

Table S1. General characteristics of the included studies.

8	Location	Sample size/ Type of study	Type of sample	Control	Measurement	Fully Immersive VR	Type of intervention	Duration	Drop out	Main results
Kim et al., 2021 [76]	South Korea	31 EG 25 CG; RCT	MCI/Cognitively normal individuals	Cognitive training sessions using VR	CRI; CERAD-NB	YES	VR cognitive training program: train memory, attention and executive functions. Supermarket scenario..	50–60 min; 2 times a week for 4 weeks	EG 9/31 (29%); CG 3/25 (12%)	No statistically significant differences between groups after intervention
Kang et al., 2021 [77]	South Korea	25 EG 20 CG; RCT	MCI both EG and CG	Usual therapy such as pharmacotherapy	MMSE; DST; TMT A-B; K-BNT; SVLT; GDS; AES; PANAS-P/N; QoL-AD; ROCFT; VRSQ	YES	VR cognitive training: train multi domain cognitive (attention, executive function and memory, working memory; mathematical calculations, visuospatial function, verbal memory, visual memory, processing speed and working memory). Multiple games.	20–30 min; 2 times a week for 4 weeks	EG 2/25 (8%); CG 2/20 (10%)	Statistically significant difference between groups in improving quality of life (QoLAD), attention, memory and executive function (DST; SVLT; TMT:SCWT)
Zajac-Lamparska et al., 2019 [84]	Poland	75 EG 75 CG; Pilot Study	Mild dementia/Healthy older adults (age 60–89)	VR-based cognitive training using the GRADYS game	DSST; DS; BDT; CTT; TA (d2); BVRT; AVL; ROCFT; ACE-III; BNT	YES	VR-based cognitive training: divided in four modules (attention, memory, language, and visuospatial processing). The storyline of each module scenario consists of tasks inspired by daily life. Each module has three difficulty levels. GRADYS game.	45–60 min; 2 times a week for 4 weeks	ES 48/75 (64%); CG 3/75 (4%)	Statistically significant only for the control group in improving cognitive function
Maeng et al. 2020 [78]	South Korea	31 EG 25 CG; RCT	MCI/Cognitively normal individuals	Virtual reality-based cognitive therapy program	CERED; KQOL-AD; GDS	YES	VR-based cognitive therapy program: train multi domain cognitive (memory, attention and executive function). In each session, items were evenly and randomly selected. There were four levels of difficulty from level 1 (four items to buy) to level 4 (seven items to buy); participants chose the difficulty level according to their performance in each session. Supermarket scenario.	50–60 min; 2 times a week for 4 weeks	EG 7/31 (22%); CG 2/25 (8%)	Statistically significant difference between groups in improving depressive symptoms (GDS), memory, language and executive function (CERED)
Liao et al., 2019 [79]	Taipei (Taiwan)	21 EG 21 CG; RCT	MCI; both EG and CG	Combined Physical (resistance, aerobic and balance exercises) and Cognitive Training (different tasks in ecological scenarios)	TMT; SCWT	YES	VR based Physical and Cognitive training: Physical tasks: simplified 24-form Yang-style Tai Chi, resistance exercise, aerobic exercise, other functional VR daily activities; Cognitive tasks: IADL based scenarios involving orientation, working memory, attention, planning and task switching	60 min; 3times per week for 12 weeks	EG 3/21 (14,28%); CG 5/21 (23,81%)	No statistically significant differences between groups after intervention cognitive function like executive function (TMT)
Kwan et al., 2021 [83]	Hong Kong (China)	9 EG	MCI and physical frailty	Non-VR motor-cognitive training program: Physical	MoCA; VRSQ	YES	VR simultaneous motor-cognitive training: Cognitive tasks: 8 tasks in ecological virtual scenarios involving visuospatial, calculation,	30 min; 2 times a week for 8 weeks	EG 1/9 (11,11%); CG 2/8	No statistically significant differences between groups after intervention.

		8 CG; Pilot Study		task: cycle on the ergometer; Cognitive training: four cognitive games on a tablet computer			memory, reaction time and attention; 2 difficulty levels. Motor training: traveling through the virtual world cycling on the ergometer	(25%)	Positive change in global cognition in the experimental group (MOCA)	
Park et al., 2020 [84]	South Korea	12 EG 12 CG; Pilot Study	amnesic MCI (aMCI), both EG and CG	Waiting list	K-MMSE; SGDS- K; SNSB-D; DST; SCWT; WVF	YES	VR cognitive tasks: 6 cognitive games that involved attention, perceptual space skills, numerical ability, perceptivity, logical ability and memory; different level difficulty (i.e., high, middle or low)	30 min; 2 times a week for 12 weeks	NO DROP OUT	No statistically significant differences between groups after intervention
Thapa et al., 2020 [80]	Busan (South Korea)	34 EG 34 CG; RCT	MCI; both EG and CG	Educational program on general health care (8 sessions - 30/50min)	MMSE-DS; NCGG-FAT; TMT A & B; DSST	YES	VR program: four series of games to aid different cognitive functions: memory, attention and processing speed. EG was also involved in an educational program on general health care	100 min; 3 times per week for 8 weeks	EG 1/34 (2,94%); CG 1/34 (2,94%).	Statistically significant differences between groups in improving executive function (TMT; DSST)
Liao et al., 2020 [81]	Taipei (Taiwan)	21 EG 21 CG; RCT	MCI, both EG and CG	Combined physical and cognitive training: -physical exercises included resistance, aerobic and balance task; -cognitive task were trained during the physical exercises	MoCA; EXIT-25; AVLT; IADL	YES	VR-based physical and cognitive training: -physical exercises included simplified 24-form Yang-style tai chi, resistance exercises, aerobic exercises and functionally oriented tasks (Kinect system, developed by Tano and Long-Good); -cognitive training included IADL activities (VIVE system, developed by the HTC company)	60 min (40 min of VR Cognitive training; 20 min of VR physical training); 3 times a week for 12 weeks	EG 3/21 (14,28%); CG 5/21 (23,8%)	Statistically significant differences between groups in improving daily functioning (IADL)
La Paglia et al., 2016 [86]	Palermo (Italy)	9 EG 6 CG; RCT	Schizophrenic disorders, both EG and CG	Integrated Psychological Therapy (IPT)	MMSE; FAB; TMT A/B/B-A; ToL; WCST	YES	VR attention training: hierarchical sequences of tasks; settled in 3 ecological virtual environment, Park (sustained attention task), Valley (selective attention task), Beach (selective and divided attention task)	90 min; 1 time a week for 10 weeks	Not specified	No statistically significant differences between groups after intervention. Positive change in global cognition (MMSE) and attention (TMT) in the experimental group
Hwang et al., 2017 [83]	Daegu (South Corea)	12 EG 12 CG; RCT	MCI, both EG and CG	Traditional occupational therapy for memory and balance ability	VST; WCT	Not specified	Not specified	30 min; 5 times a week for 4 weeks	Not specified	Statistically significant differences between groups in improving memory (VST)

CRI: Cognitive Reserve Index; CERAD-NB: Consortium to Establish a Registry for Alzheimer's Disease Neuropsychological Battery; MMSE: Mini-Mental State Examination; DS: Digit Span; TMT: Trial Making Test; K-BNT: Korean Boston Naming Test; SVLT: Seoul Verbal Learning Test; COWAT: Controlled Oral Word Association Test; SCWT: Stroop Color and Words Test; GDS: Geriatric Depression Scale; AES: Apathy Evaluation Scale; QoL-AD: Quality of Life Alzheimer Disease; PANAS: Positive and Negative Affect Schedule; ROCFT: Roy-Osterrieth Complex Figure Test; VRSQ: Virtual Reality Sickness Questionnaire; DSST: Digit Symbol Substitution Test; BDT: Block Design Test; CTT: Color Trails Test; TA (d2): Test Of attention; BVRT: Benton visual Retention Test; AVLT: Auditory Verbal Learning Test; ACE-III: Addenbroke's Cognitive Examination; BNT: Boston Naming

Test; WVF: Words Verbal fluency; MOCA: Montreal Cognitive Assessment; NCGG-FAT: National Center for Geriatrics and Gerontology functional assessment tool; EXIT-25: Executive Interview; FAB: Frontal Assessment Battery; TOL: Tower of London; WCST: Winsconsin Card Sorting test; VST: Virtual Supermarket Test; WCT: Word Choice Test.

Table S2. Effects of fully immersive virtual reality for cognitive remediation in people with Mild Cognitive Impairment.

Results of meta-analysis												Trim-and-Fill				
Outcome	K	N	Model	Hedges'g	95% CI		z	p	Q	p	I ²	k added	New estimate	95% CI		p
Executive functions	6	252	FE	-0.13	-0.34	0.07	-1.30	0.19	7.73	0.17	35%	1	-0.11	-0.37	0.14	0.40
			RE	-0.15	-0.49	0.18	-1.19	0.29								
Attention	6	242	FE	-0.15	-0.34	0.04	-1.53	0.12	2.33	0.80	0%	0				
			RE	-0.15	-0.32	0.02	-2.24	0.07								
Memory	5	176	FE	0.45	0.21	0.69	3.71	0.0002	2.58	0.63	0%	0				
			RE	0.45	0.18	0.73	4.63	0.001								
Language	4	152	FE	0.46	0.20	0.71	3.52	0.0004	5.80	0.12	48%	0				
			RE	0.48	-0.13	1.09	2.51	0.087								
Global cognition	5	183	FE	0.36	0.14	0.57	3.28	0.0011	11.02	0.03	64%	1	0.41	-0.11	0.94	0.10
			RE	0.41	-0.11	0.94	2.17	0.096								

FE = Fixed-effects model; RE = Random-effects model.

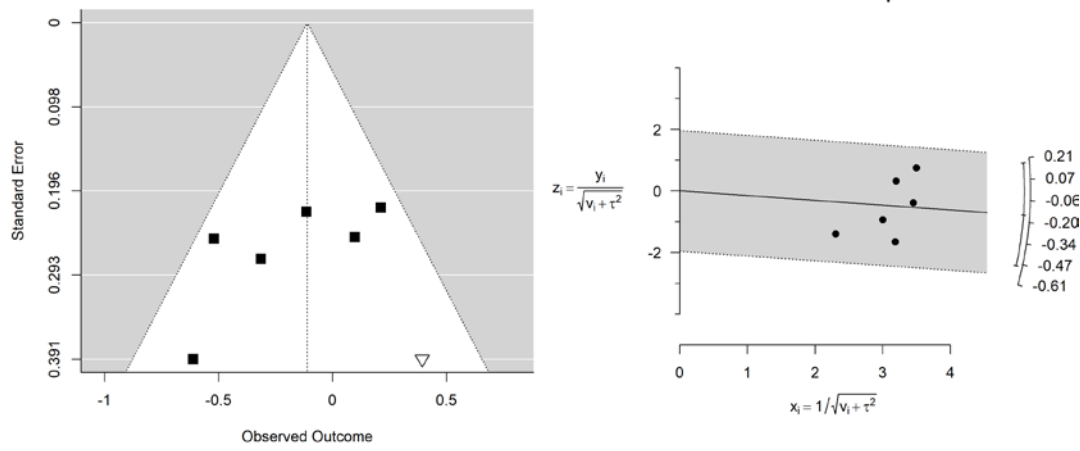


Figure S1. EX.

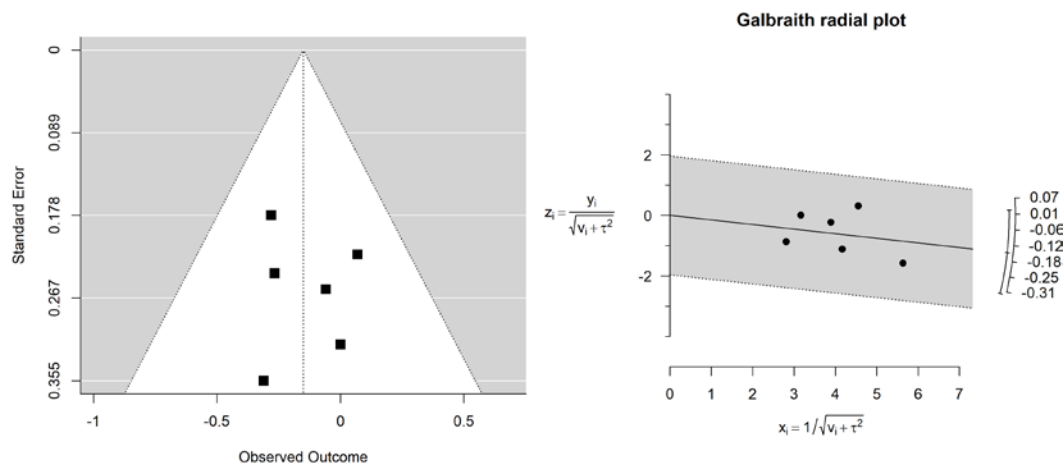


Figure S2. ATT.

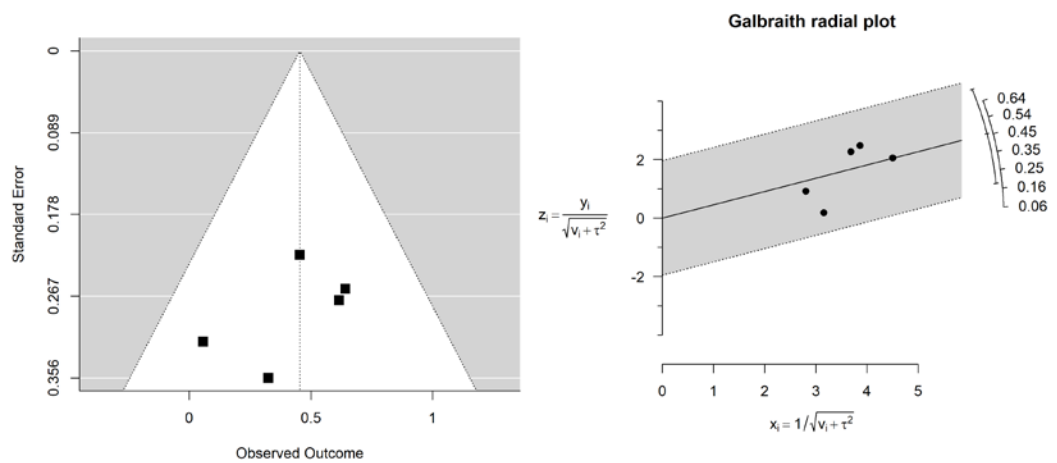


Figure S3. MEM.

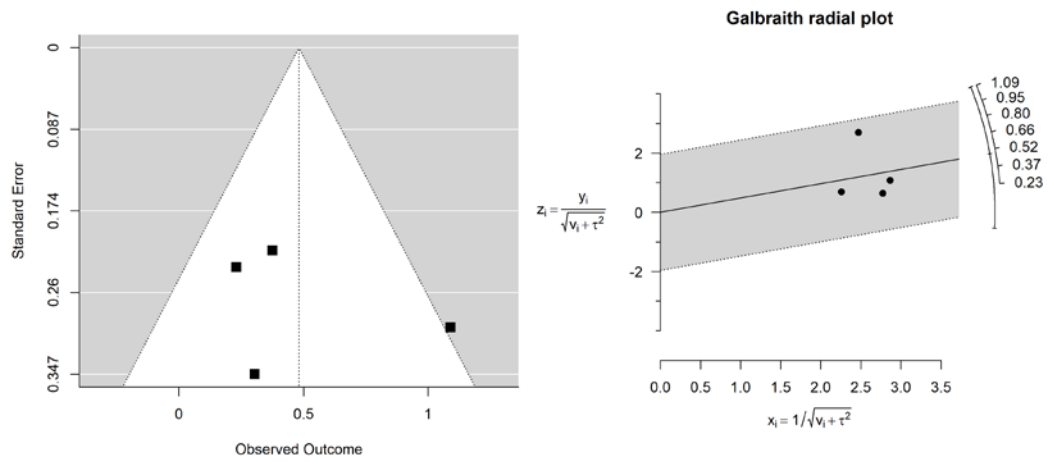


Figure S4. LANG.

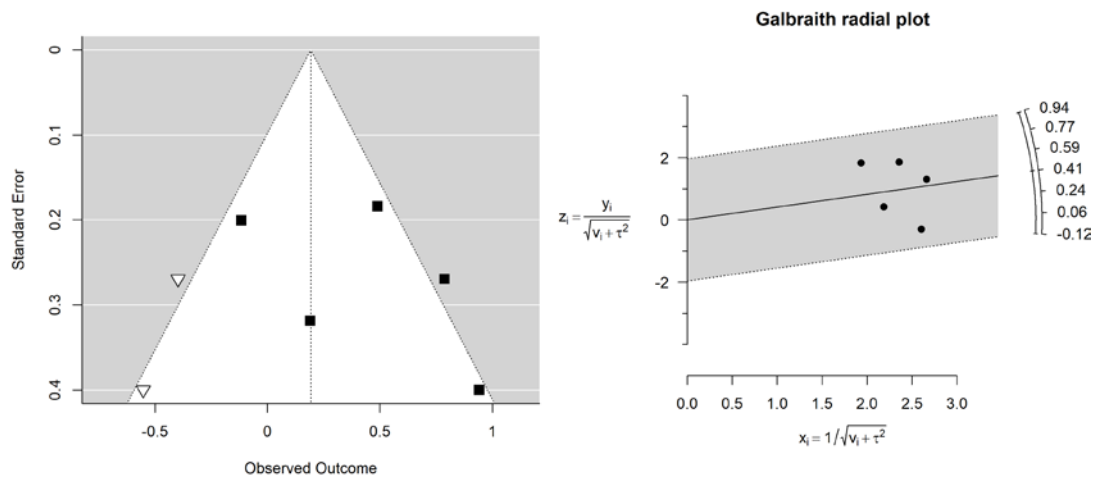


Figure S5. GLOBAL COGNITION.