

Supplementary Material

S1. Complete search strategy

Cognitive impairment & dance in the elderly

Search date: 5/21/2025

Limits: Embase limit results to articles/articles in press/reviews; PsycINFO limit to peer review

<u>PUBMED</u>	(“Aged” [MeSH] OR aged OR “Older Adults” OR “Health of the Elderly” OR Elderly) AND (Dance OR Dances OR dancing OR “Dance therapy” OR “Dance Therapies”) AND (“Cognitive Dysfunction”[Mesh] OR “cognitive dysfunction” OR “Cognitive Dysfunctions” OR “Cognitive Impairments” OR “Cognitive Impairment” OR “Cognitive Disorder” OR “Cognitive Disorders” OR “Mild Cognitive Impairment” OR “Mild Cognitive Impairments” OR “Cognitive Decline” OR “Cognitive Declines” OR “Mental Deterioration” OR “Mental Deteriorations” OR “Mental Health”[MeSH] OR “Mental Health” OR “Brain Health” OR “Dementia” [MeSH] OR Dementia OR Dementias OR Amentia OR Amentias OR “Familial Dementia” OR “Familial Dementias”) AND (“Systematic Review”[Publication Type] OR “Systematic Reviews as Topic” [Mesh] OR “Systematic Review”) Refs = 38
<u>EMBASE</u>	<u>Embase:</u> ('aged'/exp OR aged OR 'older adults'/exp OR 'older adults' OR 'health of the elderly' OR 'elderly'/exp OR 'elderly') AND ('dance'/exp OR dance OR dances OR 'dancing'/exp OR dancing OR 'dance therapy'/exp OR 'dance therapy' OR 'dance therapies') AND ('cognitive dysfunction'/exp OR 'cognitive dysfunction' OR 'cognitive dysfunctions' OR 'cognitive impairments' OR 'cognitive impairment'/exp OR 'cognitive impairment' OR 'cognitive disorder'/exp OR 'cognitive disorder' OR 'cognitive disorders'/exp OR 'cognitive disorders' OR 'mild cognitive impairment'/exp OR 'mild cognitive impairment' OR 'mild cognitive impairments' OR 'cognitive decline'/exp OR 'cognitive decline' OR 'cognitive declines' OR 'mental deterioration'/exp OR 'mental deterioration' OR 'mental deteriorations' OR 'mental health'/exp OR 'mental health' OR 'brain health'/exp OR 'brain health' OR 'dementia'/exp OR dementia OR dementias OR 'amentia'/exp OR amentia OR amentias OR 'familial dementia' OR 'familial dementias') AND ('systematic review'/exp OR 'systematic review') Refs = 64
<u>WEB OF SCIENCE</u>	(aged OR “Older Adults” OR “Health of the Elderly” OR Elderly) AND (Dance OR Dances OR dancing OR “Dance therapy” OR “Dance Therapies”) AND (“cognitive dysfunction” OR “Cognitive Dysfunctions” OR “Cognitive Impairments” OR “Cognitive Impairment” OR “Cognitive Disorder” OR “Cognitive Disorders” OR “Mild Cognitive Impairment” OR “Mild Cognitive Impairments” OR “Cognitive Decline” OR “Cognitive Declines” OR “Mental Deterioration” OR “Mental Deteriorations” OR “Mental Health” OR “Brain Health” OR Dementia OR Dementias OR Amentia OR Amentias OR “Familial Dementia” OR “Familial Dementias”) AND (“Systematic Review”)

	Refs = 64
<u>PsycINFO</u>	(aged OR “Older Adults” OR “Health of the Elderly” OR Elderly) AND (Dance OR Dances OR dancing OR “Dance therapy” OR “Dance Therapies”) AND (“cognitive dysfunction” OR “Cognitive Dysfunctions” OR “Cognitive Impairments” OR “Cognitive Impairment” OR “Cognitive Disorder” OR “Cognitive Disorders” OR “Mild Cognitive Impairment” OR “Mild Cognitive Impairments” OR “Cognitive Decline” OR “Cognitive Declines” OR “Mental Deterioration” OR “Mental Deteriorations” OR “Mental Health” OR “Brain Health” OR Dementia OR Dementias OR Amentia OR Amentias OR “Familial Dementia” OR “Familial Dementias”) AND (“Systematic Review”) Refs = 22
<u>TOTAL</u>	Total from databases = 188 Total after duplicates removed = 88

S2. List of excluded articles and reasons

List of excluded	DOI	Reason
Lyons 2018	https://dx.doi.org/10.1016/j.aip.2018.03.006	Wrong study design
Hwang 2015	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5491389/	Wrong patient population
Veronese 2017	https://dx.doi.org/10.1016/j.maturitas.2017.05.004	Wrong outcomes
Bai 2022	https://dx.doi.org/10.3389/fpsyg.2022.864327	Wrong patient population
Borhan 2018	https://dx.doi.org/10.1186/s13643-018-0689-6	Systematic review protocol
Whitty 2020	https://dx.doi.org/10.1016/j.arr.2020.101113	Wrong intervention
Zande 2020	https://dx.doi.org/10.17770/sie2020vol7.5076	Wrong study design
Bracco 2021	https://dx.doi.org/10.4274/ejgg.galenos.2021.2021-8-2	Wrong outcomes
Kamioka 2013	https://dx.doi.org/10.13105/wjma.v1.i1.27	Wrong intervention
McQuade 2023	10.1177/17579139231157533	Wrong outcomes
Li 2022	https://dx.doi.org/10.3389/fnagi.2022.962475	Wrong intervention
Delfa-Lobato 2023	10.3390/healthcare11131854	Wrong intervention
Prudente 2024	10.3390/bs14010043	Wrong patient population
Mabire 2018	10.1017/S1041610218001552	Wrong study design
Ding 2023	10.1016/j.arr.2023.101886	Wrong outcomes
Schmitt 2007	10.1055/s-2006-944298	Language
Hirt 2024	10.1016/j.ijnurstu.2024.104756	Wrong study design
Jordan 2022	10.1016/j.jpsychires.2022.04.028	Wrong intervention
Sánchez-Alcalá 2023	10.3390/jcm12227084	Wrong intervention
Wu 2022	10.3389/fnagi.2022.975711	Wrong study design
Meng 2020	10.1007/s40520-019-01159-w	Wrong patient population
Wang 2022	10.3389/fpsyg.2021.709208	Wrong outcomes
Curtis 2018	10.1177/1471301217740960	Wrong patient population
Schroeder 2023	10.1177/08919887221130268	Wrong outcomes
Ronzi 2018	10.1186/s13643-018-0680-2	Wrong patient population
Ou 2022	10.3390/ijerph19106181	Wrong patient population
Sheppard 2020	10.1080/17482631.2020.1732526	Wrong study design
Dong 2024	10.3389/fpsyt.2024.1305295	Wrong patient population
Muiños 2021	10.1016/j.neubiorev.2020.11.028	Wrong patient population

Moratelli 2023	10.1177/1089313X231178095	Wrong patient population
Sumec 2015	10.1155/2015/620674	Wrong patient population
Wu 2019	10.1111/jgs.15714	Wrong patient population
Griebler 2022	10.1016/j.archger.2021.104583	Wrong patient population
Wang 2022	10.3389/fphys.2022.1031803	Wrong patient population
Karkou 2023	10.1002/14651858.CD011022.pub3	Wrong outcomes
Ruiz-Muelle 2019	10.2174/1567205016666190725151614	Wrong study design
Jiménez 2019	10.1016/j.aip.2018.11.008	Wrong patient population
Podolski 2023	10.3390/brainsci13070981	Wrong patient population
Millman 2021	10.1002/cpp.2490	Wrong patient population
Abraha 2017	10.1136/bmjopen-2016-012759	Wrong outcomes
Hidalgo-Agudo 2020	10.3390/jcm9041038	Wrong patient population

S3. General Characteristics of included studies

General characteristics of the systematic reviews and meta-analysis included

Author/ Year	Title	Objective	Local	PRISMA	Meta- analysis	Database	Studies Included	Times Cited	Type of studies
Fong et al (2021)	Arts-based interventions to improve cognition in older persons with mild cognitive impairment: A systematic review of randomized controlled trials.	To examine the effects of arts-based interventions on cognition in older persons with MCI	Singapore	yes	no	6	11 (04 dance)	11	RCTs
Hewston et al (2021)	Effects of dance on cognitive function in older adults: a systematic review and meta-analysis.	Examining dance and cognitive function in older adults.	Canada	yes	yes	4	11 (04 MCI)	57	RCTs
Huang et al (2023)	Effects of dance therapy on cognitive and mental health in adults aged 55 years and older with mild cognitive impairment: a systematic review and meta-analysis.	To evaluate the effectiveness of dance therapy on global cognitive function, specific cognitive subdomains, quality of life, and mental health in older adults with mild cognitive impairment to enrich health management strategies for dementia.	China	yes	yes	13	110	03	RCTs and CCTs
Liu et al (2021)	Effects of Dance Interventions on Cognition, Psycho-Behavioral Symptoms, Motor Functions, and Quality of Life in Older Adult Patients With Mild Cognitive Impairment: A Meta-Analysis and Systematic Review.	To summarize and critically evaluate dance intervention studies in patients with MCI aged over 60 years; to explore the effects of dance on the elderly with MCI based on four aspects (cognitive function, emotion, physical function, and QOL); to establish a general summary of the	China	yes	yes	12	14	16	RCT or quasi experimental

		existing literature; and to provide a basis for follow-up studies in this field.							
Tao et al (2023)	The effectiveness of dance movement interventions for older adults with mild cognitive impairment, Alzheimer's disease, and dementia: A systematic scoping review and meta-analysis.	To synthesize evidence and summarize research findings related to the effectiveness and feasibility of dance movement intervention (DMI) in older adults with mild cognitive impairment (MCI), Alzheimer's disease (AD), and dementia; to systemically map existing research gaps and research directions for future practice.	Hong, Kong, USA, China	yes	yes	NI	29 eligible (13 RCTs)	02	Quantitative or qualitative studies, only RCTs were considered for meta-analysis
Vega-Ávila et al (2022)	Rhythmic Physical Activity and Global Cognition in Older Adults with and without Mild Cognitive Impairment: A Systematic Review.	To conduct a systematic review of randomized controlled trials that evaluated the effects of rhythmic PA or training on cognitive function (global cognition) in older adults with mild cognitive impairment.	Colombia, Spain	yes	no	3	11 (05 dance intervention and MCI)	12	RCT
Wang et al (2018)	Effects of Mind-Body Exercise on Cognitive Function in Older Adults With Cognitive Impairment: A Systematic Review and Meta-analysis.	To identify the effects of mind-body exercise on cognitive function in older adults with cognitive impairment, mild cognitive impairment or dementia and whether the effects of different mind-body exercise differ	China	no	yes	5	13 (03 dance)		RCTs or non RCTs with control group
Wu et al (2021)	The effect of dance interventions on cognition, neuroplasticity, physical function, depression, and quality of life for older adults with mild cognitive	To examine the effectiveness of dance interventions on cognition, neuroplasticity, physical function, depression, and quality of	Singapore, Norway	yes	yes	7	8	45	RCTs

	impairment: A systematic review and meta-analysis.	life in older adults with mild cognitive impairment.							
Yuan et al (2022)	Dance activity interventions targeting cognitive functioning in older adults with mild cognitive impairment: A meta-analysis.	To comprehensively determine the effect of dance activities on the cognitive functions and its subdomains of older adults with mild cognitive impairment (MCI)	China	yes	yes	6	12	06	RCT, CT
Zhu et al (2020)	Effects of Aerobic Dance on Cognition in Older Adults with Mild Cognitive Impairment: A Systematic Review and Meta-Analysis.	To evaluate the effects of aerobic dance on cognitive function among older adults with MCI	China	yes	yes	4	5	24	RCTs

S4 – Characteristics of the participants and interventions of the included studies

Sample size, interventions, instruments used in the research and conclusions of the included studies

Author/year	N	Population	Average Age	Sex	Diagnosis instruments	Dance intervention	Intensity	Duration	Frequency	Time	Adherence	Comparison	Main Results
Fong et al (2021)	817 (318 dance)	60+ with MCI	dance from 65.9 $\pm$ 10.8 to 76 $\pm$ 4.9 (03 studies reported age)	Most women - more than 70%	MMSE MoCA Peterson's criteria Multidisciplinary assessment (specialists)	Latin dance Ballroom dance Dance movement intervention	NI	16 to 40 weeks	1 to 3x p/w	60 min	NI	Waitlist Health education; Life-as-usual	03 of 04 studies with dance reported significant cognitive effects
Hewston et al (2021)	Total: 1412 - MCI: 453	55+ Healthy and with MCI	dance: from 65.9 $\pm$ 10.0 to 75.7 $\pm$ 4.1	NI	Peterson's criteria	Ballroom dance Aerobic	60-80% HRmax (2 studies reported)	3 to 10 months	1 to 3x p/w	From 35 to 60 min	From 74% to 93%	Waitlist Health education	Dance improves some global cognitive function
Huang et al (2023)	948	55 + with MCI	65–81	NI	Peterson's criteria	Latin Dance Ballroom dance Aerobic Dance Square dance Choreograph Square Dance	Low-high-low' pattern in intensity	12 to 48 weeks	1 to 3x p/w	From 30 to 60 min	80.29 to 95.10% attendance (5 studies)	Waitlist Health education Music program Physical therapy	Positive effects of dance therapy on global cognitive function, specific cognitive subdomains (i.e., memory, executive function, attention, language), and mental health (i.e., depression and neuropsychiatric symptoms)
Liu et al (2021)	980	60+ with MCI.	From > 60 to 81.06 $\pm$ 5.17	Most women from 50.7% to 100%	any definite, precise, and concrete diagnostic criteria	Aerobic dance Ballroom dance Chinese square dancing	Low to moderate (10 studies reported)	6 to 48 weeks	1 to 7x p/w	From 24 to 60 min	NI	Regular drug treatment therapy Educational programs	Dance may affect positively cognitive

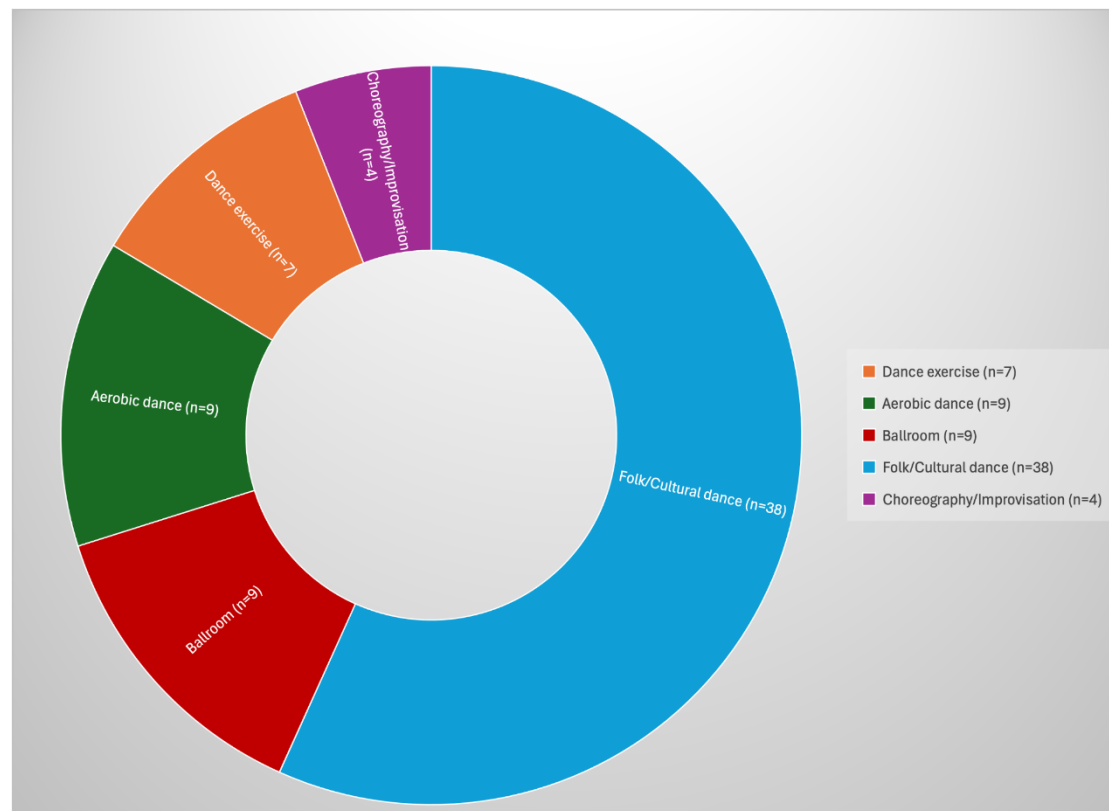
						unique dance forms (Dance Rug and Yangke) Choreography Poco-poco dance standard dance-based aerobics format						Physical therapy Relaxation exercises	function, rote memory, immediate recall, delayed recall and attention in patients with MCI. No effect on the improvement in executive function and balance
Tao et al (2023)	Total: 1708 RCTs: 600	People with MCI, AD, or dementia	From 63.8± 5.24 to 85.8 ± 5.27	Most women 73%	NI	Aerobic dance Ballroom dance Chinese square dance Greek dance Poco-poco Tango with choreography Zumba gold dance Fitness & dance training Improvisation dance Salsa Biodanza Traditional bon dance Danzón Latin ballroom dance Iranian dance Circle dance Wu tao dance Creative dance Modified dance programme Intuitive movement re-embodiment programme	09 studies reported: HR 60%–80% max. HR 100–140 beats/minute BORG not surpassing 2–3 points, systolic blood pressure staying at ≤ 150 mmHg, while the perceived exertion not greater than ≤ 14 on the BORG scale (6–20), or using portable heart rate monitors to keep a consistent level of activity throughout exercise	6 to 100 week (most 12)	2 to 3x p/w	From 30 to 120 min (most 60)	100% to 42.9% generally high adherence	NI	Significant effect on global cognition and memory.

							(40%–60% of VO2max value)						
Vega-Ávila et al (2022)	Total: 809/ Dance: 355	50+ health or with MCI	71.92 ± 5	Most women 82.45%	MMSE MoCA GDS (Global deterioration Scale)	Choreographed aerobic dance Aerobic dance, International Ballroom dance Square Dance	Moderate level Breath a little hard than normal 70% of the MAP 100-140 BPM light to moderate	3 to 10 months	1 to 4x p/w	From 20 to 90 min (most 60)	NI	Life as usual Single education classes or strategies to prevent falls Health education Physical therapy Usual care Usual physical and social habits	Mixed results
Wang et al (2018)	Total: 1319/ Dance: 347	55+ With MCI or Dementia or CI	dance: from 65.9±10.7 to 76±4.9	Most women from 50,7% to 80.3%	MMSE Petersen's criteria	Poco-poco dance and Ballroom dance	NI	6 to 40 weeks	1 to 2x p/w	From 60 to 90 min	NI	Relaxing exercises Health education Usual life	Positive effects on global cognition and memory in individuals with CI
Wu et al (2021)	680	60+ with MCI	from 65 to 81	Most women from 46.3% to 83.7%	MMSE MoCA Peterson's criteria	Irish country African dance Greek dance Tango Salsa Rock Rumba Pop Jive Waltz Cha-cha Jitterbug, Chinese square-dancing International ballroom dancing.	NI	12 to 40 weeks	1 to 3x p/w	From 35 to 60 min	NI	Usual care Health education Music Physical therapy	Positive effect on global cognition, memory, visuospatial function, language, physical function, and quality of life
Yuan et al (2022)	820	50+ With MCI	64.5 to 81	Unclear (06 reported studies = most women)	NI	Aerobic dance, Square dance Ballroom dance Choreographed exercise	Light-to-moderate (9 studies reported)	9 to 40 weeks	1 to 3x p/w	From 30 to 90 min	NI	Physical therapy Usual practice Health education Blank control	Positive effect on the cognitive function, memory, visuospatial function,

												Usual care Usual lifestyle Regular care medicine	cognitive flexibility, attention, and balance of older adults with MCI. .
Zhu et al (2020)	842	50+ With MCI	about 65 to 75	Most women 69%	diagnosed by neurologists	Salsa Rumba Waltz Cha-cha Blues Jitterbug Tango Tai Chi*	60 to 80% HR max (02 studies reported)	3 months to 1 year	1 to 3x p/w	50 min	NI	Stretching toning exercise Health education Usual care	Positive effect on global cognition, memory, and executive function

S5 – Dance distribution of included studies

Dance Intervention Diversity and Distribution



Dance genres represented in the systematic reviews included in this umbrella review can be categorized into four categories (numbers in parentheses reflect number of systematic reviews which listed dance genre): (A) **Dance exercise (7)**, including the following subcategories: Dance movement intervention (1^{*}), Dance Rug (1[§]), Fitness and dance training (1[¶]), Wu Tao dance (1[¶]), Modified dance programme (1[¶]), Intuitive movement re-embodiment (1[¶]), Choreographed exercise (1[↓]); (B) **Aerobic dance (9)**, including the following subcategories: Aerobic dance (6^{†‡§¶#↓}), Standard dance-based aerobics (1[¶]), Zumba gold dance (1[¶]), Choreographed aerobic dance (1[#]); (C) **Ballroom dance (9^{*†‡§¶#Δ↓})**; (D) **Folk/Cultural dance (38)**, including the following subcategories: Chinese square dance (6^{‡§¶#◇↓}), Yangke (Chinese folk dance[§]) (1), Poco-poco dance (indonesian line dance) (3^{§¶Δ}), Greek dance (2^{¶◇}), Tango with choreography (1[¶]), Salsa (3^{¶◇err}), Bon dance (Japanese folk dance)(1[¶]), Danzón Latin (1[¶]), Iranian dance (1[¶]), Circle dance (1[¶]), Latin dance (2^{*‡}), Irish country (1[◇]), African dance (1[◇]), Tango (2^{◇err}), Rock (1[◇]), Rumba (2^{◇err}), Pop (1[◇]), Jive (1[◇]), Waltz (2^{◇err}), Cha-Cha (2^{◇err}), Jitterbug (2^{◇err}), Blues (1^{err}); (E) Choreography/Improvisation (4), including the following subcategories: Choreography (1[§]), Improvisational dance (1[¶]), Biodanza (1[¶]), Creative dance (1[¶]). ^{*}Fong et al., 2021; [†]Hewston et al., 2021; [‡]Huang et al., 2023; [§]Liu et al., 2021; [¶]Tao et al., 2023; [#]Vega-Ávila et al., 2022; ^ΔWang et al., 2018; [◇]Wu et al., 2021; [↓]Yuan et al., 2022; ^{err}Zhu et al., 2020

S6 – Outcomes and instruments of included studies

Author/year	Outcomes	Instruments
Fong et al (2021)	Global cognition	MMSE, MoCA, NCSE
	Complex attention	CTT, TMT, DGS, SDMT, Symbol Search, TEA 4
	Executive function	DSB, DOT, FPT, FAB, FUCAS, Stroop Test, TOH, 2-Back test
	Language	CFT, FAS
	Learning and memory	RAVLT, Word List Memory, WMS: LM, RBMT (Story), Other Story Memory, ROCF (Recall), TCFT (Recall)
	Perceptual-motor function	Block Design, JLO Test, ROCF (Copy), TCFT (Copy)
Hewston et al (2021)	Global cognitive function	MMSE, MoCA
	Executive function	TMT B, Stroop Test, DST
	Learning and Memory	PAL, BVLM, ROCF, SDMT, WMS
	Immediate Memory Span	DGS, Word Recall, Recent Recall (story recall)
	Complex attention	TMT-A, Dual-task Assessment, TEA
Huang et al (2023)	Global cognition	MoCA, MoCA-P, MMSE
	Memory	LM I and II, Story Memory, Word List Memory, RBMT1, RBMT2, RAVLT, WMS-RLM, WMS-III, RBANS
	Attention	DST, SDMT, TEA
	Executive function	TMT-B, Stroop, LVF
	Processing speed	TMT-A, SDMT
	Visuospatial function	ROCFT (copy), ROCFT (delay), JLO
	Language	Word Fluency, FAS, BNT, CVF
	Mental Health	GDS-15, GDS-30, NPI, HADS (depression), HADS (anxiety)
	Quality of life	QoL-AD, SF-LLFDI, SF-36, SF-12
Liu et al (2021)	Global Cognition	MMSE, MoCA
	Memory	TMT-A
	Executive function	TMT-B
	Immediate Recall	LM I, RBMT
	Delayed Memory (LM-2)	LM II

	Attention	SDMT, TEA
	Language	BNT
	Psycho behavioral symptoms	NPI
	Anxiety	HADS (anxiety)
	Depression	GDS-15, GDS-30, NPI, HADS (depression)
	Balance	BBS
	Functional Mobility	TUG
	QoL	QoL-AD, SF-36
Tao et al (2023)	Global cognition	MMSE, MoCA
	Executive function	TMT-A, TMT-B
	Memory	WMS-RLM, DST
	Balance	BBS
	Depression	GDS
Vega-Ávila et al (2022)	Global cognition	MMSE, MoCA, RBANS
	Memory	TCF1-2, WMS III (log palm 1 and 2), WMS III (delay recall), WAIS-4 digit, RBANS, WMS-RLM, DST, RBMT, Brooks spatial test
	Attention and concentration	DST, WAIS III, AKT, FAIR, TEA
	Executive function	DST, TOH 3-4, FPT, TMT B, FAB, FUCAS
	Visuospatial function	JLO, TCF (copy), ROCF (copy and delay recall), WAIS-3 (substitution)
	Language	LVF, FAS, BNT, CVF, FAS
	Processing speed	TMT A, SDMT, WAIS-3 (substitution)
Wang et al (2018)	Global cognition	MMSE, MoCA
	Memory	RBMT (story direct and delayed recall) , ROCFT (copy and delayed recall), Story Memory, Word Memory
	Executive function	TMT-A, TMT-B
Wu et al (2021)	Global Cognition	MMSE, MoCA
	Memory	RBANS (delayed recall), RBANS (recognition), Story Memory, Word Memory, TCF 1, TCF 2, WMS III (LogpPam1 e 2), RAVLT, RBMT 1 e 2, DST, WMS-R LM
	Attention	WAIS II (digit span), WAIS II (symbols), TEA
	Executive function	TMT B, LVF, FPT, TOH 3 (Movement), TOH 3 (Time), TOH 4 (Movement), TOH 4 (Time)
	Processing Speed	TMT A, SDMT

	visuospatial function	JLO, TCP (copy), ROCFT (copy), ROCFT (delay)
	Language	BNT, CVF, FAS
	physical function	BBS; TUG
	Depression	GDS, HADS-D
	quality of life	SF-36, SF-12
Yuan et al (2022)	Global cognition	MMSE, MoCA
	Memory	DST, LM
	Attention and/or concentration	TEA, SBDMT
	Cognitive flexibility	TMT-B
	Visuospatial function	TMT-A
	Balance	BBS
Zhu et al (2020)	Global Cognition	MMSE, MoCA, ADAS-Cog
	Memory: immediate recall	DST, RAVLT, RBMT 1
	Memory: delayed recall	WMS (Revised), RAVLT, RBMT2, Story Memory Recall tests (10 min or 20 min)
	Executive Function	VFT, FAS, TMT-A, TMT-B

Abbreviations: MMSE - Mini Mental State Examination. MoCA - Montreal Cognitive Assessment. NCSE - Neurobehavioral Cognitive Status Examination. CTT - Color Trails Test. TMT - Trail Making Test. DGS - Digit Span Forward SDMT - Symbol Digit Modalities Test. TEA - Test of Everyday Attention. DSB - Digit Span Backward. DOT - Digit Ordering Test. FPT - Five-point Test. FAB - Frontal Assessment Battery. FUCAS - Functional Cognitive Assessment Scale. TOH - Tower of Hanoi. CFT - Category Verbal Fluency Test.. FAS - Verbal Fluency Test. RAVLT - Rey Auditory Verbal Learning Test, Other Auditory Verbal Learning Test. WMS: LM - Wechsler Memory Scale: Logical Memory.. RBMT - Rivermead Behavioural Memory Test. ROCF - Rey-Osterrieth Complex Figure Test. TCFT - Taylor Complex Figure Test. JLO - Judgment of Line Orientation Test. DST - Digit Stroop Test. PAL - Paired Associates Learning. BVLM - Brief Visuospatial Learning Memory. DGS - Digit Span. MoCA-P - Montreal Cognitive Assessment - Philippines. LM - Logical Memory. RBANS - Repeatable Battery for the Assessment of Neuropsychological Status. LVF - Letter Verbal Fluency. BNT - Boston Naming Test. CVF - Category Verbal Fluency. GDS-15 - 15-item Geriatric Depression Scale. GDS-30 - 30-item Geriatric Depression Scale. NPI - Neuropsychiatric Inventory. HADS - Hospital Anxiety Depression Scale. QoL-AD - Quality of Life-Alzheimer's Disease. SF-LLFDI - Short Form of the Late-Life Function and Disability Instrument. SF-12- 12-Item Short Form Health Survey. SF-36 - 36-Item Short Form Health Survey. BBS - Berg Balance Scale. TUG - Timed Up and Go. WAIS - Wechsler Adult Intelligence Scale. AKT - Alters Konzentrations Test (paper-and-pencil non-verbal geriatric concentration test). FAIR - Frankfurt Attention Inventory. ADAS-cog - Alzheimer's Disease Assessment Scale-Cognitive Subscale.

S7 – GRADE of included studies

Quality of evidence and strength of the included studies according to GRADE.

Study	Outcome	Overall certainty of evidence	Main reasons
Fong 2021	Global cognition	⊕○○○ very low	Heterogeneity of studies and unclear information
	Complex attention	⊕○○○ very low	Heterogeneity of studies and unclear information
	Executive function	⊕○○○ very low	Heterogeneity of studies and unclear information
	Language	⊕○○○ very low	Heterogeneity of studies and unclear information
	Learning and memory	⊕○○○ very low	Heterogeneity of studies and unclear information
	Perceptual motor function	⊕○○○ very low	Heterogeneity of studies and unclear information
Hewston 2021	Global cognition	⊕○○○ very low	Heterogeneity, confidence interval
	Executive function	⊕○○○ very low	Heterogeneity and confidence interval, unclear blinding outcome assessment in 2 studies and no random sequence selection in one study
	Learning and memory SDMT	⊕⊕○○ low	Confidence interval and number of studies
	Learning and memory WMS	⊕⊕⊕○ moderate	Number of studies
	Complex attention	⊕⊕⊕○ moderate	Confidence interval

	Language	⊕⊕○○ low	No random sequence generation at one study, unclear allocation, random, blinding outcome assessment and reporting and incomplete outcome data.
Huang 2023	Global cognition	⊕○○○ very low	Heterogeneity, confidence interval
	Mental Health	⊕○○○ very low	Heterogeneity, confidence interval
	QoL	⊕○○○ very low	Heterogeneity, confidence interval
	Memory	⊕⊕⊕○ moderate	Heterogeneity, confidence interval
	Executive function	⊕⊕○○ low	confidence interval
	Processing speed	⊕○○○ very low	Heterogeneity, confidence interval
	Visuospatial ability	⊕○○○ very low	Heterogeneity, confidence interval
	Attention	⊕⊕○○ low	confidence interval
	Language	⊕⊕○○ low	confidence interval
Liu 2021	Global cognition	⊕○○○ very low	Heterogeneity, confidence interval
	Rote Memory	⊕⊕○○ low	heterogeneity
	Executive function	⊕⊕○○ low	heterogeneity

	Immediate recall	⊕⊕○○ low	heterogeneity
	Delayed recall	⊕⊕○○ low	heterogeneity
	Attention	⊕⊕○○ low	heterogeneity
	Depression	⊕○○○ very low	Heterogeneity, confidence interval
	Balance	⊕○○○ very low	Heterogeneity, confidence interval
	Language	⊕○○○ very low	Unclear information
	Anxiety	⊕○○○ very low	Unclear information, number of events
	Dementia-related behavioral symptoms	⊕○○○ very low	Unclear information, number of events
	Functional mobility	⊕○○○ very low	Unclear information, number of events
	QoL	⊕○○○ very low	Unclear information, number of events
Tao 2023	Global cognition	⊕○○○ very low	Heterogeneity
	Executive function	⊕○○○ very low	Heterogeneity, confidence interval
	Memory WMS-RLM	⊕○○○ very low	Number of events
	Memory DST	⊕⊕○○ low	Number of events

	Balance	⊕○○○ very low	Heterogeneity, confidence interval
	Depression	⊕⊕○○ low	Heterogeneity
Vega-Ávila 2022	Global cognition	⊕○○○ very low	Heterogeneity, unclear information
	Memory	⊕○○○ very low	Heterogeneity, unclear information
	Attention and concentration	⊕○○○ very low	Heterogeneity, unclear information
	Executive function	⊕○○○ very low	Heterogeneity, unclear information
	Visuospatial function	⊕○○○ very low	Heterogeneity, unclear information
	Language	⊕○○○ very low	Heterogeneity, unclear information
	Processing speed	⊕○○○ very low	Heterogeneity, unclear information
Wang 2018	Global cognition	⊕○○○ very low	Heterogeneity, confidence interval
	Memory	⊕⊕○○ low	Heterogeneity, confidence interval
	Executive function	⊕⊕⊕⊕ high	
Wu 2021	Global cognition	⊕○○○ very low	Risk of bias, Heterogeneity
	Memory	⊕⊕○○ low	Risk of bias, heterogeneity

	Attention	⊕○○○ very low	Risk of bias, Heterogeneity, confidence interval and number of events
	Executive function	⊕⊕○○ low	Risk of bias, confidence interval
	Processing Speed	⊕⊕○○ low	Risk of bias, confidence interval
	Visuospatial function	⊕○○○ very low	Risk of bias, Heterogeneity, confidence interval
	Language	⊕⊕⊕○ moderate	Risk of bias
	Physical function	⊕⊕⊕○ moderate	Risk of bias
	QoL	⊕○○○ very low	Risk of bias, heterogeneity, confidence interval
Yuan 2022	Global cognition	⊕○○○ very low	Risk of bias, heterogeneity, confidence interval
	Memory	⊕⊕○○ low	Risk of bias, confidence interval
	Attention and concentration	⊕⊕○○ low	Risk of bias, confidence interval
	Cognitive flexibility	⊕⊕○○ low	Risk of bias, confidence interval
	Visuospatial function	⊕⊕○○ low	Risk of bias, heterogeneity
	Balance	⊕○○○ very low	Risk of bias, heterogeneity, confidence interval
Zhu 2020	Global cognition (MoCA and MMSE)	⊕○○○ very low	Risk of bias, heterogeneity,

	Global cognition (ADAS-cog)	⊕⊕○○ low	Risk of bias
	Memory: immediate recall	⊕⊕○○ low	Risk of bias
	Memory delayed recall	⊕⊕⊕○ moderate	Risk of bias
	Executive function TMT A	⊕⊕○○ low	Risk of bias
	Executive function TMT B	⊕○○○ very low	Risk of bias, heterogeneity, confidence interval
	Verbal fluency VFT	⊕○○○ very low	Risk of bias, heterogeneity,
	Verbal fluency FAS	⊕⊕⊕○ moderate	Risk of bias

S8 – AMSTAR2 of included studies

Methodological quality of systematic reviews and meta-analysis according to the AMSTAR2 checklist

Author/ Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Final Score
Fong et al (2021)	yes	partial yes	No	partial yes	yes	yes	no	yes	yes	no	n/a	n/a	yes	yes	n/a	yes	Low quality
Hewston et al (2021)	yes	yes	Yes	partial yes	yes	yes	no	yes	yes	no	yes	no	yes	yes	no	yes	Critically low quality
Huang et al (2023)	yes	yes	No	no	yes	yes	no	yes	yes	no	yes	yes	yes	yes	yes	yes	Critically low quality
Liu et al (2021)	yes	yes	No	partial yes	yes	yes	no	yes	yes	no	yes	yes	yes	yes	yes	yes	Low quality
Tao et al (2023)	yes	yes	Yes	no	yes	yes	no	yes	yes	no	yes	yes	yes	yes	yes	yes	Low quality
Vega-Ávila et al (2022)	yes	yes	Yes	partial yes	yes	yes	no	yes	yes	no	n/a	n/a	yes	yes	n/a	yes	Low quality
Wang 2018	yes	yes	No	partial yes	yes	yes	no	partial yes	no	no	yes	yes	no	yes	yes	yes	Low quality
Wu et al (2021)	yes	yes	Yes	yes	yes	yes	no	partial yes	yes	no	yes	yes	yes	yes	yes	yes	Low quality
Yuan et al (2022)	yes	yes	Yes	partial yes	yes	yes	no	yes	yes	no	yes	yes	yes	yes	yes	yes	Low quality
Zhu et al (2020)	yes	partial yes	Yes	no	yes	yes	no	partial yes	no	no	yes	yes	no	yes	yes	no	Critically low quality

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1. Did the research questions and inclusion criteria for the review include the components of PICO?; 2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?; 3. Did the review authors explain their selection of the study designs for inclusion in the review?; 4. Did the review authors use a comprehensive literature search strategy?; 5. Did the review authors perform study selection in duplicate?; 6. Did the review authors perform data extraction in duplicate?; 7. Did the review authors provide a list of excluded studies and justify the exclusions?; 8. Did the review authors describe the included studies in adequate detail?; 9. Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?; 10. Did the review authors report on the sources of funding for the studies included in the review?; 11. If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?; 12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?; 13. Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?; 14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?; 15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?; 16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?

S9 – Overlap of included studies

[illegible]

List studies (N=29) included in systematic reviews that meet our inclusion criteria (P: MCI/Dementia; I: Dance; O: Cognition) - bold are not RCTs

		Included in Systematic Reviews	(First Author, Year)						
1	Adam et al., 2016	3	(Wang et al., 2018; Liu et al., 2021; Tao et al., 2023)						
2	Aguñaga 2017	3	(Liu et al., 2021; Fong et al., 2021; Huang et al., 2023)						
3	Barnes et al., 2013	2	(Liu et al., 2021; Zhu et al., 2020)						
4	Barnes et al., 2015	1	(Wang et al., 2018)						
5	Bisbe et al., 2020	6	(Liu et al., 2021; Wu et al., 2021; Yuan et al., 2022; Vega-Ávila et al., 2022; Tao et al., 2023; Huang et al., 2023)						
6	Blumen et al., 2022	1	(Tao et al., 2023)						
7	Chang et al., 2021	4	(Yuan et al., 2022; Vega-Ávila et al., 2022; Tao et al., 2023; Huang et al., 2023)						
8	Doi et al., 2017	8	(Wang et al., 2018; Liu et al., 2021; Zhu et al., 2020; Wu et al., 2021; Yuan et al., 2022; Vega-Ávila et al., 2022; Tao et al., 2023; Huang et al., 2023)						
9	Dominguez et al., 2018	4	(Liu et al., 2021; Hewston et al., 2021; Tao et al., 2023; Wang et al., 2018)						
10	Douka et al., 2019	1	(Tao et al., 2023)						
11	Fei and Cai 2020	2	(Yuan et al., 2022; Huang et al., 2023)						
12	Ghadiri et al., 2022	1	(Tao et al., 2023)						
13	Ho et al., 2018	1	(Tao et al., 2023)						
14	Junmei 2016	1	(Liu et al., 2021)						
15	Kropacova et al., 2019	4	(Fong et al., 2021; Wu et al., 2021; Vega-Ávila et al., 2022; Tao et al., 2023)						
16	Lazarou et al., 2017	10	(Wang et al., 2018; Liu et al., 2021; Zhu et al., 2020; Fong et al., 2021; Wu et al., 2021; Hewston et al., 2021; Yuan et al., 2022; Vega-Ávila et al., 2022; Tao et al., 2023; Huang et al., 2023)						
17	Parial et al., 2022	1	(Tao et al., 2023)						
18	Qi et al., 2019	6	(Liu et al., 2021; Wu et al., 2021; Hewston et al., 2021; Yuan et al., 2022; Vega-Ávila et al., 2022; Tao et al., 2023)						
19	Rektorova et al., 2019	1	(Wu et al., 2021)						
20	Shimizu et al., 2018	1	(Fong et al., 2021)						
21	Wang et al., 2019	5	(Liu et al., 2021; Wu et al., 2021; Yuan et al., 2022; Tao et al., 2023; Huang et al., 2023)						
22	Wu et al., 2019	2	(Yuan et al., 2022; Huang et al., 2023)						
23	Xinjian 2017	2	(Liu et al., 2021; Yuan et al., 2022)						
24	Yi 2015	1	(Liu et al., 2021)						
25	Yu 2019	1	(Liu et al., 2021)						
26	Zhang et al., 2020	1	(Yuan et al., 2022)						
27	Zhao and Li 2020	2	(Yuan et al., 2022)						
28	Zhu et al., 2018	6	(Liu et al., 2021; Zhu et al., 2020; Wu et al., 2021; Hewston et al., 2021; Yuan et al., 2022; Tao et al., 2023)						
29	Zhu et al., 2022	2	(Vega-Ávila et al., 2022; Tao et al., 2023)						

Lazarou et al., 2017 was included in 10/10 systematic reviews, Doi et al., 2017 was included in 8/10 systematic reviews, Bisbe et al., 2020, Qi et al., 2019 and Zhu et al., 2018 included in 6/10 systematic reviews.

PRIOR Checklist

(Gates M, Gates A, Pieper D, et al. Reporting guideline for overviews of reviews of healthcare interventions: development of the PRIOR statement. *BMJ* 2022;378:e070849. doi:10.1136/bmj-2022-070849.)

Section Topic	#	Item	Location reported
TITLE			
Title	1	Identify the report as an overview of reviews.	1
ABSTRACT			
Abstract	2	Provide a comprehensive and accurate summary of the purpose, methods, and results of the overview of reviews.	4 to 5
INTRODUCTION			
Rationale	3	Describe the rationale for conducting the overview of reviews in the context of existing knowledge.	5 to 6
Objectives	4	Provide an explicit statement of the objective(s) or question(s) addressed by the overview of reviews.	6
METHODS			
Eligibility criteria	5a	Specify the inclusion and exclusion criteria for the overview of reviews. If supplemental primary studies were included, this should be stated, with a rationale.	6 to 7
	5b	Specify the definition of 'systematic review' as used in the inclusion criteria for the overview of reviews.	N/A
Information sources	6	Specify all databases, registers, websites, organizations, reference lists, and other sources searched or consulted to identify systematic reviews and supplemental primary studies (if included). Specify the date when each source was last searched or consulted.	7
Search strategy	7	Present the full search strategies for all databases, registers and websites, such that they could be reproduced. Describe any search filters and limits applied.	7 (S1)
Selection process	8a	Describe the methods used to decide whether a systematic review or supplemental primary study (if included) met the inclusion criteria of the overview of reviews.	7
	8b	Describe how overlap in the populations, interventions, comparators, and/or outcomes of systematic reviews was identified and managed during study selection.	N/A
Data collection process	9a	Describe the methods used to collect data from reports.	7 to 8
	9b	If applicable, describe the methods used to identify and manage primary study overlap at the level of the comparison and outcome during data collection. For each outcome, specify the method used to illustrate and/or quantify the degree of primary study overlap across systematic reviews.	N/A
	9c	If applicable, specify the methods used to manage discrepant data across systematic reviews during data collection.	8
Data items	10	List and define all variables and outcomes for which data were sought. Describe any assumptions made and/or measures taken to identify and clarify missing or unclear information.	7 to 8
Risk of bias assessment	11a	Describe the methods used to <u>assess</u> risk of bias or methodological quality of the included systematic reviews.	8 to 9
	11b	Describe the methods used to <u>collect</u> data on (from the systematic reviews) and/or <u>assess</u> the risk of bias of the primary studies included in the systematic reviews. Provide a justification for instances where flawed, incomplete, or missing assessments are identified but not re-assessed.	N/A
	11c	Describe the methods used to <u>assess</u> the risk of bias of supplemental primary studies (if included).	N/A
Synthesis methods	12a	Describe the methods used to summarize or synthesize results and provide a rationale for the choice(s).	8
	12b	Describe any methods used to explore possible causes of heterogeneity among results.	8
	12c	Describe any sensitivity analyses conducted to assess the robustness of the synthesized results.	8
Reporting bias assessment	13	Describe the methods used to <u>collect</u> data on (from the systematic reviews) and/or <u>assess</u> the risk of bias due to missing results in a summary or synthesis (arising from reporting biases at the levels of the systematic reviews, primary studies, and supplemental primary studies, if included).	8
Certainty assessment	14	Describe the methods used to <u>collect</u> data on (from the systematic reviews) and/or <u>assess</u> certainty (or confidence) in the body of evidence for an outcome.	8
RESULTS			
Systematic review and supplemental primary study selection	15a	Describe the results of the search and selection process, including the number of records screened, assessed for eligibility, and included in the overview of reviews, ideally with a flow diagram.	9; Figure 1
	15b	Provide a list of studies that might appear to meet the inclusion criteria, but were excluded, with the main reason for exclusion.	S2

Section Topic	#	Item	Location reported
Characteristics of systematic reviews and supplemental primary studies	16	Cite each included systematic review and supplemental primary study (if included) and present its characteristics.	9; S3
Primary study overlap	17	Describe the extent of primary study overlap across the included systematic reviews.	13; S9
Risk of bias in systematic reviews, primary studies, and supplemental primary studies	18a	Present assessments of risk of bias or methodological quality for each included systematic review.	13; S8
	18b	Present assessments (<i>collected</i> from systematic reviews or <i>assessed</i> anew) of the risk of bias of the primary studies included in the systematic reviews.	N/A
	18c	Present assessments of the risk of bias of supplemental primary studies (if included).	N/A
Summary or synthesis of results	19a	For all outcomes, summarize the evidence from the systematic reviews and supplemental primary studies (if included). If meta-analyses were done, present for each the summary estimate and its precision and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	12; Figures 3-5
	19b	If meta-analyses were done, present results of all investigations of possible causes of heterogeneity.	12
	19c	If meta-analyses were done, present results of all sensitivity analyses conducted to assess the robustness of synthesized results.	12
Reporting biases	20	Present assessments (<i>collected</i> from systematic reviews and/or <i>assessed</i> anew) of the risk of bias due to missing primary studies, analyses, or results in a summary or synthesis (arising from reporting biases at the levels of the systematic reviews, primary studies, and supplemental primary studies, if included) for each summary or synthesis assessed.	N/A
Certainty of evidence	21	Present assessments (<i>collected</i> or <i>assessed</i> anew) of certainty (or confidence) in the body of evidence for each outcome.	12; S7
DISCUSSION			
Discussion	22a	Summarize the main findings, including any discrepancies in findings across the included systematic reviews and supplemental primary studies (if included).	13
	22b	Provide a general interpretation of the results in the context of other evidence.	13 to 16
	22c	Discuss any limitations of the evidence from systematic reviews, their primary studies, and supplemental primary studies (if included) included in the overview of reviews. Discuss any limitations of the overview of reviews methods used.	16 to 17
	22d	Discuss implications for practice, policy, and future research (both systematic reviews and primary research). Consider the relevance of the findings to the end users of the overview of reviews, e.g., healthcare providers, policymakers, patients, among others.	17 to 18
OTHER INFORMATION			
Registration and protocol	23a	Provide registration information for the overview of reviews, including register name and registration number, or state that the overview of reviews was not registered.	6
	23b	Indicate where the overview of reviews protocol can be accessed, or state that a protocol was not prepared.	N/A
	23c	Describe and explain any amendments to information provided at registration or in the protocol. Indicate the stage of the overview of reviews at which amendments were made.	N/A
Support	24	Describe sources of financial or non-financial support for the overview of reviews, and the role of the funders or sponsors in the overview of reviews.	19
Competing interests	25	Declare any competing interests of the overview of reviews' authors.	19
Author information	26a	Provide contact information for the corresponding author.	2
	26b	Describe the contributions of individual authors and identify the guarantor of the overview of reviews.	18
Availability of data and other materials	27	Report which of the following are available, where they can be found, and under which conditions they may be accessed: template data collection forms; data collected from included systematic reviews and supplemental primary studies; analytic code; any other materials used in the overview of reviews.	N/A