapy for survivors of pediatric brain tumor. Pediatric blood & cancer 67(2): e28043	- Country Study conducted in the US.
Waid-Ebbs, J Kay, Wen, Pey-Shan, Grimes, Tyler et al. (2023) Executive function improvement in response to meta-cognitive training in chronic mTBI / PTSD. Frontiers in rehabilitation sciences 4: 1189292	- Country Study conducted in the US.
Walter, K.H.; Jak, A.J.; Twamley, E.W. (2015) Psychiatric comorbidity effects on compensatory cognitive training outcomes for veterans with traumatic brain injuries. Rehabilitation Psychology 60(3): 303-308	- Country Study conducted in the US.
Walton, C.C., Mowszowski, L., Gilat, M. et al. (2018) Cognitive training for freezing of gait in Parkinson's disease: a randomized controlled trial. npj Parkinson's Disease 4(1): 15	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Walton, C.C., Mowszowski, L., Shine, J.M. et al. (2016) A double-blind randomized controlled trial of cognitive training for freezing of gait in Parkinson's disease. Movement Disorders 31(supplement2): 694-s695	- Publication type Conference abstract.
Wang, Kai, Li, Kunbin, Zhang, Peiming et al. (2021) Mind-Body Exercises for Non-motor Symptoms of Patients With Parkinson's Disease: A Systematic Review and Meta-Analysis. Frontiers in aging neuroscience 13: 770920	- Country Systematic review with 3/14 studies conducted in China, 6/14 in the US, 1/14 in Korea, 1/14 in Canada, and 3/14 in Italy. Canadian and Italian studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Wang, L.-L., Sun, C.-J., Wang, Y. et al. (2022) Effects of dance therapy on non-motor symptoms in patients with Parkinson's disease: a systematic review and meta-analysis. Aging Clinical and Experimental Research 34(6): 1201-1208	- Country Systematic review with 3/10 studies conducted in Korea, 1/10 in Japan, 1/10 in China, 1/10 in the US, 1/10 in the UK, 2/10 in Italy, and 1/10 in Canada. Italian, UK, and Canadian studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.

Study	Reason for exclusion
Wang, R., Zhou, H., Wang, Y.-C. et al. (2022) Benefits of Tai Chi Quan on neurodegenerative diseases: A systematic review. Ageing research reviews: 101741	- Country Study conducted in China
Wang, Y., Zhang, Q., Li, F. et al. (2022) Effects of tai chi and Qigong on cognition in neurological disorders: A systematic review and meta-analysis. Geriatric nursing (New York, N.Y.) 46: 166-177	- Population Systematic review including participants who are in protocol (5/40 with Parkinson's disease, 1/40 with traumatic brain injury) and participants who are out of protocol (34/40 with either dementia, MCI or stroke in adults). The 5 studies with population in protocol were conducted in countries out of the protocol (2/5 China, 1/5 Taiwan, 2/5 US).
Wanner, P., Winterholler, M., Gassner, H. et al. (2021) Acute exercise following skill practice promotes motor memory consolidation in Parkinson's disease. Neurobiology of Learning and Memory 178: 107366	- Outcomes No relevant outcomes reported. Reports measures motor function, and self-reported physical activity levels.
Wei, J., Hou, J., Mu, T. et al. (2022) Evaluation of Computerized Cognitive Training and Cognitive and Daily Function in Patients Living with HIV: A Meta-analysis. JAMA Network Open 5(3): e220970	- Country Study conducted in China.
Wei, W, Yi, X, Wu, Z et al. (2021) Acute improvement in the attention network with repetitive transcranial magnetic stimulation in Parkinson's disease. Disability and rehabilitation: 1-9	- Country Study conducted in China.
Weicker, J., Hudl, N., Hildebrandt, H. et al. (2020) The effect of high vs. low intensity neuropsychological treatment on working memory in patients with acquired brain injury. Brain Injury 34(8): 1051-1060	- Population Mixed sample comprised entirely of adults of which less than 66% are in scope for this guideline (the majority of acquired brain injuries were caused by stroke) and treatment effects are not reported separately for groups that are in scope.
Weicker, J., Marichal, E., Hudl, N. et al. (2013) Computerized training of working memory for patients with acquired brain injuries-a randomized controlled trial. Behavioural Neurology 27(3): 371-372	- Publication type Conference abstract.
Wender, C.; Krch, D.; Sandroff, B. (2021) The Preliminary Effects of Aerobic Cycling Training on Cognitive Function in People with Traumatic Brain Injury and Significant Memory Impairment: a Proof-Of-Concept Randomized Controlled Trial. Archives of Physical Medicine and Rehabilitation 102(10): e67-e68	- Publication type Conference abstract.
Wender, C.L.A., Sandroff, B.M., Krch, D. et al. (2021) The preliminary effects of moderate aerobic training on cognitive function in people with TBI and significant memory impairment: a proof-of-concept randomized controlled trial. Neurocase 27(5): 430-435	- Country Study conducted in the US.
Westerhof-Evers, H.J., Visser-Keizer, A.C., Fasotti, L. et al. (2017) Effectiveness of a Treatment for Impairments in Social Cognition and Emotion Regulation (T-ScEmo) after Traumatic Brain Injury: A Randomized Controlled Trial. Journal of Head Trauma Rehabilitation 32(5): 296-307	- Comparator Comparisons target different cognitive domains from each other (T-ScEmo is intervention group 4, Cogniplus is intervention group 1, 3 & 7).

Study	Reason for exclusion
Wong, W.W.-S. and Law, S.P. (2022) Can non-linguistic cognitive stimulation enhance the cognitive and linguistic functions of people with aphasia receiving conversation therapy? Preliminary findings. Aphasiology	- Population Sample was comprised solely of adults with aphasia resulting from stroke (not in scope of this guideline).
Wood, A (2011) Rehabilitation of executive function deficits following acquired brain injury: a randomised controlled trial using Goal Management Training and Implementation Intentions to improve prospective memory. Rehabilitation of executive function deficits following acquired brain injury: a randomised controlled trial using goal management training and implementation intentions to improve prospective memory.: 1-142	- Publication date Published before 2013.
Wood, A., Scott, F., Baylan, S. et al. (2012) Rehabilitation of executive function deficits following acquired brain injury: A randomised controlled trial of goal management training and implementation intentions for the improvement of prospective memory. Brain Injury 26(45): 557	- Publication type Conference abstract.
Wood, A, Scott, F, Baylan, S et al. (2012) Rehabilitation of executive deficits following acquired brain injury: a randomised controlled trial of goal management training and implementation intentions for the improvement of prospective memory. Brain injury 9thworldcongressonbraininjuryoftheinternationalbraininjuryassociationedinburghukconferencepublication: 557	- Publication type Conference abstract.
Wu, C.-C., Xiong, H.-Y., Zheng, J.-J. et al. (2022) Dance movement therapy for neurodegenerative diseases: A systematic review. Frontiers in Aging Neuroscience 14: 975711	- Intervention Systematic review investigating dance-based interventions which did not target specific aspects of cognition. Therefore no studies were checked against protocol criteria.
Wu, C., Xu, Y., Guo, H. et al. (2021) Effects of Aerobic Exercise and Mind-Body Exercise in Parkinson's Disease: A Mixed-Treatment Comparison Analysis. Frontiers in Aging Neuroscience 13: 739115	- Intervention Systematic review with aerobic exercise interventions (treadmill or non-treadmill walking, dance, cycling) as well as yoga and tai chi interventions which did not target specific aspects of cognition. Therefore no studies were checked against protocol criteria.
Wu, Y.-N., Gravel, J., White, M. et al. (2018) Stable recovery during and after 6-week aerobic exercise with limbs blood flow restriction and body cooling in postconcussion syndrome. Neurology 91(23supplement1): 20	- Publication type Conference abstract.
Wu, Y.-N., Gravel, J., White, M. et al. (2018) Effects of the aerobic exercise with limbs compression and body cooling on individuals with post-concussion syndrome. Neurorehabilitation and Neural Repair 32(12): 1073-1074	- Publication type Conference abstract.
Xiang, S., Ji, J.-L., Li, S. et al. (2022) Efficacy and Safety of Probiotics for the Treatment of Alzheimer's Disease, Mild Cognitive Impairment, and Parkinson's	- Population Systematic review including participants who are in protocol (5/11 people with Parkinson's disease) and out of protocol

Study	Reason for exclusion
Disease: A Systematic Review and Meta-Analysis. Frontiers in Aging Neuroscience 14: 730036	(3/11 people with Alzheimer disease, 3/11 people with mild cognitive impairment). Studies including participants with Parkinson's disease were checked against protocol criteria and were not relevant.
Yang, S. (2013) The effect of virtual reality on cognitive function in patients with brain tumor. PM and R 5(9suppl1): 235	- Publication type Conference abstract.
Yang, Seoyon; Chun, Min Ho; Son, Yu Ri (2014) Effect of virtual reality on cognitive dysfunction in patients with brain tumor. Annals of rehabilitation medicine 38(6): 726-33	- Country Study conducted in South Korea.
Yhnell, E., Furby, H., Lowe, R.S. et al. (2020) A randomised feasibility study of computerised cognitive training as a therapeutic intervention for people with Huntington's disease (CogTrainHD). Pilot and Feasibility Studies 6(1): 88	- Outcomes No relevant outcomes reported. Reports measures of feasibility and acceptability.
Yin, Jinling, Liu, Yang, Lyu, Wangang et al. (2023) Tai Ji on Cognitive Function Improvement in Parkinson's Disease: A Meta-Analysis. Journal of integrative neuroscience 22(5): 123	- Country Systematic review with 3/6 studies conducted in the US, 2/6 in China, 1/6 in Korea.
Yoshida, K., Ogawa, K., Mototani, T. et al. (2017) Correlation between flow state and the effects of attention training: Randomized controlled trial of patients with traumatic brain injury. Brain Injury 31(67): 741-742	- Publication type Conference abstract.
Yoshida, K., Ogawa, K., Mototani, T. et al. (2018) Flow experience enhances the effectiveness of attentional training: A pilot randomized controlled trial of patients with attention deficits after traumatic brain injury. NeuroRehabilitation 43(2): 183-193	- Country Study conducted in Japan.
Yuan, W., Treble-Barna, A., Sohlberg, M.M. et al. (2017) Changes in Structural Connectivity Following a Cognitive Intervention in Children with Traumatic Brain Injury. Neurorehabilitation and Neural Repair 31(2): 190-201	- Study design (CYP) Not comparative/no control group - all children with traumatic brain injury received the intervention.
Yusof, Y., Mukari, S.Z.-M.S., Dzulkifli, M.A. et al. (2019) Efficacy of a newly developed auditory-cognitive training system on speech recognition, central auditory processing and cognitive ability among older adults with normal cognition and with neurocognitive impairment. Geriatrics and Gerontology International 19(8): 768-773	- Country Study conducted in Malaysia.
Zare, H (2019) The effect of computerized cognitive rehabilitation on everyday memory function in Multiple Sclerosis patients. Advances in cognitive science 20(4): 1-9	- Publication type Non-English language study.
Zhang, H., Yun, X., Zhang, X. et al. (2016) Efficacy of rehabilitation for impairments of attention. Archives of Physical Medicine and Rehabilitation 97(10): e131-e132	- Publication type Conference poster.
Zhang, Jiongliang, Wu, Minmin, Li, Jinting et al. (2024) Effects of virtual reality-based rehabilitation on cognitive function and mood in multiple sclerosis: A	- Intervention

Study	Reason for exclusion
systematic review and meta-analysis of randomized controlled trials. Multiple sclerosis and related disorders 87: 105643	Systematic review with 6/9 studies investigating virtual reality and computer based exercise games not targeted at improving cognitive function. The 3/9 potentially relevant studies were checked against protocol criteria and were either not relevant or had been separately located by the literature search and screened.
Zhang, Lingling, Lopes, Snehal, Lavelle, Tara et al. (2022) Economic Evaluations of Mindfulness-Based Interventions: a Systematic Review. Mindfulness 13(10): 2359-2378	- Outcomes Systematic review with 28/28 studies reporting outcomes from cost-analysis, which are not relevant protocol outcomes. Therefore, no studies were checked against protocol criteria.
Zhang, Q., Hu, J., Wei, L. et al. (2019) Effects of dance therapy on cognitive and mood symptoms in people with Parkinson's disease: A systematic review and meta-analysis. Complementary therapies in clinical practice 36: 12-17	- Publication type Conference poster.
Zhang, S., Liu, D., Ye, D. et al. (2017) Can music-based movement therapy improve motor dysfunction in patients with Parkinson's disease? Systematic review and meta-analysis. Neurological Sciences 38(9): 1629-1636	- Publication date Systematic review with 10/11 studies published pre-2013 and 1/11 study published 2013 or later. The study published 2013 or later was checked against protocol criteria but was not relevant.
Zhou, JW, Zhang, AR, Qiu, L et al. (2014) Cognitive impairment in earthquake brain injury treated with comprehensive program of acupuncture and rehabilitation: a randomized controlled trial. Zhongguo zhen jiu [Chinese acupuncture & moxibustion] 34(2): 105-109	- Publication type Non-English language study.
Zhou, L., Huang, X., Li, H. et al. (2021) Rehabilitation effect of rTMS combined with cognitive training on cognitive impairment after traumatic brain injury. American Journal of Translational Research 13(10): 11711-11717	- Country Study conducted in China.
Zhu, L, Song, W-Q, Yue, Y-H et al. (2011) Effect of computer-assisted cognitive training on the cognitive function and depression in patients with brain injury. Chinese journal of cerebrovascular diseases 8(10): 508-512	- Publication type Non-English language study.
Zimmer, P., Bloch, W., Schenk, A. et al. (2018) High-intensity interval exercise improves cognitive performance and reduces matrix metalloproteinases-2 serum levels in persons with multiple sclerosis: A randomized controlled trial. Multiple Sclerosis Journal 24(12): 1635-1644	- Intervention Exercise intervention that does not specifically target any aspects of cognition. Not an intervention that fits one of the 7 protocol intervention groups.
Zimmermann, R., Gschwandtner, U., Benz, N. et al. (2014) Cognitive training in Parkinson disease: Cognition-specific vs nonspecific computer training. Neurology 82(14): 1219-1226	- Comparator Active comparator that was not within scope of the comparison groups defined in the protocol.
Zoccolotti, P., Cantagallo, A., De Luca, M. et al. (2011) Selective and integrated rehabilitation programs for	- Publication date Published before 2013.

Study	Reason for exclusion
disturbances of visual/spatial attention and executive function after brain damage: A neuropsychological evidence-based review. European Journal of Physical and Rehabilitation Medicine 47(1): 123-147	
Zucchella, C., Capone, A., Codella, V. et al. (2013) Cognitive rehabilitation for early post-surgery inpatients affected by primary brain tumor: A randomized, controlled trial. Journal of Neuro-Oncology 114(1): 93-100	- Population Post-neurosurgical patients admitted to unit and enrolled in study within 3 weeks of surgery. Doesn't meet guideline definition fof chronic condition (over 3 months).

Excluded economic studies

See Supplement 2 for the list of excluded studies across all reviews.

Appendix K Research recommendations – full details

Research recommendations for review question: What is the effectiveness of interventions and approaches for improving and maintaining cognitive function?

K.1.1 Research recommendation

What is the effectiveness and cost-effectiveness of transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS) for improving and maintaining cognitive function in people with chronic neurological disorders?

K.1.2 Why this is important

Transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS) have been explored as non-invasive brain stimulation techniques to improve and maintain cognitive function in individuals with chronic neurological disorders such as stroke, multiple sclerosis (MS), Alzheimer's disease, and Parkinson's disease. Although the guideline committee did not find adequate evidence to recommend their use, they believed that, as a growing area of practice interest, further research is warranted.

K.1.3 Rationale for research recommendation

Table 39: Research recommendation rationale

Importance to 'patients' or the population	tDCS and TMS have the potential for emotional and psychological benefits and as non-invasive treatments, they have low risk. Understanding how tDCS and TMS work for different types of cognitive deficits allows for more personalized approaches. Patients could benefit from individualized brain stimulation protocols targeting specific areas of the brain responsible for their cognitive issues (for example, improving memory or attention).
Relevance to NICE guidance	NICE has published guidance on the use of tDCS for depression [IPG530], advocating for further research. Similarly NICE has published guidance on the use of rTMS for depression [IPG542] noting 'consistently positive outcomes in many studies and a good safety profile' and acceptability to most patients.
Relevance to the NHS	If found to be effective patients may remain independent for longer, reducing resource needs. Non-invasive brain stimulation techniques could reduce the reliance on medications, reducing the risk of medication-related complications. By investing in research for tDCS and TMS, the NHS can offer more diverse treatment options. This can particularly benefit patients who are resistant to traditional therapies, thus broadening the spectrum of care. Additionally, it would be important to assess whether the potential benefits and changes in related healthcare resource use are sufficient to offset any additional intervention costs.

National priorities	There are no relevant national priorities.
Current evidence base	This evidence review did not find any evidence for TMS and only 2 studies with tCDS (with the only important benefit found for Processing speed post intervention (compared to sham treatment). There was no economic evidence for these interventions.
Equality considerations	There are no relevant equality considerations.

tCDS: transcranial direct-current stimulation, TMS: transcranial magnetic stimulation

K.1.4 Modified PICO table

Table 40: Research recommendation modified PICO table

Population	Adults and Children and young people with rehabilitation needs due to the following chronic neurological disorders: • Acquired brain injury • Acquired spinal cord injury • Acquired peripheral nerve disorders • Progressive neurological diseases • Functional neurological disorders
Intervention	• Transcranial direct current stimulation (tDCS) at any dosage for improving and maintaining cognitive function • Transcranial magnetic stimulation (TMS) at any dosage for improving and maintaining cognitive function

Comparator	The same intervention or:
	• Placebo (placebo or sham)
	• Control (no intervention, waitlist, standard rehabilitation care alone, or 'usual care')
	• The same intervention (as listed under 'intervention') but varied in terms of:
	  ○ Frequency
	  ○ Intensity
	  ○ Timing
	  ○ Setting

Outcome	• Executive function • Processing speed • Memory • Perceptual function • Orientation • Attention • Social cognition • Functioning • Cost-effectiveness (including resource use measurements and QALY estimations using a validated preference-based measure such as the EQ-5D or SF-6D)
Study design	• Experimental study with random assignment to intervention and control groups. • Experimental study with non-random assignment to intervention and control groups (quasi-randomised controlled trials, non-randomised controlled trials and prospective and retrospective cohort studies)
Timeframe	• Immediate (for example, after a course of treatment) • Medium term (for example, 6 months after course of treatment)

	• Long term (for example, 2 years after course of treatment)
Additional information	Due to the heterogeneity of the chronic neuro-logical disorder population, if multiple conditions or disorders are recruited, researchers should ensure analysis is stratified by sub-group (that is, acquired brain injury, acquired spinal cord injury, acquired peripheral nerve disorders, pro-gressive neurological diseases, and functional neurological disorders).

EQ-5D: EuroQol 5-dimensions; QALY: quality-adjusted life years; SF-6D: short-form 6-dimension; tCDS: transcranial direct-current stimulation; TMS: transcranial magnetic stimulation