Supplement to: Zhang H, Huntley J, et al. The efficacy of Computerized Cognitive Training on cognitive outcomes in Mild Cognitive Impairment: A Systematic Review and Meta-Analysis.

Supplementary Table 1. Search terms used for literature search

Intervention Terms	“cognitive stimulation” OR “cognitive rehabilitation” OR “cognitive training” OR “cognitive therapy" OR "cognitive retraining” OR “cognitive support” OR “cognitive intervention” OR “cognitive exercise” OR “cognitive strategy" OR "cognitive aid" OR "memory function” OR “memory rehabilitation” OR “memory therapy” OR “memory aid” OR “memory group” OR “memory training” OR “memory retraining” OR “memory support” OR “memory stimulation” OR “memory strategy” OR “memory management” OR “brain training” OR “brain rehabilitation” OR “brain stimulation” OR “brain retraining” OR “brain exercise” OR “neuropsychological training” OR "neuropsychological therapy" OR "neuropsychological strategy" OR "neuropsychological aid" OR “neuropsychological stimulation” OR “neuropsychological rehabilitation” OR “neuropsychological exercise” OR “neuropsychological intervention” OR “neuropsychological retraining” OR “neuropsychological support” OR “psychostimulation” OR “executive training” OR “executive stimulation” OR “executive rehabilitation” OR “attention training” OR “attentional training” OR “attentional rehabilitation” OR “global stimulation” OR “reality orientation”
Study Terms	“RCT” OR “controlled trial” OR random*
Subject Terms	“Mild cognitive impairment” OR “memory impairment” OR “cognitive impairment” OR “memory disorder” OR “cognitive disorder” OR “memory dysfunction” OR “cognitive dysfunction” OR “MCI” OR “AAMI” OR “MCD” OR “mild cognitive disorder”

Supplementary Table 2. Brief description of the specific outcome measures included in the meta-analysis

Outcome measure	Domain	Brief Description	Study
Mini Mental State Examination (MMSE)	GEN COG	A 30-point questionnaire used to estimate severity of cognitive impairment including orientation and memory functions	Barben et al, 2016 Ciarmiello et al. 2015 Djabelkhir et al 2017 Han et al 2017 Hagovska et al. 2015 Rozzini et al 2007 Savullich et al 2017
Modified Mini Mental State Examination (mMMSE)	GEN COG	This instrument included all items from the standard MMSE, plus the Wechsler Adult Intelligence Scale–Revised Digit Span subtest and additional attention/calculation and general knowledge, language, and construction items.	Gooding et al 2016 study 1&2
Alzheimer's Disease Assessment Scale-Cognitive (ADAS-Cog)	GEN COG	Measuring severity of cognitive dysfunction associated with Alzheimer's disease, and is widely used in pharmacological studies of dementia and MCI. Higher scores indicate more dysfunction.	Fiatarone Singh et al 2014
Computerised Assessment of Mild Cognitive Impairment (CAMCI)	GEN COG	A battery of tests to assess cognitive performance including domains of attention, executive functioning, memory and processing speed	Hughes et al 2014
Milan Overall Dementia Assessment (MODA)	GEN COG	The MODA is a paper and pencil test, composed of three sections: an autonomy scale, a section testing orientation and a section testing a wide range of cognitive domains.	Ciarmiello et al. 2015
16-item free and cued reminding test	MEM	Participants search a card containing four pictures of items with matched category cues before subjected to tests of free and cued recall	Herrera et al 2012 Djabelkhir et al 2017
BEM-144 recall test	MEM	A 12-word immediate recall test from BEM-144 memory battery	Herrera et al 2012
Description of the visual recognition memory task (DMS48)	MEM	Participants asked to remember a sample before making a delayed forced-choice match to original sample	Herrera et al 2012 Ciarmiello et al. 2015

Outcome measure	Domain	Brief Description	Study
Doors Recognition subtest	MEM	Participants are shown a variety of different coloured doors which they must remember and later recognise from a selection of similar doors	Herrera et al 2012
MMSE - Recall Test	MEM	Participants presented with stimuli before being asked to recall as many as possible	Herrera et al 2012
Paired-associates learning (PAL)	MEM	Visual patterns revealed in different boxes before participant tested on where pattern originally located	Finn & McDonald 2011 Finn & McDonald 2015 Savullich et al 2017
Pattern Recognition Memory (PRM)	MEM	Test of visual pattern recognition in a forced discrimination paradigm	Finn & McDonald 2011
Recall of Rey's Complex Figure	MEM	Subjects shown complex figure and then tested on their delayed recall of the figure	Herrera et al 2012 Rozzini et al 2007
Rey's figure copy	MEM	Participants are to reproduce a drawing by i) copying (reproduction) and ii) memory (recall) using a 18-point scoring system	Rozzini et al 2007
List Learning Memory Sum from ADAS-Cog	MEM	List learning assessed across the three memory recall trials of the ADAS-Cog. Higher scores indicate better memory.	Fiatarone Singh et al 2014
Benton Visual Retention Test-Revised (BVRT-R)	MEM	BVRT-R is a visual memory test which assesses visual perception and visual constructional abilities as participants are required to draw from memory simple designs. Higher scores indicate better function.	Fiatarone Singh et al 2014 Savullich et al 2017
The Logical Memory subtest of the Wechsler Memory Scale 3rd edition (immediately and delayed)	MEM	The logic memory is used to measure both immediate (I) and delayed (II) memory for verbal information. Participants are presented with a simple narrative and are required to recall as many details of the story as they can immediately after presentation. Higher scores indicate better memory.	Fiatarone Singh et al 2014
Rey Auditory Verbal Learning Test (RAVLT)	MEM	RAVLT includes a list of 15 words to be recalled immediately after each of the 5 verbal presentations and after a 30-min delay	Barben et al, 2016 Ciarmiello et al. 2015
Prose memory	MEM	A subset of The Memory Assessment Scales, is an auditory verbal prose recall task which requires the subject to recall a short story. Subjects are asked to recall the story from memory and are then asked nine questions about details of the story.	Ciarmiello et al. 2015

Outcome measure	Domain	Brief Description	Study
visuospatial memory test (VST)	MEM	From the Cognitive Efficiency Profile	Djabelkhir et al 2017
Buschke Selective Reminding Test (BSRT)	MEM	The test provides 12 words which are selectively rehearsed by the subject until they are memorized. That is, only those words not recalled on the immediately preceding trial are presented. The subject then attends to an interference task or verbal list. Subsequently, after a delay, the subject is asked to recall the words.	Gooding et al 2016 study 1&2
WMS-R Visual Reproductions (VR) I and II subtests	MEM	VR assesses visual memory. Cards with printed designs is shown to the participants. Following each exposure and a 30 minutes delay, subjects draw what they remember of the design.	Gooding et al 2016 study 1&2
WMS-R Logical Memory (LM)Subtests I and II subtests	MEM	LM. The examiner reads two stories, stopping after each reading for an immediate free recall. And a 30 minutes delayed recall.	Gooding et al 2016 study 1&2
Short Story	MEM	Participants are asked to recall a short story	Rozzini et al 2007
The Word List Memory Test (WLMT)	MEM	Word list task that contains 10 semantically unrelated words The words are presented to the subject one at a time and are read aloud Three trials are administered in this fashion, with the order of the 10 words being randomized for each trial The examiner records the order of recall and notes any intrusions that might occur The primary Indices of Interest are the number of words recalled on each trial	Han et al 2017
The Word List Recall Test (WLRT)	MEM	Words, displayed one at a time for one second each. Participants read each of the words, and try to remember them without taking notes.	Han et al 2017
WLRcT(The Word List Recognition)	MEM	A word list was designed so that half its words would denote targets when any of a number of target classes were defined. After scanning this list for targets, subjects were unexpectedly tested on their ability to recognize the words they had scanned.	Han et al 2017

Outcome measure	Domain	Brief Description	Study
RBANS Memory Score	MEM	It consists of 12 subtests, which yield five Index scores (i.e., Attention, Language, Visuospatial/Constructional, Immediate Memory, and Delayed Memory) and a Total Scale score.	Rosen et al 2011
Dot counting test	WM	The task dot counting requires examinees to count the dots as quickly as possible by the fastest means possible.	Lin et al 2016
1-back test	WM	In the 1-Back task, participants are presented a sequence of stimuli one-by-one. For each stimulus, they need to decide if the current stimulus is the same as the one presented 1 trials ago.	Lin et al 2016
Digit Span Test	WM	Sequence of digits is read aloud. Subjects asked to immediately recall digits in the correct order. If correct, a sequence with an additional digit is presented.	Herrera et al 2012 Ciarmiello et al 2015
LNS (Letter-Number Sequencing)	WM	The task involves listening to and remembering a string of digits and letters read aloud at a speed of one per second, then recalling the information by repeating the numbers in chronological order, followed by the letters in alphabetical order.	Hyer et al 2016
Spatial Span	WM	Participants tested on ability to remember the location of objects on a spatial grid.	Hyer et al 2016
Spatial Span (Corsi test)	WM	Corsi is a short term memory task conceptually similar to the digit span test. the experimenter (the person who carries out the study) shows nine blocks arranged in front of the participant, the experimenter taps a sequence of blocks (for example, the experimenter taps a sequence of 3 different blocks, one after another), the participant needs to tap the blocks that the experimenter showed, in the same order, steps 1-3 are repeated multiple times with different lengths of blocks.	Ciarmiello et al. 2015
Spatial working memory (SWM)	WM	A test that requires retention and manipulation of visuospatial information to collect 'tokens' and fill a column	Finn & McDonald 2011

Outcome measure	Domain	Brief Description	Study
Symbol Span	WM	This subtest assesses visual working memory using novel visual stimuli. Beginning with two symbols, abstract visual symbols are exposed for 5 seconds. In the test phase, the participant has to correctly recall not only the correct symbols from distractor items, but also the order in which they were presented from left to right. The number of symbols presented increases by one at intervals as the test progresses. Higher scores indicate better visual working memory.	Finn & McDonald et al 2015
Word span	WM	Participants tested on ability to remember a list of words in order.	Ciarmiello et al. 2015
Alpha span task	WM	In the alpha span test, short lists of words are presented and the participant's task is to mentally reorder the words and give them back in correct alphabetical order.	Ciarmiello et al. 2015
Intra-/extra-dimensional set shifting (IED)	EXE	A test of rule acquisition and reversal. It is computerised analogue of the Wisconsin Card Sorting test and measured the total errors made	Finn & McDonald 2011
Modified Dual Task	EXE	Participants completed a modified dual task consisting of a visual detection task (responding to an appearance of a stimuli) and alpha-arithmetic task (responding 'true' or 'false' to equations of letters and numbers e.g. 'U-1 = T') simultaneously and were recorded in accuracy of responses in each task	Gagnon & Belleville 2012
Raven's coloured matrices	EXE	60 patterns present in order of difficulty. Subjects asked to identify the missing element that completes a pattern.	Rozzini et al 2007
Telephone Search Dual Task	EXE	Participants complete the telephone search test whilst simultaneously counting audible tones.	Gagnon & Belleville 2012
Telephone Search Test	EXE	Participants circle key stimuli while searching entries in a simulated classified telephone directory.	Gagnon & Belleville 2012
Trial making test	EXE	The task requires participants to ‘connect the dots’ in two parts, firstly numerically and secondly, alphanumerically.	Gagnon & Belleville 2012, Hughes et al 2014, Djabelkhir et al 2017 Hyer et al 2016

Outcome measure	Domain	Brief Description	Study
Verbal fluency	EXE	Participants generate as many words in one minute from a given letter.	Rozzini et al 2007, Djabelkhir et al 2017
Visual Elevator Test	EXE	Participants count up and down according to visual stimuli in an elevator, the time-per-direction-change score was calculated.	Gagnon & Belleville 2012
Raven's progressive matrices - non-verbal test (PM47)	EXE	The Raven Standard Progressive Matrices (PM47) assess the measure the test taker's reasoning ability.	Ciarmiello et al. 2015
Rey–Osterrieth complex figure test (ROCF)	EXE	ROCF is a neuropsychological assessment in which examinees are asked to reproduce a complicated line drawing, first by copying it freehand (recognition), and then drawing from memory (recall). The test therefore permits the evaluation of different functions, such as such as visuospatial abilities, memory, attention, planning, working memory and executive functions.	Ciarmiello et al. 2015
Categorical verbal fluency (animals)	EXE	Participants generate as many animal names as possible in one minute.	Fiatarone Singh et al 2014 Djabelkhir et al 2017
Number sequencing Number-Letter switching	EXE	In Number Sequencing, the participant is asked to draw a line connecting numbers in order from low to high as quickly as possible without making mistakes, and is a measure of attention. In Number-Letter switching, the task is to switch between connecting numbers and letters, in order, from lowest to highest, e.g., 1-A, 2-B, 3-C etc., and is a measure of cognitive flexibility.	Finn & McDonald et al 2015
Tracking A, Tracking B	EXE	Two tracking tasks requiring participants to (1) track numbers (from 24-1) in reverse order (Tracking A), and (2) months forward (January – December) and numbers in reverse (Tracking B).	Hughes et al 2014
Useful field of view (UFOV)	EXE	UFOV is a computerized test assessing visual processing speed and attention.	Lin et al 2016
Verbal fluency	EXE	Phonemic and categorical fluency	Lin et al 2016
Cognitive control	EXE	Set shifting and flanker tasks	Lin et al 2016

Outcome measure	Domain	Brief Description	Study
Cross-modality dual task (Divided)	EXE	Participants were subjected to a dual-task simultaneously consisting of a visual detection (as above) with a digit span task (orally recalling a list of digits) and recorded span items recalled correctly in %.	Gagnon & Belleville 2012
The CANTAB CRT(speed)	EXE	It is used to assess motor speed and thus acts as a control measure of general alertness to help interpret other cognitive tasks. An arrow will appear on either the left or right side of a computer screen. After the arrow appears, the participant is instructed to press a corresponding left or right button, using a response box, as quickly as possible.	Savullich et al 2017
WAIS-III Similarities	EXE	WAIS Similarities is a subtest from the WAIS-III used to measure verbal conception formation and abstractive thinking. Higher scores indicate better function.	Fiatarone Singh et al 2014
WAIS-III Matrices	EXE	WAIS Matrices is a perceptual subtest of the Wechsler Adult Intelligence Scale–III and is used to assess executive functions posing four types of non-verbal reasoning tasks including pattern completion, classification, abstraction and serial reasoning, and all items require visual perception, organization, and synthesis of visual spatial information. Higher scores indicate better function.	Fiatarone Singh et al 2014
COWAT	EXE	Combined Oral Word Association Test is a language-based task assessing association fluency, and is often used as a measure of executive functioning. The most commonly used letters are F, A, and S. or C, F, and L, based upon word prevalence rates. Higher scores indicate better function.	Fiatarone Singh et al 2014
SDMT (Attention/speed)	EXE	Symbol Digit Modalities Test measures divided attention, visual scanning, tracking, and motor speed. It uses a substitution format presenting symbols with matching numbers, and participants are required to provide name the numbers corresponding to each given symbol. Higher scores indicate better function.	Fiatarone Singh et al 2014

Notes: General cognition (GEN COG), episodic memory (MEM), working memory (WM), executive function (EXE)

Supplementary Table 3. Detailed Characteristics of studies using computerised cognitive training in persons with MCI

Author and Year	Treatment Group N, % male, mean age, mean education, MMSE (SD)	Control Group N, ratio of male, mean age, mean education, MMSE (SD)	CCT type for EC and type of CC	Frequency, duration and total hours	Drop-out (%)	Cognitive Training Intervention	Assessment interval (time pre or post intervention)	Included for meta-analysis
Barban et al 2016	N = 46 Ratio = 54.3% Age = 74.4 (5.7) Edu = 9 (4.3) MMSE = 27.3 (2.1)	N = 60 Ratio = 51.7% Age = 72.9 (6.0) Edu = 11 (4.7) MMSE = 28.1 (1.4)	EC: multi domain training. CC: passive(rest)	60 minute sessions, 2 sessions per week for 3 months. Total = 24 hours	n/s	Computerised software: 'SOCIABLE' using touch screen. Multi-component - CT including Memory, attentional Executive Function, orientation, logical reasoning, constructional Praxis, language.	Before and after training, follow-up (n/s)	Yes
Chandler et al 2017	N = 27 Ratio = 73.3% Age = 77.4 (7.2) Edu = 16.2 (2.6) MMSE = 26.7 (3.0)	N = 30 Ratio = 50.0 % Age = 76.2 (7.0) Edu = 16.0 (2.4) MMSE = 25.8 (3.2)	EC: Auditory memory training CC: Active(Memory Support System (MSS))	Frequency: n/s Duration: n/s Total = 10 hours	EC:4 CC:3 Total:10.94 %	"Auditory Brain Training" software: 6 adaptive modules exercises to recognize and differentiate sounds, match or repeat sounds, remember increasingly difficult directions, and remember details from stories.	n/s	No*

Author and Year	Treatment Group N, % male, mean age, mean education, MMSE (SD)	Control Group N, ratio of male, mean age, mean education, MMSE (SD)	CCT type for EC and type of CC	Frequency, duration and total hours	Drop-out (%)	Cognitive Training Intervention	Assessment interval (time pre or post intervention)	Included for meta-analysis
Ciarmiello et al 2015	N = 15 Ratio = 35.7% Age = 71.2 (7.7) Edu = 9.3 (3.02) MMSE = 27.9 (1.8)	N = 15 Ratio = 46.7% Age = 72.0 (7.1) Edu = 7.8 (2.6) MMSE = 27.8(1.9)	EC: multi domain CC: semi-active (meeting with psychologist – no computer)	45 minute sessions, 2 days per week for 4 months. Total = 24 hours.	EC: 0 CC: 0 0%	Computerised training with multiple difficulty levels. Includes dual-task training, executive function training, working memory updating, visual exploration, spatial orienting tasks.	Before and after training follow-up (n/s)	Yes
Djabelkhjr et al 2017	N = 10 Ratio = 30.0 % Age = 75.2 (6.4) Edu = 60.0% (6) (of college level) MMSE = 27.7 (1.9)	N = 10 Ratio = 40.0 % Age = 78.2 (7.0) Edu = 44.4% (4) (of college level) MMSE = 27.4 (2.0)	EC: multi-domain CC: Active(multi-component)	90 mins per session 1 sessions/week, 12 weeks. Total = 18 hours.	EC: 1 CC: 0 Total: 5%	'KODRO' (Altera-Group, Paris, France), a web-based platform with several applications (ie, appointment and event reminding, cognitive games, communication, entertainment, videos and a library).	Before and after training. Follow-up (n/s)	Yes
Fiatarone et al. 2014	N = 24 Ratio = n/s Age = >55 Edu = n/s MMSE = 28.0 (2.0)	N = 27 Ratio = n/s Age = >55 Edu = n/s MMSE = 27.0 (2.0)	EC: multi domain CC: active (sham)	75 minute sessions, 2 or 3 days per week for 26 weeks. Total = 80 hours.	EC: 2 CC: 3 Total: 9.8%	COGPACK program: Computer-based multimodal and multi domain exercises targeting memory, executive function, attention, and speed of information processing	At baseline and 6 months and at least 72 hours after the previous training session	Yes

Author and Year	Treatment Group N, % male, mean age, mean education, MMSE (SD)	Control Group N, ratio of male, mean age, mean education, MMSE (SD)	CCT type for EC and type of CC	Frequency, duration and total hours	Drop-out (%)	Cognitive Training Intervention	Assessment interval (time pre or post intervention)	Included for meta-analysis
							Follow-up: at 18 months	
Finn & McDonald 2011	N = 8 ratio = 37.5% age = 69.0 (7.7) Edu = 13.3 (2.2) MMSE = 28.5 (2.3)	N = 8 ratio = 62.5% age = 76.4 (6.5) Edu = 12.0 (2.8) MMSE = 27.5 (2.4)	EC: Multi-domain CC: Waiting list (Passive)	30 minute sessions, 4-5 sessions a week for an average of 11.43 weeks. Total = 25 hours	EC: 4 CC: 5 Total: 32%	Lumosity Inc CCT package. Four broad cognitive domains targeted: attention, processing speed, visual memory and cognitive control	Before and after training Follow-up (n/s)	Yes
Finn & McDonald 2015	N = 12 ratio = 66% age = 72.8 (5.7) Edu = 13.8 (3.0) MMSE = 27.8 (1.3)	N = 12 ratio = 75% age = 75.1 (7.5) Edu = 13.7 (2.8) MMSE = 27.8 (1.9)	EC: Single memory domain CC: Passive	2 sessions per week for 4 weeks Total = n/s	EC: 4 CC: 3 Total:22.6 %	Repetition-lag training to improve recollection memory	First and last training session Follow-up (n/s)	Yes

Author and Year	Treatment Group N, % male, mean age, mean education, MMSE (SD)	Control Group N, ratio of male, mean age, mean education, MMSE (SD)	CCT type for EC and type of CC	Frequency, duration and total hours	Drop-out (%)	Cognitive Training Intervention	Assessment interval (time pre or post intervention)	Included for meta-analysis
Gagnon & Belleville 2012	N = 12 ratio = n/s age = 67.0 (7.8) Edu = 15.0 (4.6) MMSE = 28.1 (1.2)	N = 12 ratio = n/s age = 68.4 (6.0) Edu = 13.1 (5.7) MMSE = 27.8 (1.5)	EC: Single domain(attentional control) CC: Active	60 minute sessions, 3 times a week for 2 weeks. Total = 6 hours	EC: 1 CC: 1 Total: 8%	Programme targeting attentional control using Variable Priority (VP) training in a dual task with selected priorities and feedback.	One week pre and after intervention Follow-up (n/s)	Yes
Gooding et al 2016 study 1	N = 31 ratio = 58.1% age = 75.6 (8.8) Edu = 15.1 (2.6) MMSE = n/s	N = 10 ratio = 58.1% age = 75.6 (8.8) Edu = 15.1 (2.6) MMSE = n/s	EC: Multi-domain CC: Active	60 min sessions, two days per week for 16 weeks Total = approx. 30 hours	EC: 12 CC: 1 Total: 20.3%	Posit Science's BrainFitness – repeated drill-and-practice adaptive exercises involving memory, attention and executive functions.	Before and after training Follow-up (n/s)	Yes
Gooding et al 2016 study 2	N = 23 ratio = 58.1% age = 75.6 (8.8) Edu = 15.1 (2.6) MMSE = n/s	N = 10 ratio = 58.1% age = 75.6 (8.8) Edu = 15.1 (2.6) MMSE = n/s	EC: Multi-domain CC: Active	60 min sessions, two days per week for 16 weeks Total = approx. 30 hours	EC: 12 CC: 1 Total: 20.3%	Posit Science's BrainFitness – repeated drill-and-practice adaptive exercises involving memory, attention and executive functions.	Before and after training Follow-up (n/s)	Yes

Author and Year	Treatment Group N, % male, mean age, mean education, MMSE (SD)	Control Group N, ratio of male, mean age, mean education, MMSE (SD)	CCT type for EC and type of CC	Frequency, duration and total hours	Drop-out (%)	Cognitive Training Intervention	Assessment interval (time pre or post intervention)	Included for meta-analysis
Hagovska et al 2016	N = 40 ratio = 55% age = 68.0 (4.4) Edu = 75% of secondary education MMSE = 26.0 (2.6)	N = 40 ratio = 48% age = 65.9 (6.2) Edu = 70% of secondary education MMSE = 26.0 (1.5)	EC: Multi domain + balance training CC: Passive(just balance training)	30 minute sessions, 2 times a week for 10 weeks. Total = 10 hours	EC: 0 CC: 2 Total: 2.5%	CogniPlus training program Battery contains subprograms for attention, Working Memory, long-term memory, executive functions, spatial processing and visuomotor coordination.	Before and after training Follow-up (n/s)	Yes
Han et al 2017	N = 23 Ratio = 56.5% Age = 73.7 (4.8) Edu = 13.5 (3.2) MMSE = 25.7 (3.2)	N = 20 Ratio = 50.0% Age = 74.5 (6.4) Edu = 12.7 (3.7) MMSE=24.5 (2.4)	EC: single memory training CC: Passive (Usual Care)	30 min per session 1 hour per day 2 sessions/week, 4 weeks. Total = 4 hours	EC:3 CC:5 Total: 16%	USMART program involving spaced retrieval-based memory training, using a self-administered application on an iPad tablet.	Week 0, 5 Follow-up (n/s)#	Yes
Herrera et al 2012	N = 11 ratio = 54% age = 75.1 (2.0) Edu = 46% of secondary school or more MMSE = 27.4 (0.5)	N = 11 ratio = 45% age = 78.2 (1.4) Edu = 63% of secondary school or more MMSE = 27.2 (0.4)	EC: Multidomain CC: Active	60 minute sessions, 2 days a week for 12 weeks. Total = 24 hours	0%	Several computer-based training exercises designed to improve memory and attention	0, 12 weeks ± 15 days Follow-up: at 24 weeks	Yes

Author and Year	Treatment Group N, % male, mean age, mean education, MMSE (SD)	Control Group N, ratio of male, mean age, mean education, MMSE (SD)	CCT type for EC and type of CC	Frequency, duration and total hours	Drop-out (%)	Cognitive Training Intervention	Assessment interval (time pre or post intervention)	Included for meta-analysis
Hughes et al 2014	N = 10 ratio = 20% age = 78.5 (7.1) Edu = 13.8 (2.4) MMSE = 27.2 (1.9)	N = 10 ratio = 40% age = 76.2 (4.3) Edu = 13.1 (1.9) MMSE = 27.1 (1.8)	EC: Multidomain CC: Active	90 minute sessions, once a week for 24 weeks. Total = 36 hours	0%	Group-based Nintendo Wii sports package. Group-based Interactive video gaming	0, 24 weeks ±1 weeks Follow-up: (n/s)	Yes
Hyer et al. 2016	N = 34 ratio = 50% age = 75.1 (7.4) Edu = 70% secondary MMSE = n/s	N = 34 ratio = 44% age = 75.2 (7.8) Edu = 66% secondary MMSE = n/s	EC: Single domain (working memory) CC: Active (Sham)	25 days of 40 min sessions, completed over 5 to 7 weeks. Total = 16.7 hours	EC: 4 CC: 5 Total: 11.7%	Cogmed – adaptive WM training	Before and after training Follow-up: 3 months after intervention	Yes
Lin et al 2016	N = 10 Ratio = 50.0% Age = 72.9 (8.2) Edu = 90.0% of college level MMSE = n/s	N = 11 Ratio = 54.5% Age = 73.1 (9.6) Edu = 54.5% of college level MMSE = n/s	EC: Single domain speed-of-processing CC: active control(mental leisure activities)	1 hour per day 4 days per week for 6 weeks in their homes. Total = 24 hours	EC:2 CC:1 Total: 12.5%	INSIGHT online program: (vision-based speed-of-processing) which included five training tasks: eye for detail, peripheral challenge, visual sweeps, double decision, and target tracker.	Before and after training Follow-up (n/s)#	Yes

Author and Year	Treatment Group N, % male, mean age, mean education, MMSE (SD)	Control Group N, ratio of male, mean age, mean education, MMSE (SD)	CCT type for EC and type of CC	Frequency, duration and total hours	Drop-out (%)	Cognitive Training Intervention	Assessment interval (time pre or post intervention)	Included for meta-analysis
Optale et al 2010	N = 15 ratio = 59.1% age = 78.5 (10.9) Edu = 5.3 (2.4) MMSE = 22.9 (5.0)	N = 16 ratio = 31.25% age = 81.6 (5.0) Edu = 6 (3.5) MMSE = 21.0 (4.8)	EC: Single domain - Memory CC: Active	30 minute sessions, 3 times a week for 3 months. Total = 58.5 hours	EC: 3 CC: 2 Total: 16.1%	A Virtual Reality-based memory training programme	Before and after training Follow-up: 3 months after intervention	No**
Rosen et al 2011	N = 6 ratio = n/s age = 70.7 (10.6) Edu = 16.7 (0.8) MMSE = 29.3 (1.2)	N = 6 ratio = n/s age = 78.0 (7.9) Edu = 18.3 (1.5) MMSE = 27.8 (2.3)	EC: processing speed and accuracy in auditory processing CC: computer-based activities(Active)	100 minute sessions, 5 times a week for 8 weeks. Total = 36 hours	0%	processing speed and accuracy in auditory processing	Before and after training Follow-up (n/s)	Yes

Author and Year	Treatment Group N, % male, mean age, mean education, MMSE (SD)	Control Group N, ratio of male, mean age, mean education, MMSE (SD)	CCT type for EC and type of CC	Frequency, duration and total hours	Drop-out (%)	Cognitive Training Intervention	Assessment interval (time pre or post intervention)	Included for meta-analysis
Rozzini et al 2007	N = 15 ratio = n/s age = 63 - 78 Edu = n/s MMSE = 26.0 (1.6)	N = 22 ratio = n/s age = 63 - 78 Edu = n/s MMSE = 26.4 (1.9)	EC: Multidomain and medication CC: Medication only (Passive)	60 minute session, 5 days a week for 4 weeks in 3 discrete blocks. Total = 60 hours	0%	Cognitive exercises based on Neuropsychology Training combined with a cholinesterase inhibitor	Before and after training Follow-up (n/s)	Yes
Savulich et al 2017	N = 21 Ratio = 52.4% Age = 75.2 (7.4) Edu = 15.9 (1.3) (Age left school) MMSE = 26.6 (2.9)	N = 21 Ratio = 66.7% Age = 76.9 (8.3 Edu = 16.0 (2.1) (Age left school) MMSE = 26.8 ± 2.2	EC: a novel memory game CC: negative (clinic visits as usual)	1 hour per session, 8 hours within 4 weeks. Total = 8 hours.	0 %	Gameshow program: Computer-based episodic memory training.	At a maximum of 4 weeks after the baseline testing session Follow-up (n/s)	Yes

Notes: MMSE: Mini Mental State Examination, SD: Standard deviation, n/s: not stated, EC: Experimental condition, CC: Control condition. *Excluded from meta-analysis due to immediate cognitive outcomes not stated, ** Excluded from meta-analysis due to suspected inclusion of individuals with AD.

Supplementary Appendix 1

Statistical methods

Effect size calculation

Effect sizes were calculated using RevMan software version 5.3. Standardised mean differences were calculated using Hedges' adjusted g[1]. Pre-intervention standard deviations were used as these are most likely to be comparable across studies and therefore provide the most accurate estimate of effect size.[3]

The Hedges' adjusted g formula used in RevMan is as follows:

$$g = [M_{\text{post intervention}} - M_{\text{post control}}/SD_{\text{pre-pooled}}]*[1- 3/(4N-9)]$$

Where $N = n_{\text{intervention group}} + n_{\text{control group}}$

and

$$SD_{\text{pre-pooled}} = \sqrt{[((n_{\text{intervention-1}}) SD_{\text{pre intervention}}^2 + (n_{\text{control-1}}) SD_{\text{pre control}}^2)/ N-2]}$$

Meta-analyses

Meta-analyses were performed using RevMan software version 5.3. A random effects method as described by DeSirmonian and laird[4] was used, adjusting standard errors of the effect sizes in each study to account for the heterogeneity for intervention effects observed between different studies.

The pooled effect size of each meta-analysis was calculated by attributing a weight to the average effect size in each study according to sample size. The z statistic was used to evaluate whether the pooled effect size was significantly different to no effect.

Heterogeneity was quantified using the I^S statistic.

Composite measure calculation

Composite scores were calculated where a study reported multiple outcomes falling within a particular outcome domain (e.g. objective cognitive performance). This approach was pragmatic in allowing one score to represent each intervention in the meta-analysis regardless of the number of outcomes reported. In turn this prevents more weight being given to studies with multiple outcomes.[2]The variance of the sum of variables was calculated as described below.

Using the example of a study with two relevant outcomes, there will be two effect sizes, namely y_1 and y_2. The overall mean effect size for the composite measure will be:

$\bar{y} = 1/2(y_1 + y_2)$

The variance of this mean is calculated as follows:

$V_{\bar{y}} = ¼ (V_{Y1} + V_{y2} + 2r*√V_{Y1}*√V_{y2})$,

where r is the correlation coefficient describing to what extent y_1 and y_2 co-vary.

If the correlation is set at 0, the outcomes are essentially treated as independent of each other and if the correlation is set at 1, the variance is an average of each outcome's variance. The former will lead to an underestimate of the variance and overestimate of precision while the latter will have the opposite effect. Consequently, in the absence of existing literature to identify a suitable correlation, we reported composite effect sizes calculated using a correlation of 0.5.

1. Hedges LV, Olkin I. Statistical methods for meta-analysis. New York, Academic Press 1985.

2. Borenstein M, Hedges LV, Higgins JPT, et al. Introduction to Meta-Analysis. Chichester, John Wiley & Sons, Ltd 2009.

3. Morris S. Estimating Effect Sizes From Pretest-Posttest-Control Group Designs. Organ. Res. Meth 2008;11 (2):364-386.

4. DerSimonian R, Laird N. Meta-analysis in clinical trials. Control Clin Trials 1986; 7(3):177-188