Supplementary Material

-

File 1 –Tables

Table S1: Summary of meta-analytic results for cognitive training interventions
    color-coding: black = significant effect, grey = no significant effect
    * = significant at $p \leq 0.05$, ** = significant at $p \leq 0.01$

Abbreviations: ADL = Activities of daily living, CI = confidence interval, g = Hedge's g, GRADE = Grading of Recommendations Assessment, Development and Evaluation, HOA = healthy older adults; k = number of studies; n = number of participants; NR = not reported, MD = mean difference (absolut), mNCD = mild neurocognitive disorder, SMD = standardized mean difference

Reference	Study Characteristics	Outcomes			
		Type	**Statistics**	**Heterogeneity**	**GRADE**
Bonnechère et al. 2020 [1]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** commercially available computerized videogames to perform cognitive training **COMPARISON:** mixed (i.e. active or passive brain training)	☒ Cognition processing speed** working memory** processing speed** verbal memory* attention visuospatial abilities ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR	$g^+ = 0.40$, $p < 0.001$, 95 % CI [0.20 to 0.60], k = 8, n = 403 $g^+ = 0.21$, $p = 0.001$, 95 % CI [0.08 to 0.34], k = 9, n = 917 $g^+ = 0.21$, $p = 0.006$, 95 % CI [0.06 to 0.35], k = 9, n = 582 $g^+ = 0.12$, $p = 0.031$, 95 % CI [0.01 to 0.24], k = 7, n = 907 $g^+ = 0.06$, $p = 0.59$, 95% CI [-0.16 to 0.29], k = 4, n = 299 $g^+ = 0.03$, $p = 0.18$, 95 % CI [-0.16 to 0.22], k = 4, n = 216	☐ sign. ☒ n.s. ☒ sign. ☐ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☒ sign. ☐ n.s. ☐ sign. ☒ n.s.	
Chan et al. 2020 [2]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☒ older adults with Dementia **INTERVENTION:** cognitive training intervention (including (i) computerized cognitive training, (ii) cognitive training and rehabilitation and (iii) cognitive stimulation therapy, such as reminiscence therapy and reality orientation. **COMPARISON:** mixed (i.e. (i) the usual care (i.e. treatment as usual or waitlisted group); (ii) social and recreational activity; and (iii) alternative psychosocial intervention.	☐ Cognition ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☒ Psychosocial Outcomes depression**	$SMD^- = -0.54$, $p < 0.0001$, 95 % CI [-0.77 to -0.31], k = 36, n = 2,414	☒ sign. ☐ n.s.	
Mansor et al. 2020 [3]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** videogames (exergames, brain training, action, strategy, and casual games) **COMPARISON:** mixed (passive (i.e. no-contact; k = 24) or active (e.g. watched a movie or a documentary, read a book, completed quizzes, or exercised; k = 9))	☒ Cognition updating memory* inhibition* reasoning processing speed shifting attention delayed memory ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR	$g^+ = 0.37$, $p = 0.02$, 95 % CI [0.07 to 0.66], k = 23, n = 879 $g^+ = 0.28$, $p = 0.02$, 95 % CI [0.02 to 0.53], k = 20, n = 709 $g^+ = 0.17$, $p = 0.45$, 95 % CI [-0.28 to 0.62], k = 13, n = 523 $g^+ = 0.15$, $p = 0.20$, 95 % CI [-0.08 to 0.38], k = 21, n = 800 $g^+ = 0.14$, $p = 0.46$, 95% CI [-0.21 to 0.50], k = 18, n = 693 $g^+ = 0.08$, $p = 0.77$, 95 % CI [-0.47 to 0.64], k = 11, n = 394 $g^+ = -0.03$, $p = 0.90$, 95% CI [-0.48 to 0.42], k = 10, n = 387	☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☒ sign. ☐ n.s.	

Study	Details	Outcomes			
Gates et al. 2020 [4]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** computerized cognitive training for at least 12 weeks **COMPARISON:** (1) active control intervention (unguided computer- and/or screen-based tasks that are not a planned intervention. These tasks can involve watching educational videos or playing computer games, with no particular training component.) (2) inactive control (no intervention)	☒ **Cognition**			
		speed of processing**[1]	$SMD^- = -0.63$, p = 0.01, 95 % CI [- 1.14 to - 0.12], k = 2, n = 138	☐ sign. ☒ n.s.	very low
		global cognition*[1]	$SMD^- = -0.31$, p = 0.02, 95 % CI [- 0.57 to - 0.05], k = 2, n = 232	☐ sign. ☒ n.s.	low
		working memory[1]	$SMD^- = -0.17$, p = 0.08, 95 % CI [- 0.36 to 0.02], k = 3, n = 392	☐ sign. ☒ n.s.	low
		executive function[1]	$SMD^- = -0.04$, p = 0.89, 95 % CI [- 0.61 to 0.53], k = 3, n = 230	☒ sign. ☐ n.s.	very low
		episodic memory[1]	$SMD^- = 0.06$, p = 0.57, 95 % CI [- 0.14 to 0.26], k = 4, n = 439	☐ sign. ☒ n.s.	low
		episodic memory*[2]	$SMD^- = -0.90$, p = 0.03, 95 % CI [- 1.73 to - 0.07], k = 1, n = 150	N/A	low
		speed of processing[2]	$SMD^- = -0.28$, p = 0.31, 95 % CI [- 0.82 to 0.26], k = 2, n = 204	☐ sign. ☒ n.s.	very low
		verbal fluency[2]	$SMD^- = -0.11$, p = 0.88, 95 % CI [- 1.58 to 1.36], k = 1, n = 150	N/A	low
		executive function[2]	$SMD^- = -0.08$, p = 0.51, 95 % CI [- 0.31 to 0.15], k = 2, n = 292	☐ sign. ☒ n.s.	low
		working memory[2]	$SMD^- = -0.08$, p = 0.66, 95 % CI [- 0.43 to 0.27], k = 1, n = 60	N/A	low
		☐ **Brain / Neurochemicals / HRV** NR			
		☐ **Physical Outcomes, Mobility, and Activities of Daily Living** NR			
		☐ **Psychosocial Outcomes** NR			
Bahar-Fuchs et al. 2019 [5]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** cognitive training **COMPARISON:** mixed (i.e. "18 passive and 13 active control conditions, along with 15 alternative treatment conditions, including occupational therapy, mindfulness, reminiscence therapy, and others."[5])	☒ **Cognition**			
		delayed memory**	$SMD^+ = 0.81$, p = 0.002, 95 % CI [0.29 to 1.32], k = 11, n = 543	☒ sign. ☐ n.s.	very low
		executive function**	$SMD^+ = 0.75$, p = 0, 95 % CI [0.28 to 1.22], k = 12, n = 511	☒ sign. ☐ n.s.	
		immediate memory**	$SMD^+ = 0.74$, p < 0.0001, 95 % CI [0.37 to 1.12], k = 18, n = 762	☒ sign. ☐ n.s.	
		language (naming)*	$SMD^+ = 0.62$, p = 0.02, 95 % CI [0.11 to 1.12], k = 5, n = 311	☒ sign. ☐ n.s.	
		attention & work. mem.*	$SMD^+ = 0.56$, p = 0.02, 95 % CI [0.56 to 1.05], k = 12, n = 551	☒ sign. ☐ n.s.	
		verb. category fluency**	$SMD^+ = 0.52$, p = 0, 95 % CI [0.23 to 0.81], k = 9, n = 475	☒ sign. ☐ n.s.	
		global cognition**	$SMD^+ = 0.42$, p < 0.0001, 95 % CI [0.23 to 0.62], k = 27, n = 1,389	☒ sign. ☐ n.s.	moderate
		meta cognition	$SMD^+ = 0.50$, p = 0.13, 95 % CI [-0.15 to 1.14], k = 2, n = 41	☐ sign. ☒ n.s.	
		processing speed	$SMD^+ = 0.22$, p = 0.19, 95 % CI [-0.11 to 0.54], k = 6, n = 201	☒ sign. ☐ n.s.	
		verb. letter fluency	$SMD^+ = 0.22$, p = 0.13, 95 % CI [-0.07 to 0.50], k = 12, n = 544	☒ sign. ☐ n.s.	
		☐ **Brain / Neurochemicals / HRV** NR			
		☒ **Physical Outcomes, Mobility, and Activities of Daily Living**			
		capacity for ADLs	$SMD^+ = 0.12$, p = 0.30, 95 % CI [- 0.11 to 0.35], k = 10, n = 687	☒ sign. ☐ n.s.	low
		☒ **Psychosocial Outcomes**			
		participants' mood	$SMD^+ = 0.72$, p = 0.08, 95 % CI [- 0.1 to 1.54], k = 8, n = 577	☒ sign. ☐ n.s.	very low
		neuropsych. symptoms	$SMD^+ = 0.44$, p = 0.27, 95 % CI [- 0.34 to 1.22], k = 6, n = 493	☒ sign. ☐ n.s.	
		quality of life	$SMD^+ = -0.04$, p = 0.81, 95 % CI [- 0.38 to 0.29], k = 5, n = 630	☒ sign. ☐ n.s.	
Gates et al. 2019 [6]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** computerized cognitive training for at least 12 weeks **COMPARISON:** (1) active control intervention (unguided computer- and/or screen-based tasks that are not a planned intervention. These tasks can involve watching educational videos or playing computer games, with no particular training component.) (2) inactive control (no intervention)	☒ **Cognition**			
		working memory*[1]	$SMD^- = -0.88$, p = 0.04, 95 % CI [- 1.73 to - 0.03], k = 3, n = 72	☐ sign. ☒ n.s.	very low
		episodic memory*[1]	$SMD^- = -0.79$, p = 0.04, 95 % CI [- 1.54 to - 0.04], k = 5, n = 223	☐ sign. ☒ n.s.	very low
		global cognition*[1]	$SMD^- = -0.53$, p = 0.05, 95 % CI [- 1.06 to - 0.01], k = 5, n = 407	☐ sign. ☒ n.s.	very low
		executive function[1]	$SMD^- = -0.31$, p = 0.31, 95 % CI [- 0.90 to 0.28], k = 3, n = 150	☐ sign. ☒ n.s.	very low
		verbal fluency[1]	$SMD^- = -0.16$, p = 0.60, 95 % CI [- 0.76 to 0.44], k = 3, n = 150	☐ sign. ☒ n.s.	low
		speed of processing[1]	$SMD^- = 0.20$, p = 0.28, 95 % CI [- 0.16 to 0.56], k = 2, n = 119	☐ sign. ☒ n.s.	low
		episodic memory*[2]	$MD^- = -2.70$, p = 0.02, 95 % CI [- 5.00 to - 0.40], k = 1, n = 37	N/A	very low
		executive function[2]	$MD^- = -2.70$, p = 0.13, 95 % CI [- 6.21 to 0.81], k = 1, n = 37	N/A	very low
		global cognition[2]	$MD^- = -0.36$, p = 0.29, 95 % CI [- 0.30 to 1.02], k = 1, n = 37	N/A	very low
		verbal fluency[2]	$MD^- = 1.90$, p = 0.56, 95 % CI [- 4.50 to 8.30], k = 1, n = 37	N/A	very low
		☐ **Brain / Neurochemicals / HRV** NR			
		☒ **Physical Outcomes, Mobility, and Activities of Daily Living**			
		funct. performance[1]	$SMD^- = 0.09$, p = 0.76, 95 % CI [-0.51 to 0.70], k = 2, n = 131	NR	NR
		funct. performance[2]	$MD^- = 0.00$, p = 1, 95 % CI [-0.48 to 0.48], k = 1, n = 37	N/A	very low
		☒ **Psychosocial Outcomes**			
		depression[1]	$SMD^- = -0.77$, p = 0.24, 95 % CI [- 2.07 to 0.52], k = 3, n = 101	☒ sign. ☐ n.s.	low
		quality of life[1]	$MD^- = 0.40$, p = 0.73, 95 % CI [- 1.85 to 2.65], k = 1, n = 19	N/A	NR
		depression*[2]	$MD^- = -1.30$, p = 0.05, 95 % CI [- 2.61 to 0.01], k = 1, n = 37	N/A	NR

Vaportzis et al. 2019 [7]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** video games, computer training, reading and arithmetic problem solving, and brain-computer interface **COMPARISON:** (1) active control intervention (e.g. stretching or balance classes) (2) passive control (no intervention)	☒ Cognition executive function [1] $SMD^+ = 0.63$, p = 0.20, 95 % CI [- 0.33 to 1.59], k = 2, n = 123 ☐ sign. ☒ n.s. Stroop interference [1] $SMD^+ = -0.12$, p = 0.43, 95 % CI [- 0.41 to 0.17], k = 2, n = 268 ☐ sign. ☒ n.s. block design [2] $SMD^+ = 0.13$, p = 0.57, 95 % CI [- 0.33 to 0.59], k = 2, n = 74 ☐ sign. ☒ n.s. digit substitution [2] $SMD^+ = 0.13$, p = 0.58, 95 % CI [- 0.33 to 0.59], k = 2, n = 74 ☐ sign. ☒ n.s. digit span [2] $SMD^+ = 0.10$, p = 0.67, 95 % CI [- 0.36 to 0.55], k = 2, n = 74 ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Zhang et al. 2019 [8]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** computerized cognitive training **COMPARISON:** mixed (i.e. active (interventions that controlled for non-specific therapeutic effects) or passive (waiting list conditions, treatment as usual or a non-matched minimal intervention))	☒ Cognition working memory** $g^+ = 0.39$, p = 0.004, 95 % CI [0.12 to 0.66], k = 5, n = 165 ☐ sign. ☒ n.s. memory** $g^+ = 0.30$, p = 0.002, 95 % CI [0.11 to 0.50], k = 13, n = 477 ☒ sign. ☐ n.s. global cognition* $g^+ = 0.23$, p = 0.03, 95 % CI [0.03 to 0.44], k = 11, n = 503 ☐ sign. ☒ n.s. executive function $g^+ = 0.20$, p = 0.08, 95 % CI [- 0.03 to 0.43], k = 11, n = 353 ☒ sign. ☐ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Liang et al. 2018 [9]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** computerized cognitive training **COMPARISON:** mixed (cognitive interventions, control group alone or in any combination)	☒ Cognition global cognition $SMD^+ = -0.02$, p = 0.588, 95 % CI [- 0.31 to 0.27], k = 4 ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☒ Psychosocial Outcomes neuropsych. symptoms $SMD^+ = -0.61$, p = NR, 95 % CI [-1.29 to 0.06], k = 1 NR
Sala et al. 2018 [10]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** video game playing **COMPARISON:** mixed (active or passive control conditions)	☒ Cognition intelligence/reasoning** $g^- = -0.63$, p = 0.004, 95 % CI [-1.06 to – 0.20], k = 15 NR memory $g^- = -0.01$, p = 0.92, 95 % CI [-0.24 to 0.22], k = 22 NR visual attention $g^- = 0.00$, p = 0.97, 95 % CI [-0.21 to 0.22], k = 26 NR spatial ability $g^- = 0.06$, p = 0.65, 95 % CI [-0.20 to 0.33], k = 12 NR cognitive control $g^- = 0.07$, p = 0.54, 95 % CI [-0.15 to 0.29, k = 17 NR ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR

García-Casal et al. 2017 [11]	POPULATION: ☐ healthy older adults ☐ older adults with mNCD ☒ older adults with Dementia INTERVENTION: computer-based cognitive interventions (i.e. cognitive recreation, cognitive rehabilitation, cognitive stimulation or cognitive training) COMPARISON: mixed (active and passive control, control populations)	☒ Cognition global cognition** SMD$^+$ = 0.69, p < 0.0001, 95 % CI [0.37 to 1.02], k = 7, n = 81 ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☒ Psychosocial Outcomes depression** SMD$^+$ = 0.47, p = 0.003, 95 % CI [0.16 to 0.78], k = 6, n = 84 ☐ sign. ☒ n.s. anxiety* SMD$^+$ = 0.55, p = 0.03, 95 % CI [0.07 to 1.04], k = 2, n = 34 ☐ sign. ☒ n.s. ADL SMD$^+$ = 0.26, p = 0.11, 95 % CI [0.06 to 0.59] NR
Hill et al. 2017 [12]	POPULATION: ☐ healthy older adults ☒ older adults with mNCD ☒ older adults with Dementia INTERVENTION: computerized cognitive training COMPARISON: (1) active (e.g., sham CCT, psychoeducation), or pencil-and-paper cognitive training) (2) passive (no-contact, wait-list)	☒ Cognition MNCD: pooled estimate** (1) g$^+$ = 0.40, p < 0.001, 95 % CI [0.17 to 0.63], k = 11 ☐ sign. ☒ n.s. global cognition** (1) g$^+$ = 0.41, p < 0.001, 95 % CI [0.03 to 0.75], k = 8 ☐ sign. ☒ n.s. pooled estimate** (2) g$^+$ = 0.32, p < 0.001, 95 % CI [0.09 to 0.55], k = 6 ☐ sign. ☒ n.s. global cognition** (2) g$^+$ = 0.37, p < 0.001, 95 % CI [0.02 to 0.72], k = 4 ☐ sign. ☒ n.s. working memory** g$^+$ = 0.74, p < 0.001, 95 % CI [0.32 to 1.15], k = 9 ☒ sign. ☐ n.s. nonverbal learning** g$^+$ = 0.50, p < 0.001, 95 % CI [0.25 to 0.76], k = 8 ☐ sign. ☒ n.s. attention** g$^+$ = 0.44, p < 0.001, 95 % CI [0.20 to 0.68], k = 6 NR verbal memory** g$^+$ = 0.42, p < 0.001, 95 % CI [0.21 to 0.63], k = 12 ☒ sign. ☐ n.s. verbal learning** g$^+$ = 0.39, p < 0.002, 95 % CI [0.14 to 0.63], k = 11 ☒ sign. ☐ n.s. language g$^+$ = 0.41, p > 0.05, 95 % CI [-0.10 to 0.92], k = 6 NR nonverbal memory g$^+$ = 0.20, p > 0.05, 95 % CI [-0.03 to 0.43], k = 7 NR executive function g$^+$ = 0.20, p > 0.05, 95 % CI [-0.05 to 0.44], k = 13 NR visuospatial skills g$^+$ = 0.18, p > 0.05, 95 % CI [-0.23 to 0.60], k = 5 NR processing speed g$^+$ = 0.09, p > 0.05, 95 % CI [-0.17 to 0.35], k = 7 NR Dementia: visuospatial skills* g$^+$ = 0.54, p = 0.02, 95 % CI [0.07 to 1.01], k = 3 NR pooled estimate * g$^+$ = 0.26, p = 0.05, 95 % CI [0.01 to 0.52], k = 11 ☐ sign. ☒ n.s. verbal learning g$^+$ = 0.42, p = 0.14, 95 % CI [-0.14 to 0.97], k = 4 NR global cognition g$^+$ = 0.31, p = 0.15, 95 % CI [-0.11 to 0.72], k = 7 NR non-verbal learning g$^+$ = 0.23, p = 0.50, 95 % CI [-0.43 to 0.90], k = 2 NR working memory g$^+$ = 0.22, p = 0.45, 95 % CI [-0.34 to 0.78], k = 4 NR verbal memory g$^+$ = 0.17, p = 0.42, 95 % CI [-0.25 to 0.59], k = 9 NR processing speed g$^+$ = 0.11, p = 0.69, 95 % CI [-0.43 to 0.66], k = 2 NR language g$^+$ = 0.08, p = 0.67, 95 % CI [-0.29 to 0.44], k = 4 NR executive function g$^+$ = 0.02, p = 0.92, 95 % CI [-0.46 to 0.51], k = 5 NR non-verbal memory g$^+$ = -0.06, p = 0.80, 95 % CI [-0.06 to 0.38], k = 1 N/A attention g$^+$ = -0.19, p = 0.52, 95 % CI [-0.77 to 0.39], k = 2 NR ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living mNCD: instrumental ADL g$^+$ = 0.21, p > 0.05, 95 % CI [- 0.18 to 0.61], k = 6 NR Dementia: ADL g$^+$ = 0.06, p = 0.84, 95 % CI [- 0.51 to 0.64], k = 2 NR instrumental ADL g$^+$ = - 0.24, p = 0.07, 95 % CI [- 0.50 to 0.02], k = 6 NR ☒ Psychosocial Outcomes mNCD: psychosocial function* g$^+$ = 0.52, p = 0.045, 95 % CI [0.01 to 1.03], k = 8 ☒ sign. ☐ n.s. Dementia: psychosocial function g$^+$ = 0.60, p = 0.07, 95 % CI [- 0.05 to 1.25], k = 6 NR
Mewborn et al. 2017 [13]	POPULATION: ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia INTERVENTION: single- and multi-domain cognitive training interventions COMPARISON: mixed (passive or active (e.g. education and support groups, completing questionnaires, and	☒ Cognition pooled effect for HOA** g$^+$ = 0.314, p < 0.001, 95 % CI [0.24 to 0.39], k = 134 ☒ sign. ☐ n.s. pooled effect for mNCD** g$^+$ = 0.336, p < 0.001, 95 % CI [0.21 to 0.47], k = 38 ☒ sign. ☐ n.s. near transfer (mixed)** g$^+$ = 0.438, p < 0.001, 95 % CI [0.36 to 0.52], k = 141 ☒ sign. ☐ n.s. far transfer (mixed)** g$^+$ = 0.145, p < 0.001, 95 % CI [0.09 to 0.20], k = 138 ☒ sign. ☐ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR

	cognitive stimulation (e.g., computer games, puzzles, reading)) without statistically difference between the pooled estimate between these two control groups)	☐ Psychosocial Outcomes NR
Shermann et al. 2017 [14]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** broad selection of cognitive training interventions (i.e. cognitive stimulation = 0/26 (0 %), restorative training = 8/26 (30.77%), compensatory training = 3/26 (11.54%), and multicomponent approaches = 15/26 (57.69%)) **COMPARISON:** mixed (i.e. passive (received no training), waitlisted, or provided standard of care (57.69 %), or active (engaged in an active, non-trained program (42.31 %).	☒ Cognition memory (verbal)** $\quad g^+ = 0.758$, $p < 0.001$, 95 % CI [0.382 to 1.133], $k = 15 \quad$ ☒ sign. ☐ n.s. memory (pooled)** $\quad g^+ = 0.659$, $p = 0.000$, 95 % CI [0.383 to 0.936], $k = 20 \quad$ ☒ sign. ☐ n.s. working memory** $\quad g^+ = 0.614$, $p = 0.000$, 95 % CI [0.285 to 0.943], $k = 12 \quad$ ☒ sign. ☐ n.s. executive function* $\quad g^+ = 0.575$, $p = 0.019$, 95 % CI [0.093 to 1.056], $k = 13 \quad$ ☒ sign. ☐ n.s. memory (non-verbal)** $\quad g^+ = 0.570$, $p = 0.006$, 95 % CI [0.160 to 0.980], $k = 5 \quad$ ☐ sign. ☒ n.s. language** $\quad g^+ = 0.511$, $p < 0.001$, 95 % CI [0.231 to 0.790], $k = 7 \quad$ ☒ sign. ☐ n.s. overall** $\quad g^+ = 0.454$, $p = 0.003$, 95 % CI [0.156 to 0.753], $k = 26 \quad$ ☒ sign. ☐ n.s. global cognition** $\quad g^+ = 0.216$, $p = 0.003$, 95 % CI [0.076 to 0.356], $k = 16 \quad$ ☐ sign. ☒ n.s. processing speed $\quad g^- = -0.434$, $p = 0.235$, 95 % CI [-1.150 to 0.282], $k = 6 \quad$ ☒ sign. ☐ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Melby-Lervåg et al. 2016 [15]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** computerized working memory training **COMPARISON:** (1) treated (non-working memory training intervention of a similar type and of equivalent intensity and duration) (2) untreated (no intervention)	☒ Cognition near-transfer ** (1) $\quad g^+ = 0.76$, $p < 0.01$, $k = 4$ working memory (1) $\quad g^+ = 0.28$, $p > 0.05$, $k = 6$ nonverbal abilities (1) $\quad g^+ = -0.13$, $p > 0.05$, $k = 6$ near-transfer* (2) $\quad g^+ = 1.37$, $p < 0.05$, $k = 7$ working memory** (2) $\quad g^+ = 0.49$, $p < 0.01$, $k = 10$ nonverbal abilities* (2) $\quad g^+ = 0.22$, $p < 0.05$, $k = 10$ visuo-spatial skills (2) $\quad g^+ = 0.47$, $p > 0.01$, $k = 4$ ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Toril et al. 2014 [16]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** video game training (i.e. commercial video games or combinations of classic cognitive tasks taken from commercial packages (e.g. Nintendo Brain Training, Brain Age, Big Brain Academy, etc.) **COMPARISON:** mixed (active control intervention and passive control (no intervention)) without significant difference in effect estimates between control conditions	☒ Cognition reaction time** $\quad d^+ = 0.63$, $p < 0.01$, 95 % CI [0.42 to 0.84] $\quad$ NR memory* $\quad d^+ = 0.39$, $p < 0.05$, 95 % CI [0.01 to 0.64] $\quad$ NR global cognition* $\quad d^+ = 0.38$, $p < 0.05$, 95 % CI [0.13 to 0.64] $\quad$ NR pooled effect** $\quad d^+ = 0.37$, $p < 0.01$, 95 % CI [0.26 to 0.48] $\quad$ ☒ sign. ☐ n.s. attention** $\quad d^+ = 0.37$, $p < 0.01$, 95 % CI [0.17 to 0.57] $\quad$ NR executive function $\quad d^+ = 0.16$, $p > 0.05$, 95 % CI [-0.10 to 0.42] $\quad$ NR ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR

Lampit et al. 2014 [17]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** computerized cognitive training **COMPARISON:** mixed (active control intervention and passive control (no intervention)) without significant difference in effect estimates between control conditions	☒ Cognition processing speed** $\quad g^+ = 0.31$, p = 0.002, 95 % CI [0.11 to 0.50], k = 33 $\quad$ ☒ sign. ☐ n.s nonverbal memory** $\quad g^+ = 0.24$, p = 0.002, 95 % CI [0.09 to 0.38], k = 13 $\quad$ ☐ sign. ☒ n.s pooled effect** $\quad g^+ = 0.22$, p < 0.001, 95 % CI [0.15 to 0.29], k = 52 $\quad$ ☒ sign. ☐ n.s working memory** $\quad g^+ = 0.22$, p < 0.001, 95 % CI [0.09 to 0.35], k = 28 $\quad$ ☒ sign. ☐ n.s verbal memory* $\quad g^+ = 0.16$, p = 0.02, 95 % CI [0.03 to 0.29], k = 3 $\quad$ ☒ sign. ☐ n.s visuospatial skills** $\quad g^+ = 0.02$, p = 0.01, 95 % CI [0.15 to 0.29], k = 8 $\quad$ ☐ sign. ☒ n.s executive function $\quad g^+ = 0.09$, p = 0.096, 95 % CI [-0.02 to 0.19], k = 29 $\quad$ ☒ sign. ☐ n.s attention $\quad g^+ = 0.024$, p = 0.06, 95 % CI [-0.01 to 0.50], k = 11 $\quad$ ☒ sign. ☐ n.s ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Karbach et al. 2014 [18]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** cognitive training interventions **COMPARISON:** mixed (passive or active without statistically difference between the pooled estimate between these two control groups)	☒ Cognition target measure (pooled)** $\quad \Delta SMD_{exp}^+ = 0.91$, p < 0.001, 95 % CI [0.83 to 1.00], k = 28 $\quad$ ☒ sign. ☐ n.s. near transfer (pooled)** $\quad \Delta SMD_{exp}^+ = 0.68$, p < 0.001, 95 % CI [0.56 to 0.79], k = 9 $\quad$ ☒ sign. ☐ n.s. far transfer (pooled)** $\quad \Delta SMD_{exp}^+ = 0.37$, p < 0.001, 95 % CI [0.24 to 0.49], k = 4 $\quad$ ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR

Table S2: Summary of meta-analytic results for physical training interventions
color-coding: black = significant effect, grey = no significant effect
* = significant at p ≤ 0.05, ** = significant at p ≤ 0.01

Abbreviations: ADAS-cog = Alzheimer Disease Assessment Scale-Cognitive Subscale, ADL = Activities of daily living, BDNF = brain derived neurotrophic factor, CI = confidence interval, DSF = digit span forward, DSB = digit span backward, DSF-B = Δ digit span forward – digit span backward, g = Hedge's g, GRADE = Grading of Recommendations Assessment, Development and Evaluation, HF-HRV = high frequency heart rate variability, HOA = healthy older adults; mNCD = mild neurocognitive disorder, MD = mean difference (absolut), MMSE = Mini-Mental State Examination, MoCA = Montreal Cognitive Assessment, k = number of studies; n = number of participants; NR = not reported, RAVL = Rey Auditory Verbal Learning Task, RMSSD = root mean square of successive RR interval differences, ST-Ptot = short-term total frequency power, ST-SDNN = short-term Standard Deviation of RR-Intervals SMD = standardized mean difference, ST-A = Stroop test A, ST-B = Stroop test B, TMT-A = Trail Making Test Part 1, TMT-B = Trail Making Test Part B, 24 h-SDNN = mean Standard Deviation of RR-Intervals over a time period of 24 h, 24 h-Ptot = mean total frequency power over a time period of 24 h

Reference	Study Characteristics	Outcomes			
		Type	Statistics	Heterogeneity	GRADE
Biazus-Sehn et al. 2020 [19]	POPULATION: ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☒ aerobic training ☒ resistance training ☐ balance training ☒ multicomponent physical training ☐ mixed physical training COMPARISON: mixed (i.e. no treatment; balance, tone or stretching programs; or social and/or mental activities)	☒ Cognition pooled estimates global cognition** executive function* delayed recall* verbal fluency attention immediate recall cognitive speed working memory aerobic training only global cognition executive function delayed recall resistance training only global cognition executive function delayed recall multicomp. training only global cognition executive function delayed recall ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR	SMD^+ = 0.35, p < 0.001, 95 % CI [0.17 to 0.43], k = 18, n = 1,472 SMD^+ = 0.21, p = 0.026, 95 % CI [0.03 to 0.40], k = 19, n = 1,072 SMD^+ = 0.18, p = 0.047, 95 % CI [0.00 to 0.36], k = 17, n = 1,569 SMD^+ = 0.27, p = 0.069, 95 % CI [-0.02 to 0.56], k = 11, n = 1,115 SMD^+ = 0.17, p = 0.073, 95 % CI [-0.02 to 0.36], k = 4, n = 467 SMD^+ = 0.09, p = 0.31, 95 % CI [-0.09 to 0.26], k = 9, n = 679 SMD^+ = 0.02, p = 0.79, 95 % CI [-0.15 to 0.20], k = 11, n = 642 SMD^+ = -0.01, p = 0.939, 95 % CI [-0.03 to -0.30], k = 15, n = 849 SMD^+ = 0.19, p = 0.364, 95 % CI [-0.22 to 0.59] SMD^+ = 0.13, p = 0.407, 95 % CI [-0.18 to 0.44] SMD^+ = 0.07, p = 0.596, 95 % CI [-0.19 to 0.34] SMD^+ = 0.19, p = 0.488, 95 % CI [-0.35 to 0.74] SMD^+ = 0.14, p = 0.499, 95 % CI [-0.26 to 0.53] SMD^+ = -0.04, p = 0.856, 95 % CI [-0.44 to 0.37] SMD^+ = 0.38, p = 0.066, 95 % CI [-0.03 to 0.79] SMD^+ = 0.04, p = 0.928, 95 % CI [-0.81 to 0.90] SMD^+ = 0.01, p = 0.973, 95 % CI [-0.38 to 0.39]	☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. NR NR NR NR NR NR NR NR NR NR NR NR NR NR	
Chen et al. 2020 [20]	POPULATION: ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☐ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☒ mixed physical training COMPARISON: mixed (no contact, no treatment, waiting list, sham exercise, and alternative active treatments for the comparison condition	☒ Cognition pooled older adults: shifting* overall effect (resistance)* overall (executive funct.)* working memory* inhibition* overall effect (aerobic)* overall effect (combined)* HOA: pooled effect (HOA)* mNCD: pooled effect (mNCD)* ☐ Brain / Neurochemicals / HRV ☐ Physical Outcomes, Mobility, and Activities of Daily Living	g^+ = 0.27, p < 0.05, 95 % CI [0.19 to 0.36], k = 34 g^+ = 0.22, p < 0.05, 95 % CI [0.10 to 0.33], k = 20 g^+ = 0.21, p < 0.05, 95 % CI [0.17 to 0.26], k = 107 g^+ = 0.19, p < 0.05, 95 % CI [0.12 to 0.26], k = 42 g^+ = 0.14, p < 0.05, 95 % CI [0.04 to 0.24], k = 27 g^+ = 0.14, p < 0.05, 95 % CI [0.06 to 0.33], k = 45 g^+ = 0.10, p < 0.05, 95 % CI [0.00 to 0.19], k = 18 g^+ = 0.26, p < 0.05, 95 % CI [0.20 to 0.32], k = 85 g^+ = 0.08, p < 0.05, 95 % CI [0.00 to 0.17], k = 22	NR NR ☒ sign. ☐ n.s. NR NR NR NR NR NR	

		☐ Psychosocial Outcomes
Zhou et al. 2020 [21]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☒ mixed physical training **COMPARISON:** mixed (i.e. sham (such as stretching activities), placebo or no treatment or health education)	☒ Cognition executive function** (DSF, DSB, DSF-B ,ST-A, ST-B) SMD^+ = 0.66, p = 0.008, 95 % CI [0.17 to 1.15], k = 5, n = 243 ☒ sign. ☐ n.s. verbal fluency** SMD^+ = 0.55, p = 0.001, 95 % CI [0.22 to 0.89], k = 2, n = 72 ☐ sign. ☒ n.s. gen. cognition** (ADAS-cog) SMD^- = - 0.45, p = 0.02, 95 % CI [- 0.82 to - 0.08], k = 2, n = 171 ☐ sign. ☒ n.s. visuo-spatial skills* SMD^+ = 0.38, p = 0.03, 95 % CI [0.03 to 0.72], k = 2, n = 132 ☐ sign. ☒ n.s. memory** SMD^+ = 0.37, p = 0.001, 95 % CI [0.15 to 0.60], k = 4, n = 295 ☐ sign. ☒ n.s. gen. cog. ** (MMSE, MoCA) SMD^+ = 0.32, p = 0.005, 95 % CI [0.10 to 0.54], k = 5, n = 355 ☐ sign. ☒ n.s. executive funct. (TMT B-A) SMD^- = 0.25, p = 0.45, 95 % CI [- 0.88 to 0.39], k = 3, n = 203 ☒ sign. ☐ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Law et al. 2020 [22]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☒ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☒ mixed physical training **COMPARISON:** mixed (i.e. no intervention or training plus other intervention vs. other intervention only)	☒ Cognition pooled estimates: global cognition** SMD^+ = 0.42, p < 0.001, 95 % CI [0.25 to 0.59], k = 26, n = 2,079 ☒ sign. ☐ n.s. low working memory* SMD^+ = 0.26, p = 0.02, 95 % CI [0.03 to 0.49], k = 8, n = 646 ☒ sign. ☐ n.s. low recognition SMD^+ = 0.31, p = 0.28, 95 % CI [-0.25 to 0.88], k = 6, n = 291 ☒ sign. ☐ n.s. low delayed memory SMD^+ = 0.15, p = 0.12, 95 % CI [-0.04 to 0.33], k = 11, n = 1,294 ☒ sign. ☐ n.s. low language SMD^+ = 0.15, p = 0.11, 95 % CI [-0.03 to 0.34], k = 15, n = 1,593 ☒ sign. ☐ n.s. very low attention SMD^+ = 0.04, p = 0.52, 95 % CI [-0.07 to 0.15], k = 15, n = 1,294 ☐ sign. ☒ n.s. moderate cogn. flexibility SMD^+ = 0.03, p = 0.74, 95 % CI [-0.14 to 0.20], k = 8, n = 544 ☐ sign. ☒ n.s. moderate aerobic training only: global cognition** SMD^+ = 0.45, 95 % CI [0.15 to 0.76], k = 11, n = 704 ☐ sign. ☒ n.s. moderate attention SMD^+ = 0.12, 95 % CI [-0.06 to 0.30], k = 6, n = 481 ☐ sign. ☒ n.s. cogn. flexibility SMD^+ = 0.01, 95 % CI [-0.16 to 0.19], k = 6, n = 522 ☐ sign. ☒ n.s. multicomp. training only: global cognition** SMD^+ = 0.43, 95 % CI [0.13 to 0.73], k = 9, n = 831 ☒ sign. ☐ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☒ Psychosocial Outcomes behavioral problems** SMD^+ = 0.35, p = 0.01, 95 % CI [0.07 to 0.64], k = 9, n = 1,172 ☐ sign. ☒ n.s. moderate
Jia et al. 2019 [23]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☒ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☐ mixed physical training **COMPARISON:** non-diet, non-training control group	☒ Cognition global cognition (MMSE)** SMD^+ = 1.12, p < 0.001, 95 % CI [0.66 to 1.59], k = 13, n = 673 ☒ sign. ☐ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR

Marinus et al. 2019 [24]	POPULATION: ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☒ aerobic training ☒ resistance training ☐ balance training ☒ multicomponent physical training ☐ mixed physical training COMPARISON: mixed (i.e. comparison to another training intervention, control intervention (no training) or pre-intervention values))	☐ Cognition NR ☒ Brain / Neurochemicals / HRV [BDNF]$_{blood\ (pooled)}$** $g^+ = 0.53$, p < 0.001, 95 % CI [0.31 to 0.75], k = 11, n = 464 ☒ sign. ☐ n.s. Δ[BDNF]$_{blood\ (multicomp.)}$** $g^- = -0.43$, p < 0.001, 95 % CI [-0.71 to -0.15], k = 4, n = 103 ☐ sign. ☒ n.s. Δ[BDNF]$_{blood\ (resistance)}$** $g^- = -0.22$, p = 0.003, 95 % CI [-0.37 to -0.07], k = 10, n = 361 ☒ sign. ☐ n.s. Δ[BDNF]$_{blood\ (pooled)}$** $g^- = -0.20$, p < 0.001, 95 % CI [-0.30 to -0.09], k = 20, n = 730 ☒ sign. ☐ n.s. Δ[BDNF]$_{blood\ (aerobic)}$ $g^- = -0.07$, p = 0.41, 95 % CI [-0.24 to 0.10], k = 5, n = 266 ☒ sign. ☐ n.s. ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Raffin et al. 2019 [25]	POPULATION: ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☒ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☐ mixed physical training COMPARISON: NR	☐ Cognition NR ☒ Brain / Neurochemicals / HRV / HRV overall study analysis: 24 h-SDNN** $g^+ = 0.442$, p = 0.004, 95 % CI [0.144 to 0.740], k = 3, n = 52 ☐ sign. ☒ n.s. ST-SDNN** $g^+ = 0.366$, p < 0.001, 95 % CI [0.366 to 0.185], k = 5, n = 66 ☐ sign. ☒ n.s. 24 h-P$_{tot}$ $g^+ = 1.334$, p = 0.060, 95 % CI [- 0.057 to 2.724], k = 2, n = 25 ☒ sign. ☐ n.s. HF-HRV $g^+ = 0.089$, p = 0.260, 95 % CI [-0.066 to 0.243], k = 12, n = 200 ☐ sign. ☒ n.s. RMSSD $g^+ = 0.078$, p = 0.581, 95 % CI [-0.201 to 0.358], k = 6, n = 114 ☐ sign. ☒ n.s. ST-P$_{tot}$ $g^+ = -0.055$, p = 0.774, 95 % CI [-0.434 to 0.323], k = 4, n = 73 ☐ sign. ☒ n.s. controlled study analysis: 24 h-SDNN** $g^+ = 0.721$, p = 0.008, 95 % CI [0.184 to 1.257], k = 3, n = 106 ☐ sign. ☒ n.s. 24 h-P$_{tot}$** $g^+ = 0.731$, p = 0.008, 95 % CI [0.195 to 1.267], k = 2, n = 55 ☐ sign. ☒ n.s. ST-SDNN $g^+ = 0.605$, p = 0.075, 95 % CI [-0.062 to 1.271], k = 2, n = 63 ☐ sign. ☒ n.s. HF-HRV $g^+ = 0.236$, p = 0.086, 95 % CI [-0.033 to 0.506], k = 6, n = 205 ☐ sign. ☒ n.s. RMSSD $g^+ = 0.299$, p = 0.105, 95 % CI [-0.062 to 0.659], k = 4, n = 116 ☐ sign. ☒ n.s. ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Sanders et al. 2019 [26]	POPULATION: ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☒ aerobic training ☒ resistance training ☐ balance training ☒ multicomponent physical training ☒ mixed physical training COMPARISON: contrasting activities (i.e. including non-physical activities or stretching and toning)	☒ Cognition HOA: execut. funct.$_{(pooled)}$** $g^+ = 0.34$, p < 0.01, 95 % CI [0.20 to 0.47], k = 28, n = 1,430 ☐ sign. ☒ n.s. memory$_{(pooled)}$** $g^+ = 0.31$, p < 0.01, 95 % CI [0.10 to 0.53], k = 11, n = 589 ☐ sign. ☒ n.s. overall estimate$_{(pooled)}$** $g^+ = 0.26$, p < 0.01, 95 % CI [0.15 to 0.37], k = 23, n = 1,225 NR overall est.$_{(resistance)}$** $g^+ = 0.27$, p < 0.01, 95 % CI [0.09 to 0.46] NR overall est.$_{(aerobic)}$** $g^+ = 0.22$, p < 0.01, 95 % CI [0.03 to 0.41] NR overall est.$_{(mult.comp)}$ $g^+ = 0.30$, p > 0.05, 95 % CI [-0.01 to 0.60] NR global cognition$_{(pooled)}$ $g^+ = 0.10$, p > 0.05, 95 % CI [-0.04 to 0.24], k = 5, n = 314 ☐ sign. ☒ n.s. mNCD: global cognition$_{(pooled)}$** $g^+ = 0.47$, p < 0.01, 95 % CI [0.19 to 0.74], k = 11, n = 699 ☐ sign. ☒ n.s. overall est.$_{(multicomp)}$** $g^+ = 0.36$, p < 0.01, 95 % CI [0.04 to 0.68] NR execut. function$_{(pooled)}$* $g^+ = 0.24$, p < 0.05, 95 % CI [0.02 to 0.47], k = 6, n = 358 ☐ sign. ☒ n.s. overall est.$_{(pooled)}$* $g^+ = 0.22$, p < 0.05, 95 % CI [0.05 to 0.39], k = 13, n =782 NR overall est.$_{(aerobic)}$ $g^+ = 0.22$, p > 0.05, 95 % CI [-0.20 to 0.64] NR overall est.$_{(aerobic)}$ $g^+ = 0.22$, p > 0.05, 95 % CI [-0.20 to 0.64] NR memory$_{(pooled)}$ $g^+ = 0.11$, p > 0.05, 95 % CI [-0.07 to 0.28], k = 6, n = 311 ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR

Wang et al. 2019 [27]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☒ aerobic training ☒ resistance training ☐ balance training ☐ multicomponent physical training ☐ mixed physical training **COMPARISON:** mixed (i.e. stretching, education, usual lifestyle, social activities)	☒ Cognition global cogn. (aerobic)** $SMD^+ = 0.80$, p < 0.001, 95 % CI [0.55 to 1.05], k = 5, n = 308 ☐ sign. ☒ n.s. global cogn. (resistance)** $SMD^+ = 0.80$, p = 0.002, 95 % CI [0.29 to 1.32], k = 4, n = 146 ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Vaportzis et al. 2019 [7]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☒ mixed physical training **COMPARISON:** (1) active control intervention (e.g. stretching or balance classes) (2) wait-list control (3) passive control (no intervention)	☒ Cognition digit span forward[1] $g^+ = 2.48$, p = 0.33, 95 % CI [- 2.50 to 7.46], k = 2, n = 109 ☒ sign. ☐ n.s. stroop colour[1] $g^+ = 0.23$, p = 0.10, 95 % CI [- 0.04 to 0.51], k = 2, n = 245 ☐ sign. ☒ n.s. TMT A/B[1] $g^+ = 0.19$, p = 0.32, 95 % CI [- 0.18 to 0.56], k = 2, n = 245 ☐ sign. ☒ n.s. stroop interference[1] $g^+ = 0.04$, p = 0.77, 95 % CI [- 0.24 to 0.32], k = 3, n = 195 ☐ sign. ☒ n.s. digit span backward[1] $g^+ = 0.04$, p = 0.80, 95 % CI [- 0.25 to 0.32], k = 3, n = 219 ☐ sign. ☒ n.s. RAVL-delayed recall[2] $g^+ = 0.24$, p = 0.80, 95 % CI [- 0.08 to 0.55], k = 2, n = 159 ☐ sign. ☒ n.s. RAVL-immediate recall[2] $g^+ = 0.17$, p = 0.28, 95 % CI [- 0.14 to 0.48], k = 2, n = 159 ☐ sign. ☒ n.s. digit span backwards[2] $g^+ = 0.05$, p = 0.75, 95 % CI [- 0.26 to 0.36], k = 2, n = 159 ☐ sign. ☒ n.s. TMT A[2] $g^+ = 0.04$, p = 0.62, 95 % CI [- 0.12 to 0.21], k = 3, n = 559 ☐ sign. ☒ n.s. verbal fluency[2] $g^+ = 0.02$, p = 0.93, 95 % CI [- 0.32 to 0.35], k = 2, n = 135 ☐ sign. ☒ n.s. TMT B[2] $g^+ = 0.01$, p = 0.94, 95 % CI [- 0.33 to 0.35], k = 2, n = 135 ☐ sign. ☒ n.s. letter-number seq.[2] $g^+ = -0.03$, p = 0.85, 95 % CI [- 0.33 to 0.27], k = 2, n = 183 ☐ sign. ☒ n.s. choice reaction time[2] $g^+ = -0.08$, p = 0.62, 95 % CI [- 0.38 to 0.23], k = 2, n = 183 ☐ sign. ☒ n.s. verbal fluency*[3] $g^+ = 0.31$, p = 0.04, 95 % CI [0.02 to 0.61], k = 2, n = 221 ☐ sign. ☒ n.s. TMT A*[3] $g^+ = 0.43$, p = 0.05, 95 % CI [- 0.00 to 0.86], k = 3, n = 331 ☒ sign. ☐ n.s. digit symbol substit.*[3] $g^+ = 0.30$, p = 0.05, 95 % CI [- 0.00 to 0.59], k = 2, n = 221 ☐ sign. ☒ n.s. delayed logical memory[3] $g^+ = 0.19$, p = 0.41, 95 % CI [- 0.26 to 0.64], k = 2, n = 226 ☐ sign. ☒ n.s. logical memory[3] $g^+ = 0.17$, p = 0.45, 95 % CI [- 0.27 to 0.60], k = 2, n = 226 ☐ sign. ☒ n.s. digit span forward[3] $g^+ = 0.12$, p = 0.26, 95 % CI [- 0.09 to 0.33], k = 3, n = 407 ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Firth et al. 2018 [28]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☒ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☐ mixed physical training **COMPARISON:** mixed (i.e. inactive control, time-and-attention matched comparator of minimal activity (e.g. stretching, balance training), of a similar duration)	☐ Cognition NR ☒ Brain / Neurochemicals / HRV hippocampal volume_left** $g^+ = 0.355$, p = 0.001, 95 % CI [0.14 to 0.57], k = 5, n = 332 ☐ sign. ☒ n.s. hippocampal volume_right* $g^+ = 0.237$, p = 0.032, 95 % CI [0.02 to 0.45], k = 5, n = 332 ☐ sign. ☒ n.s. hippocampal volume_total $g^+ = 0.146$, p = 0.07, 95 % CI [-0.011 to 0.303], k = 6, n = 390 ☐ sign. ☒ n.s. ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR

Lam et al. 2018 [29]	POPULATION: ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☒ aerobic training ☒ resistance training ☒ balance training ☒ multicomponent physical training ☒ mixed physical training COMPARISON: mixed (i.e. training versus no intervention/placebo or training plus other intervention versus other intervention only)	☐ Cognition NR ☐ Brain / Neurochemicals / HRV NR ☒ Physical Outcomes, Mobility, and Activities of Daily Living

Physical Outcomes detail (Lam et al. 2018):

Outcome	Result	Significance	Quality
endurance (6-min walk test)*	MD^+ = 50, $p < 0.05$, 95 % CI [18 to 81], k = 7, n = 402	☒ sign. ☐ n.s.	moderate
ADL (Barthel Index)*	MD^+ = 10, $p < 0.05$, 95 % CI [3 to 16], k = 4, n = 237	☒ sign. ☐ n.s.	low
step length [cm]*	MD^+ = 5, $p < 0.05$, 95 % CI [2 to 8], k = 5, n = 296	☐ sign. ☒ n.s.	high
balance (funct. reach test)*	MD^+ = 3.9, $p < 0.05$, 95 % CI [0.3 to 7.0], k = 6, n = 242	☐ sign. ☒ n.s.	high
balance (Berg-balance-scale)*	MD^+ = 3.6, $p < 0.05$, 95 % CI [0.3 to 7.0], k = 6, n = 722	☒ sign. ☐ n.s	high
strength (30-second sit-to-stand)*	MD^+ = 2.1, $p < 0.05$, 95 % CI [0.3 to 3.9], k = 4, n = 278	☒ sign. ☐ n.s.	moderate
walking speed [m/s]*	MD^+ = 0.13, $p < 0.05$, 95 % CI [0.03 to 0.24], k = 7, n = 568	☒ sign. ☐ n.s.	moderate
mobility (Timed Up and Go)*	MD^- = -1, $p < 0.05$, 95 % CI [-2 to 0], k = 11, n = 606	☐ sign. ☒ n.s.	moderate
fall rate	OR = 0.98, $p > 0.05$, 95 % CI [0.49 to 1.95], k = 3, n = 191	☐ sign. ☒ n.s.	low

☐ Psychosocial Outcomes

NR

Liang et al. 2018 [9]	POPULATION: ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☐ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☒ mixed physical training COMPARISON: mixed (i.e. cognitive interventions, control group alone or in any combination)	☒ Cognition

Outcome	Result	Significance
global cognition (MMSE)	SMD^+ = 0.35, $p > 0.05$, 95 % CI [-0.12 to 0.82], k = 4	☒ sign. ☐ n.s.

☐ Brain / Neurochemicals / HRV

NR

☐ Physical Outcomes, Mobility, and Activities of Daily Living

NR

☐ Psychosocial Outcomes

NR

Northey et al. 2018 [30]	POPULATION: ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☒ aerobic training ☒ resistance training ☐ balance training ☒ multicomponent physical training ☐ mixed physical training COMPARISON: mixed (i.e. (1) sham training or alternative active treatment, (2) attention control, (3) no contact)	☒ Cognition

Outcome	Result	Significance	Quality
overall (pooled)[1]	SMD^+ = 0.13, $p > 0.05$, 95 % CI [-0.06 to 0.32], n = 120	NR	
overall (pooled)[2]**	SMD^+ = 0.48, $p < 0.01$, 95 % CI [0.14 to 0.82], n = 17	NR	
overall (pooled)[3]**	SMD^+ = 0.34, $p < 0.01$, 95 % CI [0.17 to 0.51], n = 189	NR	
memory (pooled)**	SMD^+ = 0.36, $p < 0.01$, 95 % CI [0.22 to 0.50], n = 81	NR	
executive funct. (pooled)**	SMD^+ = 0.34, $p < 0.01$, 95 % CI [0.20 to 0.47], n = 94	NR	
overall (mult.comp.)**	SMD^+ = 0.33, $p < 0.01$, 95 % CI [0.14 to 0.53], n = 80	NR	moderate
overall (pooled)**	SMD^+ = 0.29, $p < 0.01$, 95 % CI [0.17 to 0.41], k = 36, n = 333	☒ sign. ☐ n.s.	
overall (resistance)**	SMD^+ = 0.29, $p < 0.01$, 95 % CI [0.13 to 0.44], n = 80	NR	
work. memory (pooled)**	SMD^+ = 0.29, $p < 0.01$, 95 % CI [0.12 to 0.45], n = 81	NR	
attention (pooled)**	SMD^+ = 0.27, $p < 0.01$, 95 % CI [0.14 to 0.41], n = 87	NR	
overall (aerobic)**	SMD^+ = 0.24, $p < 0.01$, 95 % CI [0.10 to 0.37], n = 153	NR	
global cognition (pooled)	SMD^+ = 0.16, $p > 0.05$, 95 % CI [-0.14 to 0.47], n = 6	NR	

HOA

overall (pooled)**	SMD^+ = 0.36, $p < 0.01$, 95 % CI [0.04 to 0.68], n = 41	NR

mNCD

overall (pooled)**	SMD^+ = 0.28, $p < 0.01$, 95 % CI [0.11 to 0.44], n = 197	NR

☐ Brain / Neurochemicals / HRV

NR

☐ Physical Outcomes, Mobility, and Activities of Daily Living

NR

☐ Psychosocial Outcomes

NR

Panza et al. 2018 [31]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☒ older adults with Dementia **INTERVENTION:** ☒ aerobic training ☒ resistance training ☐ balance training ☒ multicomponent physical training ☐ mixed physical training **COMPARISON:** nondiet, non-training control group	☒ Cognition pooled estimates global cogn. (pooled)* $d^+ = 0.47$, $p < 0.05$, 95 % CI [0.26 to 0.68], k = 23, n = 1,150 global cogn. (aerobic)* $d^+ = 0.65$, $p < 0.05$, 95 % CI [0.35 to 0.95], k = 15 global cogn. (combined) $d^+ = 0.19$, $p > 0.05$, 95 % CI [-0.06 to 0.43], k = 8 mNCD global cogn. (pooled)* $d^+ = 0.27$, $p < 0.05$, 95 % CI [0.05 to 0.50], k = 12 ADAS-cog (pooled)* $d^+ = 0.65$, $p < 0.05$, 95 % CI [0.31 to 0.99], k = 11 ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR	
de Souto et al. 2018 [32]	**POPULATION:** ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☒ mixed physical training **COMPARISON:** mixed (i.e. usual care or an active-control group, including control sham training groups, such as stretching and light-intensity training)	☒ Cognition risk of mNCD onset $RR^- = 1.12$, $p = 0.49$, 95 % CI [0.81 to 1.55], k = 1, n = 686 risk for cogn. decline $RR^- = 0.90$, $p = 0.79$, 95 % CI [0.42 to 1.95], k = 2, n = 124 pooled estimate $RR^- = 0.74$, $p = 0.27$, 95 % CI [0.43 to 1.26], k = 2, n = 1,073 risk of dementia onset $RR^- = 0.56$, $p = 0.20$, 95 % CI [0.23 to 1.36], k = 3, n = 949 ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR	N/A ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s.
Sherrington et al. 2017 [33]	**POPULATION:** ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☒ mixed physical training **COMPARISON:** mixed (i.e. inactive control group or sham training)	☐ Cognition NR ☐ Brain / Neurochemicals / HRV NR ☒ Physical Outcomes, Mobility, and Activities of Daily Living HOA: fall rate** $RR^- = 0.79$, $p < 0.001$, 95 % CI [0.73 to 0.85], k = 69 mNCD: fall rate** $RR^- = 0.55$, $p = 0.004$, 95 % CI [0.37 to 0.83], k = 3 ☐ Psychosocial Outcomes NR	☐ sign. ☒ n.s. ☐ sign. ☒ n.s.
Kelly et al. 2014 [34]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☒ aerobic training ☒ resistance training ☐ balance training ☐ multicomponent physical training ☐ mixed physical training **COMPARISON:** (1) stretching/toning (2) non- training active control (i.e. health education, watching movies, or socializing) (3) no intervention	☒ Cognition aerobic training attention [1] $SMD^+ = 0.91$, $p = 0.15$, 95 % CI [- 0.34 to 2.16], k = 5, n = 409 delayed recall [1] $SMD^+ = 0.39$, $p = 0.16$, 95 % CI [- 0.15 to 0.82], k = 3, n = 278 work. memory [1] $SMD^+ = 0.28$, $p = 0.30$, 95 % CI [- 0.25 to 0.82], k = 2, n = 215 processing speed [1] $SMD^+ = 0.27$, $p = 0.28$, 95 % CI [- 0.22 to 0.75], k = 3, n = 307 immediate recall [1] $SMD^+ = 0.23$, $p = 0.62$, 95 % CI [- 0.67 to 1.14], k = 3, n = 307 recognition [2] $SMD^+ = 0.20$, $p = 0.51$, 95 % CI [- 0.39 to 0.78], k = 2, n = 93 overall cognition [2] $SMD^+ = 0.18$, $p = 0.26$, 95 % CI [- 0.13 to 0.49], k = 4, n = 432 verbal fluency [2] $SMD^+ = 0.09$, $p = 0.58$, 95 % CI [- 0.22 to 0.39], k = 3, n = 380 delayed recall [2] $SMD^+ = 0.04$, $p = 0.67$, 95 % CI [- 0.15 to 0.23], k = 4, n = 413 immediate recall [2] $SMD^+ = 0.00$, $p = 1.00$, 95 % CI [- 0.40 to 0.40], k = 3, n = 263 working memory [2] $SMD^+ = -0.03$, $p = 0.75$, 95 % CI [- 0.24 to 0.17], k = 5, n = 374 processing speed [2] $SMD^+ = -0.04$, $p = 0.76$, 95 % CI [- 0.29 to 0.21], k = 3, n = 413 attention [2] $SMD^+ = -0.06$, $p = 0.56$, 95 % CI [- 0.25 to 0.14], k = 6, n = 414 reasoning [2] $SMD^+ = -0.18$, $p = 0.28$, 95 % CI [- 0.49 to 0.14], k = 2, n = 210 reasoning [3] $SMD^+ = 0.47$, $p = 0.48$, 95 % CI [- 0.83 to 1.77], k = 2, n = 90 immediate recall [3] $SMD^+ = 0.29$, $p = 0.30$, 95 % CI [- 0.25 to 0.83], k = 2, n = 209 delayed recall [3] $SMD^+ = 0.27$, $p = 0.13$, 95 % CI [- 0.08 to 0.62], k = 3, n = 300 verbal fluency [3] $SMD^+ = 0.20$, $p = 0.14$, 95 % CI [- 0.07 to 0.48], k = 2, n = 209 working memory [3] $SMD^+ = 0.06$, $p = 0.70$, 95 % CI [- 0.24 to 0.35], k = 3, n = 181	☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☒ sign. ☐ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s.

Kelly et al. 2014 [34] (continued)	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☒ aerobic training ☒ resistance training ☐ balance training ☐ multicomponent physical training ☐ mixed physical training **COMPARISON:** (1) stretching/toning (2) non- training active control (i.e. health education, watching movies, or socializing) (3) no intervention	resistance training reasoning [1]** $\quad$ SMD$^+$ = 3.16, p = 0.003, 95 % CI [1.07 to 5.24], k = 2, n = 135 working memory [1] $\quad$ SMD$^+$ = 0.10, p = 0.47, 95 % CI [- 0.17 to 0.36], k = 3, n = 236 attention [1] $\quad$ SMD$^+$ = -0.12, p = 0.37, 95 % CI [- 0.39 to 0.14], k = 3, n = 236 working memory [2] $\quad$ SMD$^+$ = 0.17, p = 0.31, 95 % CI [- 0.16 to 0.50], k = 2, n =152 attention [2] $\quad$ SMD$^+$ = -0.06, p = 0.62, 95 % CI [- 0.30 to 0.18], k = 3, n = 271 ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR	☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s. ☐ sign. ☒ n.s.	
Forbes et al. 2015 [35]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☒ mixed physical training **COMPARISON:** mixed (i.e. usual care/group activities)	☒ Cognition global cognition $\quad$ SMD$^+$ = 0.43, p = 0.08, 95 % CI [- 0.05 to 0.92], k = 9, n = 409 ☐ Brain / Neurochemicals / HRV NR ☒ Physical Outcomes, Mobility, and Activities of Daily Living ADL* $\quad$ SMD$^+$ = 0.68, p = 0.03, 95 % CI [0.08 to 1.27], k = 6, n = 289 ☒ Psychosocial Outcomes depression $\quad$ SMD$^+$ = -0.14, p = 0.20, 95 % CI [-0.36 to 0.97], k = 5, n = 341	☒ sign. ☐ n.s. ☒ sign. ☐ n.s. ☐ sign. ☒ n.s.	very low low moderate
Groot et al. 2015 [36]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☒ aerobic training ☒ resistance training ☐ balance training ☒ multicomponent physical training ☒ mixed physical training **COMPARISON:** non-exposed control condition or a control condition that received another intervention	☒ Cognition pooled estimates global cogn. (comb.execut.)** $\quad$ SMD$^+$ = 0.59, p < 0.01, 95 % CI [0.32 to 0.86], k = 6, n = 225 global cogn. (pooled)** $\quad$ SMD$^+$ = 0.42, p < 0.01, 95 % CI [0.23 to 0.62], k = 16, n = 691 global cogn. (aerobic)** $\quad$ SMD$^+$ = 0.41, p < 0.01, 95 % CI [0.05 to 0.76], k = 6, n = 320 global cogn. (resistance) $\quad$ SMD$^+$ = - 0.10, p > 0.05, 95 % CI [- 0.38 to 0.19], k = 4, n = 191 ADAS-cog (pooled)** $\quad$ SMD$^+$ = 0.38, p < 0.01, 95 % CI [0.09 to 0.66], k = 6, n = 210 Dementia global cogn. (pooled)** $\quad$ SMD$^+$ = 0.47, p < 0.01, 95 % CI [0.14 to 0.80], k = 6, n = 248 ☐ Brain / Neurochemicals / HRV NR ☒ Physical Outcomes, Mobility, and Activities of Daily Living ADL (pooled)** $\quad$ SMD$^+$ = 1.18, p < 0.01, 95 % CI [0.57 to 1.79], k = 4 ☐ Psychosocial Outcomes NR	NR NR NR NR NR NR NR	
Ströhle et al. 2015 [37]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ aerobic training ☐ resistance training ☐ balance training ☐ multicomponent physical training ☒ mixed physical training **COMPARISON:** non-exposed control condition or a control condition that received another intervention	☒ Cognition mNCD global cognition* $\quad$ SMCR$^+$ = 0.20, p < 0.05, 95 % CI [0.59 to 1.07], k = 6, n = 451 ADAS-cog* $\quad$ SMCR$^+$ = 0.83, p < 0.05, 95 % CI [0.11 to 0.28], k = 4, n = 119 ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR	☒ sign. ☐ n.s. ☒ sign. ☐ n.s.	

Table S3: Summary of meta-analytic results for simultaneous cognitive-motor training interventions
color-coding: black = significant effect, grey = no significant effect
* = significant at $p \leq 0.05$, ** = significant at $p \leq 0.01$

Abbreviations: ADL = Activities of Daily Living, BBS = Berg Balance Scale, COP = centre of pressure, FAS = F-A-S test, g = Hedge's g, GRADE = Grading of Recommendations Assessment, Development and Evaluation, IADL = Instrumeted Activities of Daily Living, HOA = healthy older adults, k = number of studies; mNCD = mild neurocognitive disorder, n = number of participants; SMD = standardized mean difference, TMT-A = Trail Making Test Part 1, TMT-B = Trail Making Test Part B, TUG = Timed Up and Go, VFT = Verbal Fluency test

Reference	Study Characteristics	Outcomes			
		Type	Statistics	Heterogeneity	GRADE
Corregidor-Sánchez et al. 2021 [38]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ sequential motor-cognitive ☐ coupled motor-cognitive ☒ exergame/VR/active videogame ☐ mixed cognitive-motor int. **COMPARISON:** active (i.e. physical training (six studies) and health education (three studies))	☐ Cognition ☐ Brain / Neurochemicals / HRV NR ☒ Physical Outcomes, Mobility, and Activities of Daily Living			
		ADL	$SMD^+ = 0.61$, p = 0.11, 95 % CI [-0.15 to 1.37], k = 7, n = 192	☒ sign. ☐ n.s.	
		IADL	$SMD^+ = -0.34$, p = 0.17, 95 % CI [-0.82 to 0.15], k = 3, n = 67	☐ sign. ☒ n.s.	
		transfer	$SMD^- = -0.23$, p = 0.35, 95 % CI [-0.71 to 0.25], k = 6, n = 88	☐ sign. ☒ n.s.	
		ambulation**	$SMD^- = -0.63$, p < 0.00001, 95 % CI [-0.86 to -0.40], k = 32, n = 1,315	☒ sign. ☐ n.s.	
		☐ Psychosocial Outcomes NR			
Gavelin et al. 2021 [39]	**POPULATION:** ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☒ sequential motor-cognitive ☒ coupled motor-cognitive ☒ exergame/VR/active videogame ☒ mixed cognitive-motor int. **COMPARISON:** active (i.e. combined intervention with physical training, cognitive training, a sham intervention (e.g. health education, relaxation, stretching or non-specific cognitive activ- ities such as data entry on a computer)), or passive (i.e. wait-list, no-contact).	☒ Cognition			
		pooled estimates:			
		global cognition*	$g^+ = 0.30$, p < 0.05, 95 % CI [0.06 to 0.53], k = 41	NR	
		short-term memory*	$g^+ = 0.30$, p < 0.05, 95 % CI [0.05 to 0.55], k = 21	NR	
		fluid reasoning*	$g^+ = 0.24$, p < 0.05, 95 % CI [0.02 to 0.46], k = 7	NR	
		executive function*	$g^+ = 0.22$, p < 0.05, 95 % CI [0.13 to 0.30], k = 27	NR	
		overall effect*	$g^+ = 0.22$, p < 0.05, 95 % CI [0.14 to 0.30], k = 41	☐ sign. ☒ n.s.	
		processing speed*	$g^+ = 0.17$, p < 0.05, 95 % CI [0.07 to 0.27], k = 22	NR	
		visual processing	$g^+ = 0.11$, p > 0.05, 95 % CI [-0.18 to 0.40], k = 6	NR	
		HOA:			
		overall effect**	$g^+ = 0.20$, p < 0.001, 95 % CI [0.12 to 0.29], k = 28	NR	
		mNCD:			
		overall effect*	$g^+ = 0.26$, p = 0.02, 95 % CI [0.06 to 0.46], k = 13	NR	
		☐ Brain / Neurochemicals / HRV NR ☒ Physical Outcomes, Mobility, and Activities of Daily Living			
		pooled estimates:			
		functional mobility*	$g^+ = 0.34$, p < 0.05, 95 % CI [0.16 to 0.52], k = 22	NR	
		overall effect*	$g^+ = 0.25$, p < 0.05, 95 % CI [0.13 to 0.37], k = 32	☐ sign. ☒ n.s.	
		balance	$g^+ = 0.23$, p > 0.05, 95 % CI [-0.04 to 0.49], k = 12	NR	
		cognitive-motor ability	$g^+ = 0.19$, p > 0.05, 95 % CI [-0.01 to 0.39], k = 14	NR	
		strength	$g^+ = 0.17$, p > 0.05, 95 % CI [-0.10 to 0.44], k = 9	NR	
		aerobic capacity	$g^+ = 0.10$, p > 0.05, 95 % CI [-0.06 to 0.26], k = 14	NR	
		gait	$g^+ = 0.06$, p > 0.5, 95 % CI [-0.23 to 0.34], k = 10	NR	
		HOA:			
		overall effect**	$g^+ = 0.23$, p = 0.005, 95 % CI [0.08 to 0.38], k = 24	NR	
		mNCD:			
		overall effect**	$g^+ = 0.32$, p = 0.008, 95 % CI [0.12 to 0.52], k = 8	NR	
		☒ Psychosocial Outcomes			
		pooled estimates:			
		overall effect*	$g^+ = 0.10$, p < 0.05, 95 % CI [0.01 to 0.20], k = 8	☐ sign. ☒ n.s	

Biazus-Sehn et al. 2020 [19]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ sequential motor-cognitive ☒ coupled motor-cognitive ☐ exergame/VR/active videogame ☐ mixed cognitive-motor int. **COMPARISON:** mixed (i.e. no treatment; balance, tone or stretching programs; or social and/or mental activities)	☒ Cognition delayed recall** SMD^+ = 0.593, p < 0.001, 95 % CI [0.269 to 0.917] NR global cognition** SMD^+ = 0.531, p = 0.003, 95 % CI [0.172 to 0.529] NR executive function* SMD^+ = 0.499, p = 0.015, 95 % CI [0.093 to 0.905] NR ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Chan et al. 2020 [40]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ sequential motor-cognitive ☒ coupled motor-cognitive ☐ exergame/VR/active videogame ☐ mixed cognitive-motor int. **COMPARISON:** mixed (i.e. waitlist control group, health education)	☒ Cognition immediate recall** SMD^+ = 0.54, p < 0.001, 95 % CI [0.38 to 0.71], k = 4 ☐ sign. ☒ n.s. global cognition** SMD^+ = 0.48, p < 0.001, 95 % CI [0.21 to 0.74], k = 4 ☐ sign. ☒ n.s. attention** SMD^+ = 0.33, p < 0.01, 95 % CI [0.12 to 0.54], k = 4 ☐ sign. ☒ n.s. delayed recall* SMD^+ = 0.33, p < 0.05, 95 % CI [0.01 to 0.64], k = 3 ☒ sign. ☐ n.s. visuospatial skills* SMD^+ = 0.16, p < 0.05, 95 % CI [0.01 to 0.32], k = 4 ☐ sign. ☒ n.s. language SMD^+ = 0.37, p > 0.05, 95 % CI [- 0.16 to 0.91], k = 2 ☐ sign. ☒ n.s. mental flexibility SMD^+ = 0.18, p > 0.05, 95 % CI [- 0.13 to 0.49], k = 4 ☒ sign. ☐ n.s. working memory SMD^+ = 0.11, p > 0.05, 95 % CI [- 0.18 to 0.40], k = 3 ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV ☐ Physical Outcomes, Mobility, and Activities of Daily Living ☐ Psychosocial Outcomes
Chen et al. 2020 [20]	**POPULATION:** ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ sequential motor-cognitive ☒ coupled motor-cognitive ☐ exergame/VR/active videogame ☒ mixed cognitive-motor int. **COMPARISON:** mixed (no contact, no treatment, waiting list, sham training, and alternative active treatments for the comparison condition	☒ Cognition pooled older adults: overall effect (coupled)* g^+ = 0.44, p < 0.05, 95 % CI [0.29 to 0.60], k = 10 NR ☐ Brain / Neurochemicals / HRV ☐ Physical Outcomes, Mobility, and Activities of Daily Living ☐ Psychosocial Outcomes
Mansor et al. 2020 [3]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ sequential motor-cognitive ☐ coupled motor-cognitive ☐ exergame/VR/active videogame ☒ mixed cognitive-motor int. **COMPARISON:** mixed (passive (i.e. no-contact; k = 24) or active (e.g. watched a movie or a documentary, read a book, completed quizzes, or exercised; k = 9))	☒ Cognition updating memory* g^+ = 0.37, p = 0.02, 95 % CI [0.07 to 0.66], k = 23, n = 879 ☒ sign. ☐ n.s. inhibition* g^+ = 0.28, p = 0.02, 95 % CI [0.02 to 0.53], k = 20, n = 709 ☒ sign. ☐ n.s. processing speed g^+ = 0.15, p = 0.20, 95 % CI [- 0.08 to 0.38], k = 21, n = 800 ☒ sign. ☐ n.s. attention g^+ = 0.08, p = 0.77, 95 % CI [- 0.47 to 0.64], k = 11, n = 394 ☒ sign. ☐ n.s. delayed memory g^+ = -0.03, p = 0.90, 95% CI [- 0.48 to 0.42], k = 10, n = 387 ☒ sign. ☐ n.s. reasoning g^+ = 0.17, p = 0.45, 95 % CI [- 0.28 to 0.62], k = 13, n = 523 ☒ sign. ☐ n.s. shifting g^+ = 0.14, p = 0.46, 95 % CI [- 0.21 to 0.50], k = 18, n = 693 ☒ sign. ☐ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR

Pacheco et al. 2020 [41]	**POPULATION:** ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ sequential motor-cognitive ☐ coupled motor-cognitive ☒ exergame/VR/active videogame ☐ mixed cognitive-motor int. **COMPARISON:** mixed (no intervention (e.g., no physical training) or to health education, or cognitive training without physical activity)	☐ Cognition NR ☐ Brain / Neurochemicals / HRV NR ☒ Physical Outcomes, Mobility, and Activities of Daily Living balance (BBS)** MD^+ = 2.46, p = 0.0001, 95 % CI [0.49 to 4.44], k = 3, n = 102 ☒ sign. ☐ n.s. balance (COP sway)*" SMD^- = -0.93, p = 0.0001, 95 % CI [- 1.52 to - 0.34], k = 4, n = 124 ☒ sign. ☐ n.s. mobility (TUG)** MD^- = -2.48, p = 0.0001, 95 % CI [- 3.83 to - 1.12], k = 3, n = 103 ☐ sign. ☒ n.s. ☐ Psychosocial Outcomes NR
Zhu et al. 2020 [42]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ sequential motor-cognitive ☒ coupled motor-cognitive ☐ exergame/VR/active videogame ☐ mixed cognitive-motor int. **COMPARISON:** active (i.e. health education and/or training but not aerobic dance training)	☒ Cognition global cognition** MD^+ = 1.43, p = 0.0009, 95 % CI [0.59 to 2.27], k = 3, n = 524 ☐ sign. ☒ n.s. verbal fluency (FAS)** MD^+ = 1.73, p = 0.003, 95 % CI [0.58 to 2.88], k = 1, n = 129 not applicable delayed recall** MD^+ = 0.46, p < 0.00001, 95 % CI [0.30 to 0.62], k = 5, n = 647 ☐ sign. ☒ n.s. immediate recall* MD^+ = 0.24, p = 0.04, 95 % CI [0.01 to 0.46], k = 4, n = 513 ☐ sign. ☒ n.s. verbal fluency (VFT) MD^+ = 0.22, p = 0.9, 95 % CI [- 3.43 to 3.88], k = 2, n = 324 ☒ sign. ☐ n.s. ☐ Brain / Neurochemicals / HRV NR ☐ Physical Outcomes, Mobility, and Activities of Daily Living NR ☐ Psychosocial Outcomes NR
Wang et al. 2019 [27]	**POPULATION:** ☐ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ sequential motor-cognitive ☒ coupled motor-cognitive ☒ exergame/VR/active videogame ☐ mixed cognitive-motor int. **COMPARISON:** mixed (i.e. stretching, education, usual lifestyle, and social recreational activities)	☒ Cognition global cogn. (combined)** SMD^+ = 0.41, p < 0.001, 95 % CI [0.20 to 0.62], k = 7, n = 732 ☐ sign. ☒ n.s. global cogn. (exergame) SMD^+ = 0.57, p = 0.21, 95 % CI [-0.32 to 1.47], k = 1, n = 20 N/A ☐ Brain / Neurochemicals / HRV ☐ Physical Outcomes, Mobility, and Activities of Daily Living ☐ Psychosocial Outcomes
Wu et al. 2019 [43]	**POPULATION:** ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia **INTERVENTION:** ☐ sequential motor-cognitive ☒ coupled motor-cognitive ☐ exergame/VR/active videogame ☐ mixed cognitive-motor int. **COMPARISON:** mixed (i.e. active controls including aerobic training, memory training, and resistance training, or usual care)	☒ Cognition pooled estimates: global cogn. (dance)* MD^+ = 1.12, p = 0.02, 95 % CI [0.16 to 2.08], k = 2, n = 263 ☐ sign. ☒ n.s. global cogn. (tai chi)* MD^+ = 0.97, p = 0.02, 95 % CI [0.19 to 1.76], k = 10, n = 1,604 ☐ sign. ☒ n.s. global cogn. (pooled)** MD^+ = 0.92, p = 0.002, 95 % CI [0.33 to 1.51], k = 13, n = 1,892 ☒ sign. ☐ n.s. language fluency (dance)** MD^+ = 0.61, p < 0.001, 95 % CI [0.09 to 0.45], k = 1, n = 129 N/A work. memory (tai chi) MD^+ = 0.46, p = 0.06, 95 % CI [- 0.03 to 0.94], k = 6, n = 837 ☒ sign. ☐ n.s. work. memory (dance) MD^+ = 0.41, p = 0.18, 95 % CI [- 0.19 to 1.00], k = 2, n = 92 ☐ sign. ☒ n.s. memory (dance)* MD^+ = 0.35, p = 0.003, 95 % CI [0.12 to 0.58], k = 3, n = 285 ☐ sign. ☒ n.s. work. memory (pooled)* MD^+ = 0.32, p = 0.05, 95 % CI [0.01 to 0.64], k = 10, n = 1,084 ☐ sign. ☒ n.s. language fluency (pooled)* MD^+ = 0.27, p = 0.003, 95 % CI [0.09 to 0.45], k = 9, n = 1,166 ☐ sign. ☒ n.s. memory (pooled)** MD^+ = 0.24, p = 0.001, 95 % CI [0.10 to 0.39], k = 15, n = 1,593 ☒ sign. ☐ n.s. memory (tai chi)* MD^+ = 0.20, p = 0.005, 95 % CI [0.06 to 0.35], k = 7, n = 888 ☐ sign. ☒ n.s. language fluency (tai chi)* MD^+ = 0.18, p = 0.05, 95 % CI [0.00 to 0.37], k = 6, n = 887 ☐ sign. ☒ n.s. proc. speed (dance) MD^- = -0.69, p = 0.22, 95 % CI [- 1.78 to 0.41], k = 3, n = 222 ☐ sign. ☒ n.s. proc. speed (tai chi) MD^- = -1.29, p = 0.74, 95 % CI [- 9.0 to 6.4], k = 4, n = 758 ☒ sign. ☐ n.s. proc. speed (pooled) MD^- = -1.44, p = 0.39, 95 % CI [- 4.7 to 1.8], k = 9, n = 1,208 ☒ sign. ☐ n.s. cogn. flexibility (dance) MD^- = -6.19, p = 0.38, 95 % CI [- 20.1 to 7.7], k = 3, n = 222 ☒ sign. ☐ n.s cogn. flexibility (pooled)** MD^- = -8.80, p = 0.007, 95 % CI [- 15.2 to - 2.4], k = 13, n = 1,423 ☒ sign. ☐ n.s cogn. flexibility (tai chi) MD^- = -9.06, p = 0.11, 95 % CI [- 20.0 to 1.9], k = 7, n = 894 ☒ sign. ☐ n.s HOA: global cogn. (pooled) MD^+ = 0.57, p = 0.19, 95 % CI [- 0.28 to 141], k = 3, n = 705 ☒ sign. ☐ n.s. mNCD: global cogn. (pooled)** MD^+ = 1.04, p = 0.008, 95 % CI [0.27 to 1.80], k = 10, n = 1,187 ☒ sign. ☐ n.s. ☐ Brain / Neurochemicals / HRV

		☐ Physical Outcomes, Mobility, and Activities of Daily Living ☐ Psychosocial Outcomes
Vaportzis et al. 2019 [7]	POPULATION: ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☐ sequential motor-cognitive ☐ coupled motor-cognitive ☐ exergame/VR/active videogame ☒ mixed cognitive-motor int. COMPARISON: (1) active control intervention (e.g. stretching or balance classes) (2) wait-list control (3) passive control (no intervention	☒ Cognition TMT B [1] $SMD^+ = 0.16$, p = 0.34, 95 % CI [-0.16 to 0.48], k = 2, n = 202 ☐ sign. ☒ n.s. TMT A [1] $SMD^+ = 0.10$, p = 0.47, 95 % CI [-0.17 to 0.36], k = 4, n = 270 ☐ sign. ☒ n.s. digit symb. substitution [1] $SMD^+ = 0.07$, p = 0.70, 95 % CI [-0.27 to 0.40], k = 2, n = 170 ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV ☐ Physical Outcomes, Mobility, and Activities of Daily Living ☐ Psychosocial Outcomes
Northey et al. 2018 [30]	POPULATION: ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☐ sequential motor-cognitive ☒ coupled motor-cognitive ☐ exergame/VR/active videogame ☐ mixed cognitive-motor int. COMPARISON: mixed (i.e. (1) sham training or alternative active treatment, (2) attention control, (3) no contact)	☒ Cognition overall (tai chi)** $SMD^+ = 0.25$, p < 0.01, 95 % CI [0.32 to 0.71], k = 47 NR ☐ Brain / Neurochemicals / HRV ☐ Physical Outcomes, Mobility, and Activities of Daily Living ☐ Psychosocial Outcomes
Stanmore et al. 2017 [44]	POPULATION: ☒ healthy older adults ☒ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☐ sequential motor-cognitive ☒ coupled motor-cognitive ☒ exergame/VR/active videogame ☐ mixed cognitive-motor int. COMPARISON: (1) physically active (e.g. aerobic training, balance, stretching, strenth training) (2) cognitively active (e.g. health education sessions, reading, cognitive remediation, or memory training) (3) passive (e.g. waitlist/usual treatment)	☒ Cognition pooled estimates: spat. learning / memory $g^+ = 1.230$, p = 0.264, 95 % CI [- 0.93 to 3.39], k = 3, n = 135 ☒ sign. ☐ n.s. inhibitory control** $g^+ = 0.900$, p < 0.001, 95 % CI [0.48 to 1.33], k = 5, n = 139 ☐ sign. ☒ n.s. language $g^+ = 0.570$, p = 0.360, 95 % CI [- 0.65 to 1.79], k = 3, n = 184 ☒ sign. ☐ n.s. verb. learning / memory $g^+ = 0.525$, p = 0.085, 95 % CI [- 0.07 to 1.13], k = 4, n = 171 ☒ sign. ☐ n.s. global cognition [1-3]** $g^+ = 0.436$, p = 0.001, 95 % CI [0.18 to 0.69], k = 17, n = 926 ☒ sign. ☐ n.s. global cognition [1]* $g^+ = 0.435$, p = 0.030, 95 % CI [0.04 to 0.83], k = 8, n = 632 ☒ sign. ☐ n.s. reasoning $g^+ = 0.393$, p = 0.495, 95 % CI [- 0.74 to 1.52], k = 3, n = 134 ☒ sign. ☐ n.s. global cognition [1 & 2]* $g^+ = 0.363$, p = 0.020, 95 % CI [0.06 to 0.67], k = 12, n = 768 ☒ sign. ☐ n.s. cognitive flexibility* $g^+ = 0.348$, p = 0.049, 95 % CI [0.002 to 0.694], k = 8, n = 245 ☒ sign. ☐ n.s. visuo-spatial skills * $g^+ = 0.345$, p = 0.033, 95 % CI [0.03 to 0.66], k = 4, n = 226 ☐ sign. ☒ n.s. attention / proc. speed* $g^+ = 0.298$, p = 0.027, 95 % CI [0.03 to 0.56], k = 11, n = 688 ☒ sign. ☐ n.s. Executive Function* $g^+ = 0.256$, p = 0.048, 95 % CI [0.002 to 0.510], k = 13, n = 745 ☒ sign. ☐ n.s. working memory $g^+ = 0.032$, p = 0.831, 95 % CI [- 0.26 to 0.33], k = 4, n = 171 ☐ sign. ☒ n.s. HOA: global cognition [1-3]** $g^+ = 0.573$, p = 0.010, 95 % CI [0.14 to 1.01], k = 9, n = 415 ☒ sign. ☐ n.s. mNCD (mixed): global cognition [1-3]* $g^+ = 0.340$, p = 0.017, 95 % CI [0.06 to 0.62], k = 6, n = 193 ☐ sign. ☒ n.s. ☐ Brain / Neurochemicals / HRV ☐ Physical Outcomes, Mobility, and Activities of Daily Living ☐ Psychosocial Outcomes

Howes et al. 2017 [45]	POPULATION: ☒ healthy older adults ☐ older adults with mNCD ☐ older adults with Dementia INTERVENTION: ☐ sequential motor-cognitive ☐ coupled motor-cognitive ☒ exergame/VR/active videogame ☐ mixed cognitive-motor int. COMPARISON: (1) active control (2) inactive control	☒ Cognition		
		executive function [1 & 2]* $g^- = -0.48$, $p = 0.003$, 95 % CI [- 0.80 to - 0.17], k = 8, n = 459	☒ sign. ☐ n.s	low
		executive function [1]** $g^- = -0.65$, $p < 0.001$, 95 % CI [- 1.03 to - 0.28], k = 3, n = 144	☐ sign. ☒ n.s	low
		executive function [2]* $g^- = -0.40$, $p = 0.05$, 95 % CI [- 0.79 to - 0.00], k = 5, n = 315	☒ sign. ☐ n.s	low
		☐ Brain / Neurochemicals / HRV		
		☒ Physical Outcomes, Mobility, and Activities of Daily Living		
		balance [1 & 2]* $g^+ = 0.52$, $p < 0.05$, 95 % CI [0.24 to 0.79], k = 17, n = 743	NR	low
		balance [1]* $g^+ = 0.56$, $p < 0.05$, 95 % CI [0.25 to 0.87], k = 10, n = 394	NR	very low
		balance [2]* $g^+ = 0.51$, $p < 0.05$, 95 % CI [0.02 to 1.01], k = 7, n = 349	NR	very low
		funct. exercise cap. [1 & 2]* $g^+ = 0.29$, $p < 0.05$, 95 % CI [0.04 to 0.55], k = 7, n = 248	NR	low
		funct. exercise cap. [1]* $g^+ = 0.58$, $p < 0.05$, 95 % CI [0.09 to 1.07], k = 3, n = 70	NR	very low
		funct. exercise cap. [2] $g^+ = 0.19$, $p > 0.05$, 95 % CI [- 0.11 to 0.48], k = 4, n = 178	NR	very low
		functional mobility [1 & 2] $g^- = -0.36$, $p > 0.05$, 95 % CI [- 0.36 to 0.09], k = 16, n = 670	NR	very low
		functional mobility [1] $g^- = -0.12$, $p > 0.05$, 95 % CI [- 0.48 to 0.25], k = 6, n = 260	NR	very low
		functional mobility [2] $g^- = -0.14$, $p > 0.05$, 95 % CI [- 0.45 to 0.17], k = 10, n = 410	NR	very low
		☒ Psychosocial Outcomes		
		fear of falling [1 & 2] $g^+ = 0.18$, $p > 0.05$, 95 % CI [- 0.16 to 0.53], k = 16, n = 816	NR	very low
		fear of falling [1] $g^+ = 0.28$, $p > 0.05$, 95 % CI [- 0.50 to 1.05], k = 8, n = 325	NR	very low
		fear of falling [2] $g^+ = 0.10$, $p > 0.05$, 95 % CI [- 0.09 to 0.29], k = 8, n = 491	NR	low

Table S4: Synthesis of Evidence for Moderating Effects of Training Parameters in Older Adults with mNCD or Dementia based on Meta-Analyses
color-coding: black = significant effect, grey = no significant effect
* = significant at p ≤ 0.05, ** = significant at p ≤ 0.01
↑ = significant improvement, ↗ trend for improvement, → no significant effect

Abbreviations: DUAL = simultaneous cognitive-motor training, COG = cognitive training, g = Hedge's g, k = number of studies; MD = mean difference (absolute), mNCD = mild neurocognitive disorder, n = number of participants; NR = not reported, PHYS = physical training, SMD = standardized mean difference, SE = standard error

Parameter	Moderating Effects				
	Outcome	Reference	Type of Training	Variable & Relation	Statistics
Frequency	⊠ Cognition				
	Older Adults with mNCD/Dementia:				
	Global Cognition: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	⊠ COG ☐ PHYS ☐ DUAL	pooled estimate** ≤ 3x/week* > 3x/week* between-group diff. ↗	SMD^+ = 0.42, p < 0.0001, 95 % CI [0.23 to 0.61], k = 27 SMD^+ = 0.33, p = 0, 95 % CI [0.13 to 0.53], k = 20 SMD^+ = 0.71, p = 0, 95 % CI [0.27 to 1.14], k = 7 Chi^2 = 2.39, p = 0.12, I^2 = 58.13 %
	moderator analysis	Sanders et al. 2019 [26]	☐ COG ⊠ PHYS ☐ DUAL	moderator effect* ↑* pooled estimate* 2x/week 3x/week* post-hoc test reference = 2x/week → 4x/week** post-hoc test reference = 2x/week ↑*	$F(2, 51)$ = 1.589, p < 0.05 g^+ = 0.22, p < 0.05, 95 % CI [0.05 to 0.39], k = 13 g^+ = 0.05, p > 0.05, 95 % CI [-0.15 to 0.26] g^+ = 0.35, p < 0.05, 95 % CI [0.04 to 0.66] ß = 0.22, 95 % CI [-0.16 to 0.61], p > 0.05 g^+ = 0.50, p < 0.01, 95 % CI [0.24 to 0.76] ß = 0.42, 95 % CI [0.06 to 0.78], p < 0.05
	subgroup analysis	Groot et al. 2015 [36]	☐ COG ⊠ PHYS ☐ DUAL	pooled estimate** multicomponent pooled (1)** aerobic only pooled (2)** resistance only pooled (3) low frequency (1-3)* high frequency (1-3)** between-group diff. (1-3)** ↓** low frequency (1+2)** high frequency (1+2)* between-group diff. (1+2) →	SMD^+ = 0.42, p < 0.01, 95 % CI [0.23 to 0.62], k = 16 SMD^+ = 0.59, p < 0.01, 95 % CI [0.32 to 0.86], k = 6 SMD^+ = 0.41, p < 0.01, 95 % CI [0.05 to 0.76], k = 6 SMD^+ = -0.10, p > 0.05, 95 % CI [-0.38 to 0.19], k = 4 SMD^+ = 0.33, p < 0.05, 95 % CI [0.03 to 0.63], k = 7 SMD^+ = 0.64, p < 0.01, 95 % CI [0.39 to 0.89], k = 7 $t(12)$ = 4.02, p < 0.01 SMD^+ = 0.68, p < 0.01, 95 % CI [0.39 to 0.96], k = 5 SMD^+ = 0.47, p < 0.05, 95 % CI [0.06 to 0.88], k = 5 $t(8)$ = 1.79, p = 0.11
	Executive Function: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	⊠ COG ☐ PHYS ☐ DUAL	pooled estimate** ≤ 3x/week* > 3x/week* between-group diff. →	SMD^+ = 0.75, p = 0, 95 % CI [0.28 to 1.22], k = 12 SMD^+ = 0.57, p = 0.04, 95 % CI [0.01 to 1.13], k = 8 SMD^+ = 1.20, p = 0.02, 95 % CI [0.2 to 2.20], k = 4 Chi^2 = 1.14, p = 0.29, I^2 = 12.19 %
	Learning and Memory: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	⊠ COG ☐ PHYS ☐ DUAL	immediate memory: pooled estimate** ≤ 3x/week** > 3x/week** between-group diff. →	 SMD^+ = 0.74, p < 0.0001, 95 % CI [0.29 to 1.19], k = 18 SMD^+ = 0.73, p = 0, 95 % CI [0.27 to 1.19], k = 14 SMD^+ = 0.74, p = 0, 95 % CI [0.29 to 1.19], k = 4 Chi^2 = 0, p = 0.97, I^2 = 0 %
	Language: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	⊠ COG ☐ PHYS ☐ DUAL	pooled estimate ≤ 3x/week > 3x/week* between-group diff. →	SMD^+ = 0.22, p = 0.13, 95 % CI [- 0.07 to 0.50], k = 12 SMD^+ = 0.05, p = 0.57, 95 % CI [- 0.13 to 0.24], k = 9 SMD^+ = 1.00, p = 0.03, 95 % CI [0.09 to 1.92], k = 3 Chi^2 = 3.96, p = 0.05, I^2 = 74.72 %
	Mixed Healthy Older Adults and Older Adults with mNCD or Dementia:				
	Global Cognition: bivariate correlation	Gomes-Osman et al. 2018 [46]	☐ COG ⊠ PHYS ☐ DUAL	frequency (per week) →	r = -0.05, p = 0.67
	Healthy Older Adults:				
	Global Cognition: moderator analysis	Sanders et al. 2019 [26]	☐ COG ⊠ PHYS ☐ DUAL	moderator effect → pooled estimate** 1x/week 2x/week* 3x/week** 4x/week	$F(3, 128)$ = 0.283, p > 0.05 g^+ = 0.26, p < 0.01, 95 % CI [0.15 to 0.37], k = 23 g^+ = 0.23, p > 0.05, 95 % CI [-0.17 to 0.63] g^+ = 0.34, p < 0.05, 95 % CI [0.07 to 0.62] g^+ = 0.23, p < 0.01, 95 % CI [0.09 to 0.37] g^+ = 0.41, p > 0.05, 95 % CI [-0.19 to 1.00]
	subgroup analysis	Jia et al. 2019 [23]	☐ COG ⊠ PHYS ☐ DUAL	pooled estimate** up to 3x/week* > 3x/week* between-group difference →	SMD^+ = 1.12, p < 0.001, 95 % CI [0.66 to 1.59], k = 13 SMD^+ = 1.58, 95 % CI [1.01 to 2.14], k = 3 SMD^+ = 0.99, 95 % CI [0.49 to 1.50], k = 10 NR
	moderator analysis	Northey et al. 2018 [30]	☐ COG ⊠ PHYS ⊠ DUAL	moderator effect** ↑** pooled estimate** < 2x/week* 3 - 4x/week*	Q_5 = 24.12, p < 0.01 SMD^+ = 0.29, p < 0.01, 95 % CI [0.17 to 0.41], k = 36 SMD^+ = 0.32, p < 0.05, 95 % CI [0.13 to 0.52], n = 92 SMD^+ = 0.24, p < 0.05, 95 % CI [0.07 to 0.52], n = 229

Frequency (continued)	moderator analysis	Mewborn et al. 2017 [13]	☒ COG ☐ PHYS ☐ DUAL	5 - 7x/week* moderator effect** pooled estimate** 3+ times/week** 1 – 2 times/week**	↓**	SMD⁺ = 0.69, p < 0.05, 95 % CI [0.10 to 1.28], n = 13 Q = 816.39, p = 0.001 g⁺ = 0.298, p < 0.001, 95 % CI [0.25 to 0.35], k = 279 g⁺ = 0.304, p < 0.001, 95 % CI [0.22 to 0.39], k = 122 g⁺ = 0.363, p < 0.001, 95 % CI [0.29 to 0.44], k = 144
	subgroup analysis	Lampit et al. 2014 [17]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate** 1x/week* 2 – 3x/week* > 3x/week between-group diff.**	↓**	g⁺ = 0.22, p < 0.001, 95 % CI [0.15 to 0.29], k = 52 g⁺ = 0.34, p < 0.05, 95 % CI [0.16 to 0.51], k = 5 g⁺ = 0.28, p < 0.05, 95 % CI [0.18 to 0.37], k = 29 g⁺ = 0.07, p > 0.05, 95 % CI [-0.05 to 0.19], k = 16 p = 0.01
	Attention: correlation	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions per week	→	coefficient (SE) = -0.05 (0.20), p = 0.81
	Executive Function: moderator analysis	Chen et al. 2020 [20]	☐ COG ☒ PHYS ☒ DUAL	frequency (weeks)* low (1 – 2 times)* moderate (3 – 4 times)*	↑*	Q(1) = 10.86, p < 0.05 g⁺ = 0.15, p < 0.05, 95 % CI [0.08 to 0.22], k = 46 g⁺ = 0.31, p < 0.05, 95 % CI [0.24 to 0.38], k = 56
	Inhibition: correlation	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions per week	→	coefficient (SE) = -0.10 (0.12), p = 0.40
	Shifting: correlation	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions per week	→	coefficient (SE) = -0.05 (0.18), p = 0.79
	Updating: correlation	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions per week	→	coefficient (SE) = -0.11 (0.14), p = 0.44
	Memory: correlation	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions per week	→	coefficient (SE) = 0.04 (0.19), p = 0.85
	Processing Speed: correlation	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions per week	→	coefficient (SE) = -0.01 (0.11), p = 0.89
	Reasoning: correlation	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions per week	→	coefficient (SE) = 0.10 (0.22), p = 0.66

☒ Brain / Neurochemicals / HRV

	Heart Rate Variability: ST-SDNN meta-regression	Raffin et al. 2019 [25]	☐ COG ☒ PHYS ☐ DUAL	frequency/week*	↑*	coefficient (SE) = 0.191 (0.096), p = 0.046
	RMSSD meta-regression	Raffin et al. 2019 [25]	☐ COG ☒ PHYS ☐ DUAL	frequency/week	→	coefficient (SE) = -0.008 (0.130), p = 0.928
	HF-HRV meta-regression	Raffin et al. 2019 [25]	☐ COG ☒ PHYS ☐ DUAL	frequency/week	→	coefficient (SE) = 0.111 (0.081), p = 0.174

☐ Physical Outcomes, Mobility, and Activities of Daily Living

☐ Psychosocial Outcomes

Intensity / Complexity	☒ Cognition					

Older Adults with mNCD/Dementia:

	Global Cognition: subgroup analysis	Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	aerobic training (pooled)** mod. to high intensity**		SMD⁺ = 0.45, 95 % CI [0.15 to 0.76], k = 11 SMD⁺ = 0.60, 95 % CI [0.21 to 0.98], k = 7
	moderator analysis	Sanders et al. 2019 [26]	☐ COG ☒ PHYS ☐ DUAL	between-group difference moderator effect aerobic training (pooled) low intensity moderate intensity multicomp. ex. (pooled)** low intensity moderate intensity high intensity	→ →	NR F(1, 25) = 1.967, p > 0.05, and F(2, 6) = 0.845, p > 0.05 g⁺ = 0.22, p > 0.05, 95 % CI [-0.20 to 0.64] g⁺ = 0.42, p > 0.05, 95 % CI [-0.10 to 0.93] g⁺ = 0.06, p > 0.05, 95 % CI [-0.12 to 0.24] g⁺ = 0.36, p < 0.01, 95 % CI [0.04 to 0.68] g⁺ = 1.02, p > 0.05, 95 % CI [-0.35 to 2.39] g⁺ = 0.21, p > 0.05, 95 % CI [-0.47 to 0.89] g⁺ = 0.42, p > 0.05, 95 % CI [-0.80 to 1.64]
	Executive Function: moderator analysis	Chen et al. 2020 [20]	☐ COG ☒ PHYS ☐ DUAL	intensity moderate* vigorous*	→	Q(1) = 2.87, p > 0.05 g⁺ = 0.11, p < 0.05, 95 % CI [0.00 to 0.21], k = 25 g⁺ = 0.22, p < 0.05, 95 % CI [0.14 to 0.30], k = 44
	subgroup-analysis	Biazus-Sehn et al. 2020 [19]	☐ COG ☒ PHYS ☒ DUAL	pooled effect* light intensity moderate intensity* vigorous intensity	↑*	SMD⁺ = 0.21, p = 0.026, 95 % CI [0.03 to 0.40], k = 19 SMD⁺ = 0.04, p = 0.928, 95 % CI [-0.82 to 0.90] SMD⁺ = 0.45, p = 0.039, 95 % CI [0.08 to 0.82] SMD⁺ = 0.07, p = 0.688, 95 % CI [-0.26 to 0.39]
	Working Memory: subgroup-analysis	Biazus-Sehn et al. 2020 [19]	☐ COG ☒ PHYS ☒ DUAL	pooled effect moderate intensity*	↑*	SMD⁺ = -0.01, p = 0.939, 95 % CI [-0.03 to 0.30], k = 15 SMD⁺ = -0.06, p = 0.039, 95 % CI [-1.26 to -0.03]
	Memory:					

Intensity / Complexity (continued)	subgroup-analysis	Biazus-Sehn et al. 2020 [19]	☐ COG ☒ PHYS ☒ DUAL	pooled effect* light intensity moderate intensity* ↑* vigorous intensity	$SMD^+ = 0.18$, $p = 0.047$, 95 % CI [0.00 to 0.36], $k = 17$ $SMD^+ = 0.26$, $p = 0.244$, 95 % CI [-0.18 to 0.70] $SMD^+ = 0.66$, $p = 0.002$, 95 % CI [0.023 to 1.09] $SMD^+ = -0.01$, $p = 0.930$, 95 % CI [-0.35 to 0.32]

Healthy Older Adults:

	Global cognition:				
	moderator analysis	Sanders et al. 2019 [26]	☐ COG ☒ PHYS ☐ DUAL	moderator effect → aerobic exerc. (pooled)** low intensity moderate intensity** high intensity multicomp. ex. (pooled) low intensity moderate intensity high intensity	$F_{(2, 77)} = 2.396$, $p > 0.05$ AND $F_{(2, 40)} = 0.243$, $p > 0.05$ $g^+ = 0.22$, $p < 0.01$, 95 % CI [0.03 to 0.41] $g^+ = 0.65$, $p > 0.05$, 95 % CI [-0.32 to 1.62] $g^+ = 0.25$, $p < 0.01$, 95 % CI [0.07 to 0.43] $g^+ = -0.30$, $p > 0.05$, 95 % CI [-0.94 to 0.34] $g^+ = 0.30$, $p > 0.05$, 95 % CI [-0.01 to 0.60] $g^+ = 0.03$, $p > 0.05$, 95 % CI [-1.77 to 1.84] $g^+ = 0.24$, $p > 0.05$, 95 % CI [-1.57 to 2.04] $g^+ = 0.49$, $p > 0.05$, 95 % CI [-0.80 to 1.79]
	moderator analysis	Northey et al. 2018 [30]	☐ COG ☒ PHYS ☐ DUAL	moderator effect ↑** aerobic exerc. (pooled)** low intensity moderate intensity high intensity	$Q_S = 13.55$, $p < 0.01$ $SMD^+ = 0.29$, $p < 0.01$, 95 % CI [0.17 to 0.41], $k = 36$ $SMD^+ = 0.10$, $p > 0.05$, 95 % CI [-0.02 to 0.23], $n = 71$ $SMD^+ = 0.17$, $p < 0.05$, 95 % CI [0.03 to 0.33], $n = 57$ $SMD^+ = 0.16$, $p < 0.05$, 95 % CI [0.04 to 0.27], $n = 8$
	moderator analysis	Toril et al. 2014 [16]	☒ COG ☐ PHYS ☐ DUAL	moderator effect → pooled estimate** simple games** complex games**	$Q_{(1)} = 0.55$, $p > 0.05$ $d^+ = 0.37$, $p < 0.01$, 95 % CI [0.26 to 0.48] $d^+ = 0.42$, $p < 0.01$, 95 % CI [0.25 to 0.58] $d^+ = 0.33$, $p < 0.01$, 95 % CI [0.18 to 0.48]

☐ **Brain / Neurochemicals / HRV**

☒ **Physical Outcomes, Mobility, and Activities of Daily Living**

Healthy Older Adults:

	Fall Rate:				
	meta-regression	Sherrington et al. 2017 [33]	☐ COG ☒ PHYS ☒ DUAL	resistance training moderate-high intensity → high-intensity → balance training moderate-high challenge → high challenge* ↑*	$RR^- $ (95 % CI) $= 0.97$ (0.82 to 1.15), $p = 0.73$, $\Delta I^2 = -4$ % RR^- (95 % CI) $= 1.23$ (0.96 to 1.57), $p = 0.11$, $\Delta I^2 = 9$ % RR^- (95 % CI) $= 0.85$ (0.71 to 1.00), $p = 0.06$, $\Delta I^2 = 19$ % RR^- (95 % CI) $= 0.85$ (0.73 to 1.00), $p = 0.04$, $\Delta I^2 = 28$ %

☐ **Psychosocial Outcomes**

Type (of training)	☒ **Cognition**				

Older Adults with mNCD/Dementia:

	Global Cognition:				
	network meta-analysis	Gavelin et al. 2021 [39]	☒ COG ☒ PHYS ☒ DUAL	pairwise comparisons pooled estimate* simultaneous training* sequential training cognitive training exergaming physical training	see table 4 of publication $g^+ = 0.26$, $p = 0.02$, 95 % CI [0.06 to 0.46], $k = 13$ $g^+ = 0.45$, $p < 0.05$, 95 % CI [0.11 to 0.78], $k = 3$ $g^+ = 0.25$, $p > 0.05$, 95 % CI [-0.05 to 0.55], $k = 2$ $g^+ = 0.26$, $p > 0.05$, 95 % CI [-0.12 to 0.64], $k = 2$ $g^+ = 0.13$, $p > 0.05$, 95 % CI [-0.22 to 0.48], $k = 2$ $g^+ = 0.07$, $p > 0.05$, 95 % CI [-0.26 to 0.39], $k = 2$
	subgroup analysis	Biazus-Sehn et al. 2020 [19]	☐ COG ☒ PHYS ☒ DUAL	pooled estimate** aerobic training only resistance training only multicomp. training only comb. cognitive-motor** ↑** between-group difference	$SMD^+ = 0.35$, $p < 0.001$, 95 % CI [0.17 to 0.43], $k = 18$ $SMD^+ = 0.19$, $p = 0.364$, 95 % CI [-0.22 to 0.59] $SMD^+ = 0.19$, $p = 0.488$, 95 % CI [-0.35 to 0.74] $SMD^+ = 0.38$, $p = 0.066$, 95 % CI [-0.03 to 0.79] $SMD^+ = 0.53$, $p = 0.003$, 95 % CI [0.17 to 0.53] NR
	subgroup analysis	Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate** aerobic training only** multicomp. exerc. only** between-group difference	$SMD^+ = 0.42$, $p < 0.001$, 95 % CI [0.25 to 0.59], $k = 26$ $SMD^+ = 0.45$, 95 % CI [0.15 to 0.76], $k = 11$, $n = 704$ $SMD^+ = 0.43$, 95 % CI [0.13 to 0.73], $k = 9$, $n = 831$ NR
	subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate* traditional training* augmented training* between-group difference	$SMD^+ = 0.42$, $p < 0.001$, 95 % CI [0.23 to 0.61], $k = 27$ $SMD^+ = 0.43$, $p = 0$, 95 % CI [0.18 to 0.68], $k = 18$ $SMD^+ = 0.37$, $p = 0.01$, 95 % CI [0.10 to 0.65], $k = 9$ $Chi^2 = 0.09$, $p = 0.77$, $I^2 = 0$ %
	subgroup analysis	Wu et al. 2019 [43]	☐ COG ☐ PHYS ☒ DUAL	pooled estimate** dance only* tai chi only* → between-group difference	$MD^+ = 0.92$, $p = 0.002$, 95 % CI [0.33 to 1.51], $k = 13$ $MD^+ = 1.12$, $p = 0.02$, 95 % CI [0.16 to 2.08], $k = 2$ $MD^+ = 0.97$, $p = 0.02$, 95 % CI [0.19 to 1.76], $k = 10$ $p = 0.25$, $I^2 = 59$ %
	moderator analysis	Sanders et al. 2019 [26]	☐ COG ☒ PHYS ☐ DUAL	moderator effect → pooled estimate* aerobic only	$F_{(2, 51)} = 0.432$, $p > 0.05$ $g^+ = 0.22$, $p < 0.05$, 95 % CI [0.05 to 0.39], $k = 13$ $g^+ = 0.22$, $p > 0.05$, 95 % CI [-0.20 to 0.64]

Type (of training; continued)		Study	Training type	Description		Statistics
				resistance only		$g^+ = 0.22$, p > 0.05, 95 % CI [-0.20 to 0.64]
				multicomponent only**		$g^+ = 0.36$, p < 0.01, 95 % CI [0.04 to 0.68]
				between-group difference	→	$F(3, 182) = 0.322$, p > 0.05
	subgroup analysis	Panza et al. 2018 [31]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate**		$d^+ = 0.47$, p < 0.05, 95 % CI [0.26 to 0.68], k = 23
				aerobic training only*		$d^+ = 0.65$, p < 0.05, 95 % CI [0.35 to 0.95], k = 15
				multicomp. training only		$d^+ = 0.19$, p > 0.05, 95 % CI [-0.06 to 0.43], k = 8
				between group difference	→	p = 0.11
	subgroup analysis	Liang et al. 2018 [9]	☒ COG ☒ PHYS ☐ DUAL	pooled estimate		$SMD^+ = 0.13$, p = 0.212, 95 % CI [-0.00 to 0.25], k = 15
				aerobic training only		$SMD^+ = 0.35$, p = 0.051, 95 % CI [-0.12 to 0.82], k = 4
				cognitive training only		$SMD^+ = -0.02$, p = 0.588, 95 % CI [-0.31 to 0.27], k = 4
				between-group difference		NR
	direct comparison	García-Casal et al. 2017 [11]	☒ COG ☐ PHYS ☐ DUAL	computer based vs. not	↑*	$SMD^+ = 0.48$, p = 0.02, 95 % CI [0.09 to 0.87], n = 119
	subgroup analysis	Shermann et al. 2017 [14]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate		$g^+ = 0.445$, p = 0.002, 95 % CI [0.072 to 0.730], k = 26
				restorative training		$g^+ = 0.389$, p = 0.156, 95 % CI [-0.149 to 0.927], k = 8
				compensatory training		$g^+ = 0.623$, p = 0.150, 95 % CI [-0.224 to 1.470], k = 3
				multidomain training*		$g^+ = 0.438$, p = 0.019, 95 % CI [0.072 to 0.804], k = 15
				between-group difference		Q = 0.211, p = 0.900
				group training		$g^+ = 0.297$, p = 0.158, 95 % CI [-0.116 to 0.710], k = 12
				individual training*		$g^+ = 1.008$, p = 0.006, 95 % CI [0.293 to 1.723], k = 4
				computer training		$g^+ = 0.394$, p = 0.098, 95 % CI [-0.072 to 0.859], k = 10
				between-group difference		Q = 2.918, p = 0.232
	subgroup analysis	Groot et al. 2015 [36]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate**		$SMD^+ = 0.42$, p < 0.01, 95 % CI [0.23 to 0.62], k = 16
				multicomponent (1)**		$SMD^+ = 0.59$, p < 0.01, 95 % CI [0.32 to 0.86], k = 6
				aerobic only (2)**		$SMD^+ = 0.41$, p < 0.01, 95 % CI [0.05 to 0.76], k = 6
				resistance only (3)		$SMD^+ = -0.10$, p > 0.05, 95 % CI [-0.38 to 0.19], k = 4
				subgroup diff. (1+2 vs 3)**	↑**	$t(14) = 9.08$, p < 0.01
				subgroup diff. (1 vs 3)**	↑**	$t(8) = 5.47$, p < 0.01
				subgroup diff. (2 vs 3)**	↑**	$t(8) = 4.54$, p < 0.01
				subgroup diff. (1 vs 2)	→	$t(10) = 1.98$, p = 0.08
Complex Attention:						
	meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	exergame		coefficient (SE) = 1.57 (1.02), p = 0.16
				brain game**	↓**	coefficient (SE) = -1.67 (0.44), p < 0.01
	subgroup analysis	Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate		$SMD^+ = 0.04$, p = 0.52, 95 % CI [-0.07 to 0.15], k = 15
				aerobic training only		$SMD^+ = 0.12$, 95 % CI [-0.06 to 0.30], k = 6
				between-group difference		NR
	subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate*		$SMD^+ = 0.56$, p = 0.02, 95 % CI [0.07 to 0.95], k = 12
				traditional training		$SMD^+ = 0.56$, p = 0.13, 95 % CI [- 0.17 to 1.30], k = 8
				augmented training*		$SMD^+ = 0.51$, p = 0.02, 95 % CI [0.07 to 0.95], k = 4
				between-group difference		$Chi^2 = 0.01$, p = 0.91, $I^2 = 0$ %
Executive Function:						
	subgroup analysis	Biazus-Sehn et al. 2020 [19]	☐ COG ☒ PHYS ☒ DUAL	pooled estimate*		$SMD^+ = 0.21$, p = 0.026, 95 % CI [0.03 to 0.40], k = 19
				aerobic training only		$SMD^+ = 0.13$, p = 0.407, 95 % CI [-0.18 to 0.44]
				resistance training only		$SMD^+ = 0.14$, p = 0.499, 95 % CI [-0.26 to 0.53]
				multicomp. training only		$SMD^+ = 0.04$, p = 0.928, 95 % CI [-0.81 to 0.90]
				comb. cognitive-motor*	↑*	$SMD^+ = 0.50$, p = 0.015, 95 % CI [0.93 to 0.91]
				between-group difference		NR
	subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate*		$SMD^+ = 0.75$, p = 0, 95 % CI [0.28 to 1.22], k = 12
				traditional training*		$SMD^+ = 0.64$, p = 0.01, 95 % CI [0.14 to 1.14], k = 9
				augmented training		$SMD^+ = 1.32$, p = 0.10, 95 % CI [- 0.26 to 2.91], k = 3
				between-group difference		$Chi^2 = 0.65$, p = 0.42, $I^2 = 0$ %
				pooled estimate		$SMD^+ = 0.03$, p = 0.74, 95 % CI [-0.14 to 0.20], k = 8
				aerobic training only		$SMD^+ = 0.01$, 95 % CI [-0.16 to 0.19], k = 6
				between-group difference	→	NR
Cognitive Flexibility:						
	subgroup analysis	Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate*		$MD^- = -8.80$, p = 0.007, 95 % CI [-15.2 to -2.4], k = 13
				dance only		$MD^- = -6.19$, p = 0.38, 95 % CI [-20.1 to 7.7], k = 3
				tai chi only		$MD^- = -9.06$, p = 0.11, 95 % CI [-20.0 to 1.9], k = 7
	subgroup analysis	Wu et al. 2019 [43]	☐ COG ☐ PHYS ☒ DUAL	between-group difference		p = 0.82, $I^2 = 0$ %
Inhibition:						
	meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	exergame	→	coefficient (SE) = 0.28 (0.28), p = 0.34
				brain game	→	coefficient (SE) = 0.13 (0.31), p = 0.71
Shifting:						
	meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	exergame	→	coefficient (SE) = 0.49 (0.41), p = 0.25
				brain game	→	coefficient (SE) = 0.13 (0.31), p = 0.71
Updating:						
	meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	exergame	→	coefficient (SE) = -0.32 (0.41), p = 0.44
				brain game	→	coefficient (SE) = 0.18 (0.39), p = 0.65
Working Memory:						
	subgroup analysis	Wu et al. 2019 [43]	☐ COG ☐ PHYS ☒ DUAL	pooled estimate*		$MD^+ = 0.32$, p = 0.05, 95 % CI [0.01 to 0.64], k = 10
				dance only		$MD^+ = 0.41$, p = 0.18, 95 % CI [-0.19 to 1.00], k = 2
				tai chi only		$MD^+ = 0.46$, p = 0.06, 95 % CI [-0.03 to 0.94], k = 6
				between-group difference	→	p = 0.52, $I^2 = 0$ %
Learning & Memory:						
	subgroup analysis	Biazus-Sehn et al. 2020 [19]	☐ COG ☒ PHYS ☒ DUAL	pooled estimate*		$SMD^+ = 0.18$, p = 0.047, 95 % CI [0.00 to 0.36], k = 17
				aerobic training only		$SMD^+ = 0.07$, p = 0.596, 95 % CI [-0.19 to 0.34]
				resistance training only		$SMD^+ = -0.04$, p = 0.856, 95 % CI [-0.44 to 0.37]
				multicomp. training only		$SMD^+ = 0.01$, p = 0.973, 95 % CI [-0.38 to 0.39]
				comb. cognitive-motor**	↑**	$SMD^+ = 0.59$, p < 0.001, 95 % CI [0.27 to 0.92]

Type (of training; continued)					

	subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	between-group difference
				immediate memory:
				pooled estimate*
				  traditional training*
				  augmented training*
				between-group difference →
				delayed memory:
				between-group difference
				  traditional training*
				  augmented training
				between-group difference →
					NR
					
					$SMD^+ = 0.74$, $p < 0.001$, 95 % CI [0.04 to 1.02], k = 18
					$SMD^+ = 0.82$, $p = 0$, 95 % CI [0.33 to 1.30], k = 13
					$SMD^+ = 0.53$, $p = 0.03$, 95 % CI [0.04 to 1.02], k = 5
					$Chi^2 = 0.65$, $p = 0.42$, $I^2 = 0$ %
					
					$SMD^+ = 0.81$, $p = 0$, 95 % CI [0.29 to 1.32], k = 11
					$SMD^+ = 0.86$, $p = 0.02$, 95 % CI [0.15 to 1.58], k = 7
					$SMD^+ = 0.68$, $p = 0.09$, 95 % CI [- 0.11 to 1.46], k = 4
					$Chi^2 = 0.12$, $p = 0.73$, $I^2 = 0$ %

Language Fluency:
subgroup analysis
 	
subgroup analysis
		Bahar-Fuchs et al. 2019 [5]
		
		Wu et al. 2019 [43]
			☒ COG ☐ PHYS ☐ DUAL
			
			☐ COG ☐ PHYS ☒ DUAL
				pooled estimate*
				  traditional training*
				  augmented training
				between-group difference →
				pooled estimate*
				  dance only**
				  tai chi only*
				between-group difference →
					$SMD^+ = 0.52$, $p = 0.0005$, 95 % CI [0.23 to 0.81], k = 9
					$SMD^+ = 0.64$, $p = 0$, 95 % CI [0.26 to 1.01], k = 6
					$SMD^+ = 0.33$, $p = 0.05$, 95 % CI [0 to 0.65], k = 3
					$Chi^2 = 1.5$, $p = 0.22$, $I^2 = 33.37$ %
					$MD^+ = 0.27$, $p = 0.003$, 95 % CI [0.09 to 0.45], k = 9
					$MD^+ = 0.61$, $p < 0.001$, 95 % CI [0.09 to 0.45], k = 1
					$MD^+ = 0.18$, $p = 0.05$, 95 % CI [0.00 to 0.37], k = 6
					$p = 0.11$, $I^2 = 55.5$ %

Memory:
subgroup analysis
		Wu et al. 2019 [43]	☐ COG ☐ PHYS ☒ DUAL	pooled estimate**
				  dance only*
				  tai chi only*
				between-group difference →
					$MD^+ = 0.24$, $p = 0.001$, 95 % CI [0.10 to 0.39], k = 15
					$MD^+ = 0.35$, $p = 0.003$, 95 % CI [0.12 to 0.58], k = 3
					$MD^+ = 0.20$, $p = 0.005$, 95 % CI [0.06 to 0.35], k = 7
					$p = 0.49$, $I^2 = 0$ %

Processing Speed:
subgroup analysis
		Wu et al. 2019 [43]	☐ COG ☐ PHYS ☒ DUAL	pooled estimate
				  dance only
				  tai chi only
				between-group difference →
					$MD^- = -1.44$, $p = 0.39$, 95 % CI [-4.7 to 1.8], k = 9
					$MD^- = -0.69$, $p = 0.22$, 95 % CI [-1.78 to 0.41], k = 3
					$MD^- = -1.29$, $p = 0.74$, 95 % CI [-9.0 to 6.4], k = 4
					$p = 0.94$, $I^2 = 0$ %

Healthy Older Adults:					

Global Cognition:
network meta-analysis
 	
moderator analysis
 	
moderator analysis
		Gavelin et al. 2021 [39]
		
		Sanders et al. 2019 [26]
		
		Northey et al. 2018 [30]
			☒ COG ☒ PHYS ☒ DUAL
			
			☐ COG ☒ PHYS ☐ DUAL
			
			☐ COG ☒ PHYS ☐ DUAL
				pairwise comparisons
				pooled estimate*
				  simultaneous training*
				  sequential training*
				  cognitive training*
				  physical training*
				  exergaming*
				moderator effect →
				  pooled estimate*
				  aerobic only*
				  resistance only**
				  multicomponent only
				moderator effect**
				  pooled estimate**
				  aerobic only**
				  resistance only**
				  multicomponent only** ↑**
					see table 4 of publication
					$g^+ = 0.20$, $p < 0.001$, 95 % CI [0.12 to 0.29], k = 28
					$g^+ = 0.45$, $p < 0.05$, 95 % CI [0.23 to 0.53], k = 2
					$g^+ = 0.38$, $p < 0.05$, 95 % CI [0.22 to 0.56], k = 2
					$g^+ = 0.36$, $p < 0.05$, 95 % CI [0.16 to 0.41], k = 1
					$g^+ = 0.24$, $p < 0.05$, 95 % CI [0.07 to 0.38], k = 1
					$g^+ = 0.21$, $p < 0.05$, 95 % CI [0.04 to 0.35], k = 5
					$F(3, 128) = 0.081$, $p > 0.05$
					$g^+ = 0.26$, $p < 0.01$, 95 % CI [0.15 to 0.37], k = 23
					$g^+ = 0.22$, $p < 0.05$, 95 % CI [0.03 to 0.41]
					$g^+ = 0.27$, $p < 0.01$, 95 % CI [0.09 to 0.46]
					$g^+ = 0.30$, $p > 0.05$, 95 % CI [-0.01 to 0.60]
					$Q_5 = 39.53$, $p < 0.01$
					$SMD^+ = 0.29$, $p < 0.01$, 95 % CI [0.17 to 0.41], k = 36
					$SMD^+ = 0.24$, $p < 0.01$, 95 % CI [0.10 to 0.37], n = 153
					$SMD^+ = 0.29$, $p < 0.01$, 95 % CI [0.13 to 0.44], n = 80
					$SMD^+ = 0.52$, $p < 0.01$, 95 % CI [0.32 to 0.71], n = 80

Executive Function:
moderator analysis
		Chen et al. 2020 [20]	☐ COG ☒ PHYS ☒ DUAL	Type of training* ↑**
				  aerobic training*
				  resistance training*
				  multicomp. training*
				  Tai Chi / Yoga*
				  cognitive-motor training*
					$Q(4) = 226.18$, $p < 0.05$
					$g^+ = 0.14$, $p < 0.05$, 95 % CI [0.06 to 0.33], k = 45
					$g^+ = 0.22$, $p < 0.05$, 95 % CI [0.10 to 0.33], k = 20
					$g^+ = 0.10$, $p < 0.05$, 95 % CI [0.00 to 0.19], k = 18
					$g^+ = 0.38$, $p < 0.05$, 95 % CI [0.27 to 0.49], k = 14
					$g^+ = 0.44$, $p < 0.05$, 95 % CI [0.29 to 0.66], k = 10

☐ Brain / Neurochemicals / HRV					
☒ Physical Outcomes, Mobility, and Activities of Daily Living					
Older Adults with mNCD/Dementia:					

Global Physical Outc.:
network meta-analysis
		Gavelin et al. 2021 [39]	☒ COG ☒ PHYS ☒ DUAL	pairwise comparisons
				pooled estimate*
				  sequential training*
				  simultaneous training
				  physical training
				  exergaming
				  cognitive training
					see table 4 of publication
					$g^+ = 0.32$, $p = 0.008$, 95 % CI [0.12 to 0.52], k = 8
					$g^+ = 0.66$, $p < 0.05$, 95 % CI [0.13 to 1.19], k = 2
					$g^+ = 0.36$, $p > 0.05$, 95 % CI [-0.02 to 0.75], k = 2
					$g^+ = 0.26$, $p > 0.05$, 95 % CI [-0.19 to 0.70], k = 1
					$g^+ = 0.22$, $p > 0.05$, 95 % CI [-0.11 to 0.54], k = 1
					$g^+ = - 0.09$, $p > 0.05$, 95 % CI [-0.57 to 0.40], k = 5

Healthy Older Adults:					

			COG/PHYS/DUAL	Comparison	Dir.	Statistics
Type (of training; continued)	Global Physical Outc.: network meta-analysis	Gavelin et al. 2021 [39]	☒ COG ☒ PHYS ☒ DUAL	pairwise comparisons pooled estimate* simultaneous training* sequential training* physical training* exergaming* cognitive training		see table 4 of publication $g^+ = 0.23$, $p = 0.005$, 95 % CI [0.08 to 0.38], k = 24 $g^+ = 0.50$, $p < 0.05$, 95 % CI [0.24 to 0.77], k = 2 $g^+ = 0.43$, $p < 0.05$, 95 % CI [0.20 to 0.65], k = 2 $g^+ = 0.38$, $p < 0.05$, 95 % CI [0.15 to 0.61], k = 1 $g^+ = 0.23$, $p < 0.05$, 95 % CI [0.03 to 0.43], k = 1 $g^+ = 0.18$, $p > 0.05$, 95 % CI [-0.11 to 0.47], k = 5

☒ Psychosocial Outcomes

Older Adults with mNCD/Dementia:

			COG/PHYS/DUAL	Comparison	Dir.	Statistics
Depression: direct comparison subgroup analysis		García-Casal et al. 2017 [11] Chan et al. 2020 [2]	☒ COG ☒ PHYS ☐ DUAL ☒ COG ☐ PHYS ☐ DUAL	computer based vs. not pooled estimate* computerized training* cognitive rehabilitation* cognitive stimulation* between-group difference	→	$SMD^+ = -0.02$, $p = 0.95$, 95 % CI [-0.54 to 0.50], k = 3 $SMD^- = -0.54$, $p < 0.001$, 95 % CI [-0.77 to –0.31], k = 36 $SMD^- = -0.77$, $p < 0.001$, 95 % CI [-1.09 to –0.44], k = 7 $SMD^- = -0.32$, $p < 0.001$, 95 % CI [-0.57 to -0.07], k = 16 $SMD^- = -0.61$, $p < 0.001$, 95 % CI [-1.08 to –0.15], k = 14 NR
Participants' Mood: subgroup analysis		Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate traditional training augmented training between-group difference		$SMD^+ = 0.72$, $p = 0.08$, 95 % CI [- 0.10 to 1.54], k = 8 $SMD^+ = 0.9$, $p = 0.14$, 95 % CI [0.3 to 2.1], k = 5 $SMD^+ = 0.46$, $p = 0.52$, 95 % CI [- 0.94 to 1.86], k = 3 $Chi^2 = 0.22$, $p = 0.64$, $I^2 = 0$ %

☒ Cognition

Older Adults with mNCD/Dementia:

			COG/PHYS/DUAL	Comparison	Dir.	Statistics
Time (session duration)	Global Cognition: moderator analysis	Sanders et al. 2019 [26]	☐ COG ☒ PHYS ☐ DUAL	moderator effect** pooled estimate* ≤ 30 min** post-hoc test(reference = ≥ 45min)** 31 – 45 min post-hoc test(reference = ≥ 45min) ≥ 45 min	↓** ↓** →	$F_{(2, 51)} = 5.756$, $p < 0.01$ $g^+ = 0.22$, $p < 0.05$, 95 % CI [0.05 to 0.39], k = 13 $g^+ = 0.43$, $p < 0.01$, 95 % CI [0.24 to 0.62] ß = 0.38, 95 % CI [0.15 to 0.60], $p < 0.01$ $g^+ = 0.28$, $p > 0.05$, 95 % CI [-0.26 to 0.82] ß = 0.23, 95 % CI [-0.23 to 0.78], $p > 0.05$ $g^+ = -0.07$, $p > 0.05$, 95 % CI [-0.07 to 0.17]

Mixed Healthy Older Adults and Older Adults with mNCD or Dementia:

			COG/PHYS/DUAL	Comparison	Dir.	Statistics
Global Cognition: bivariate correlation		Gomes-Osman et al. 2018 [46]	☐ COG ☒ PHYS ☐ DUAL	session time (min)	→	$r = 0.20$, $p = 0.05$ (n.s.)

Healthy Older Adults:

			COG/PHYS/DUAL	Comparison	Dir.	Statistics
Complex Attention: meta-regression		Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions duration	→	coefficient (SE) = -0.01 (0.02), $p = 0.48$
Processing Speed: meta-regression		Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions duration	→	coefficient (SE) = -0.01 (0.01), $p = 0.19$
Executive Function: moderator analysis		Chen et al. 2020 [20]	☐ COG ☒ PHYS ☒ DUAL	Session time short (≤ 45 min)* moderate (45 – 60 min)* long (60+ min)*	→	$Q_{(2)} = 0.21$, $p > 0.05$ $g^+ = 0.26$, $p < 0.05$, 95 % CI [0.18 to 0.33], k = 50 $g^+ = 0.26$, $p < 0.05$, 95 % CI [0.18 to 0.33], k = 39 $g^+ = 0.30$, $p < 0.05$, 95 % CI [0.15 to 0.44], k = 10
Inhibition: meta-regression		Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions duration	→	coefficient (SE) = -0.00 (0.01), $p = 0.60$
Reasoning: meta-regression		Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions duration	→	coefficient (SE) = -0.02 (0.02), $p = 0.34$
Shifting: meta-regression		Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions duration	→	coefficient (SE) = -0.01 (0.01), $p = 0.13$
Updating: meta-regression		Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions duration	→	coefficient (SE) = 0.01 (0.001), $p = 0.25$
Global Cognition: moderator analysis		Sanders et al. 2019 [26]	☐ COG ☒ PHYS ☐ DUAL	moderator effect pooled estimate** ≤ 30 min 31 – 45 min ≥ 45 min**	→	$F_{(3, 129)} = 0.905$, $p > 0.05$ $g^+ = 0.26$, $p < 0.01$, 95 % CI [0.15 to 0.37], k = 23 $g^+ = 0.22$, $p > 0.05$, 95 % CI [-0.03 to 0.47] $g^+ = 0.11$, $p > 0.05$, 95 % CI [-0.16 to 0.38] $g^+ = 0.31$, $p < 0.01$, 95 % CI [0.16 to 0.45]
subgroup analysis		Jia et al. 2019 [23]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate** up to 30 min/session* > 30 min/session* between-group difference*	↓*	$SMD^+ = 1.12$, $p < 0.001$, 95 % CI [0.66 to 1.59], k = 13 $SMD^+ = 1.92$, 95 % CI [1.55 to 2.30], k = 6 $SMD^+ = 0.34$, 95 % CI [0.08 to 0.61], k = 7 NR, but no overlap of CI
moderator analysis		Northey et al. 2018 [30]	☐ COG ☒ PHYS ☒ DUAL	moderator effect** pooled estimate** ≤ 45 min 46 – 59 min*	↑**	$Q_3 = 27.83$, $p < 0.01$ $SMD^+ = 0.29$, $p < 0.01$, 95 % CI [0.17 to 0.41], k = 36 $SMD^+ = 0.09$, $p > 0.05$, 95 % CI [-0.28 to 0.46], n = 36 $SMD^+ = 0.31$, $p < 0.05$, 95 % CI [0.16 to 0.46], n = 263

Time (session duration; continued)	moderator analysis	Mewborn et al. 2017 [13]	☒ COG ☐ PHYS ☐ DUAL	≥ 60 min moderator effect** pooled estimate** > 0.5 h** < 0.5 h**	↓**	SMD⁺ = 0.33, p > 0.05, 95 % CI [-0.04 to 0.65], n = 24 Q = 885.04, p = 0.001 g⁺ = 0.298, p < 0.001, 95 % CI [0.25 to 0.35], k = 279 g⁺ = 0.302, p < 0.001, 95 % CI [0.25 to 0.36], k = 245 g⁺ = 0.316, p < 0.001, 95 % CI [0.17 to 0.47], k = 29
	subgroup analysis	Lampit et al. 2014 [17]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate** < 30 min 31 – 60 min > 60 min between-group difference	→	g⁺ = 0.22, p < 0.001, 95 % CI [0.15 to 0.29], k = 52 g⁺ = 0.15, p < 0.05, 95 % CI [0.00 to 0.31], k = 13 g⁺ = 0.24, p < 0.05, 95 % CI [0.14 to 0.34], k = 29 g⁺ = 0.23, p < 0.05, 95 % CI [0.06 to 0.40], k = 8 p = 0.62
	Learning and Memory: meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	sessions duration**	↓**	coefficient (SE) = -0.03 (0.01), p = 0.03

☒ Brain / Neurochemicals / HRV

Healthy Older Adults:

	Heart Rate Variability: ST-SDNN meta-regression	Raffin et al. 2019 [25]	☐ COG ☒ PHYS ☐ DUAL	training duration	→	coefficient (SE) = 0.003 (0.008), p = 0.760
	RMSSD meta-regression	Raffin et al. 2019 [25]	☐ COG ☒ PHYS ☐ DUAL	training duration	→	coefficient (SE) = 0.003 (0.012), p = 0.829
	HF-HRV meta-regression	Raffin et al. 2019 [25]	☐ COG ☒ PHYS ☐ DUAL	training duration	→	coefficient (SE) = 0.008 (0.006), p = 0.152

☐ Physical Outcomes, Mobility, and Activities of Daily Living

☐ Psychosocial Outcomes

Duration (of intervention)						

☒ Cognition

Older Adults with mNCD/Dementia:

	Global Cognition: subgroup-analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate ≤ 3 months* > 3 months* between-group diff.		SMD⁺ = 0.42, p < 0.0001, 95 % CI [0.23 to 0.61], k = 27 SMD⁺ = 0.38, p = 0, 95 % CI [0.18 to 0.58], k = 21 SMD⁺ = 0.54, p = 0.02, 95 % CI [0.07 to 1.01], k = 6 Chi² = 0.38, p = 0.54, I² = 0 %
	subgroup-analysis	Wu et al. 2019 [43]	☐ COG ☒ PHYS ☒ DUAL	pooled estimate** 0 – 12 weeks* 13 – 14 weeks* > 24 weeks* between-group difference	→	SMD⁺ = 0.92, p < 0.001 95 % CI [0.33 to 0.59], k = 13 SMD⁺ = 1.74, p = 0.03, 95 % CI [0.18 to 3.29], k = 4 SMD⁺ = 0.46, p = 0.04, 95 % CI [0.02 to 0.90], k = 6 SMD⁺ = 0.58, p = 0.05, 95 % CI [0.01 to 1.15], k = 3 p = 0.30; I² = 17 %
	moderator analysis	Sanders et al. 2019 [26]	☐ COG ☒ PHYS ☐ DUAL	moderator effect pooled estimate* 4 – 12 weeks 13 – 24 weeks* ≥ 24 weeks	→	F(2, 51) = 1.259, p > 0.05 g⁺ = 0.22, p < 0.05, 95 % CI [0.05 to 0.39], k = 13 g⁺ = 0.29, p > 0.05, 95 % CI [-0.01 to 0.58] g⁺ = 0.34, p < 0.05, 95 % CI [0.05 to 0.53] g⁺ = 0.10, p > 0.05, 95 % CI [-0.16 to 0.36]
	Learning & Memory: subgroup-analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate ≤ 3 months > 3 months between-group diff.	→	SMD⁺ = 0.74, p < 0.0001, 95 % CI [0.37 to 1.12], k = 18 SMD⁺ = 0.03, p = 0.84, 95 % CI [- 0.23 to 0.28], k = 9 SMD⁺ = 0.66, p = 0.07, 95 % CI [- 0.05 to 1.38], k = 3 Chi² = 2.71, p = 0.10, I² = 63.13 %
	Language: subgroup-analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate ≤ 3 months* > 3 months* between-group diff.	→	SMD⁺ = 0.22, p = 0.13, 95 % CI [- 0.07 to 0.50], k = 12 SMD⁺ = 0.75, p = 0, 95 % CI [0.29 to 1.21], k = 15 SMD⁺ = 0.76, p = 0, 95 % CI [0.26 to 1.26], k = 3 Chi² = 0, p = 0.97, I² = 0 %

Mixed Healthy Older Adults and Older Adults with mNCD or Dementia:

	Global Cognition: moderator analysis	Gavelin et al. 2021 [39]	☐ COG ☐ PHYS ☒ DUAL	moderator effect pooled estimate* ≤ 12 weeks** > 12 weeks**	→	F(1, 18) = 0.32, p = 0.58 g⁺ = 0.22, p < 0.05, 95 % CI [0.14 to 0.30], k = 41 g⁺ = 0.24, p < 0.001, 95 % CI [0.13 to 0.36], k = 25 g⁺ = 0.19, p = 0.003, 95 % CI [0.13 to 0.30], k = 16
	bivariate correlation	Gomes-Osman et al. 2018 [46]	☐ COG ☒ PHYS ☐ DUAL	duration (weeks)	→	r = 0.15, p = 0.12

Healthy Older Adults:

	Global Cognition: meta-regression	Bonnechère et al. 2020 [1]	☒ COG ☐ PHYS ☐ DUAL	meta-regression	→	ß = -0.007, SE = 0.006, p = 0.24
	meta-regression	Biazus-Sehn et al. 2020 [19]	☐ COG ☒ PHYS ☒ DUAL	length of trial	→	ß = -0.0042, R² = 0, p = 0.52

Category	Analysis	Study	Intervention	Effect	Dir.	Statistics
Duration (of intervention; continued)	moderator analysis	Sanders et al. 2019 [26]	☐ COG ☒ PHYS ☐ DUAL	moderator effect pooled estimate** 4 – 12 weeks** 13 – 24 weeks ≥ 24 weeks*	→	$F_{(3, 128)}$ = 1.487, p > 0.05 g^+ = 0.26, p < 0.01, 95 % CI [0.15 to 0.37], k = 23 g^+ = 0.36, p < 0.01, 95 % CI [0.17 to 0.54] g^+ = 0.14, p > 0.05, 95 % CI [-0.04 to 0.32] g^+ = 0.29, p < 0.05, 95 % CI [0.06 to 0.52]
	moderator analysis	Northey et al. 2018 [30]	☐ COG ☒ PHYS ☒ DUAL	moderator effect** pooled estimate** 4 – 12 weeks 13 – 24 weeks ≥ 24 weeks	→	Q_3 = 23.32, p < 0.01 SMD^+ = 0.29, p < 0.01, 95 % CI [0.17 to 0.41], k = 36 SMD^+ = 0.31, p < 0.05, 95 % CI [0.09 to 0.54], n = 78 SMD^+ = 0.28, p < 0.05, 95 % CI [0.10 to 0.47], n = 170 SMD^+ = 0.27, p < 0.05, 95 % CI [0.03 to 0.52], n = 86
	subgroup analysis	Stanmore et al. 2017 [44]	☐ COG ☐ PHYS ☒ DUAL	pooled estimate** < 12 weeks* > 12 weeks* between-group difference	→	g^+ = 0.436, p = 0.01, 95 % CI [0.18 to 0.69], k = 17 g^+ = 0.255, p = 0.030, 95 % CI [0.02 to 0.49] g^+ = 0.759, p = 0.005, 95 % CI [0.23 to 1.29] p = 0.086
	moderator analysis	Toril et al. 2014 [16]	☒ COG ☐ PHYS ☐ DUAL	moderator effect* pooled estimate** short (1 – 6 weeks)** long (7 – 12 weeks)**	↓*	$Q_{(1)}$ = 3.73, p = 0.05 d^+ = 0.37, p < 0.01, 95 % CI [0.26 to 0.48] d^+ = 0.49, p < 0.01, 95 % CI [0.32 to 0.67] d^+ = 0.26, p < 0.01, 95 % CI [0.09 to 0.43]
Executive Function:	moderator analysis	Chen et al. 2020 [20]	☐ COG ☒ PHYS ☒ DUAL	Length of Intervention* short (1 – 3 months)* medium (4 – 6 months)* long (> 6 months)*	↓*	$Q_{(2)}$ = 16.64, p < 0.05 g^+ = 0.32, p < 0.05, 95 % CI [0.23 to 0.41], k = 29 g^+ = 0.26, p < 0.05, 95 % CI [0.18 to 0.34], k = 49 g^+ = 0.09, p < 0.05, 95 % CI [0.01 to 0.17], k = 29
	meta-regression	Biazus-Sehn et al. 2020 [19]	☐ COG ☒ PHYS ☒ DUAL	length of trial*	↓*	ß = -0.0035, R^2 = 0.32, p < 0.047
	subgroup analysis	Jia et al. 2019 [23]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate** up to 16 weeks* > 16 weeks*	↑	SMD^+ = 1.12, p < 0.001, 95 % CI [0.66 to 1.59], k = 13 SMD^+ = 0.91, 95 % CI [0.40 to 1.43], k = 9 SMD^+ = 1.12, 95 % CI [0.66 to 1.59], k = 4

☐ Brain / Neurochemicals / HRV

☒ Physical Outcomes, Mobility, and Activities of Daily Living

Mixed Healthy Older Adults and Older Adults with mNCD or Dementia:

Category	Analysis	Study	Intervention	Effect	Dir.	Statistics
Global Cognition:	moderator analysis	Gavelin et al. 2021 [39]	☐ COG ☐ PHYS ☒ DUAL	moderator effect pooled estimate* ≤ 12 weeks** > 12 weeks	↓*	$F_{(2, 18)}$ = 4.52, p = 0.048 g^+ = 0.25, p < 0.05, 95 % CI [0.13 to 0.37], k = 32 g^+ = 0.33, p < 0.001, 95 % CI [0.17 to 0.48], k = 21 g^+ = 0.09, p = 0.31, 95 % CI [-0.10 to 0.28], k = 11

☒ Psychosocial Outcomes

Older Adults with mNCD/Dementia:

Category	Analysis	Study	Intervention	Effect	Dir.	Statistics
Neuropsych. Sympt.:	subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate ≤ 3 months > months between-group diff.	→	SMD^+ = 0.44, p = 0.27, 95 % CI [- 0.34 to 1.22], k = 6 SMD^+ = 0.66, p = 0.59, 95 % CI [- 1.70 to 3.02], k = 3 SMD^+ = 0.12, p = 0.57, 95 % CI [- 0.29 to 0.53], k = 3 Chi^2 = 0.19, p = 0.66, I^2 = 0 %

Volume / Dose						

☒ Cognition

Older Adults with mNCD/Dementia:

Category	Analysis	Study	Intervention	Effect	Dir.	Statistics
Global Cognition:	subgroup analysis	Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate* tot. time$_{training}$ ≤ 24h* tot. time$_{training}$ > 24h* between-group difference		SMD^+ = 0.44, 95 % CI [0.27 to 0.61], k = 26 SMD^+ = 0.23, 95 % CI [0.07 to 0.40], k = 13 SMD^+ = 0.66, 95 % CI [0.32 to 0.99], k = 12 NR
	meta-regression	Biazus-Sehn et al. 2020 [19]	☐ COG ☒ PHYS ☒ DUAL	volume (min/week)*	↓*	ß = -0.0048, R^2 = 0.33, p = 0.044
	subgroup-analysis	Wu et al. 2019 [43]	☐ COG ☒ PHYS ☒ DUAL	pooled estimate** low (< 60min/week) mod. (60–120 min/week)* high (> 120min/week) between-group difference	→	SMD^+ = 0.92, p < 0.001 95 % CI [0.33 to 0.59], k = 13 SMD^+ = 0.41, p = 0.16, 95 % CI [-0.16 to 0.97], k = 2 SMD^+ = 1.15, p = 0.006, 95 % CI [0.34 to 1.97], k = 8 SMD^+ = 0.15, p = 0.51, 95 % CI [-0.29 to 0.59], k = 3 p = 0.11; I^2 = 55.5 %
	subgroup analysis	Jia et al. 2019 [23]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate** up to 2h/week* more than 2h/week* between-group difference	→	SMD^+ = 1.12, p < 0.001, 95 % CI [0.66 to 1.59], k = 13 SMD^+ = 1.74, 95 % CI [1.32 to 2.15], k = 5 SMD^+ = 0.76, 95 % CI [0.27 to 1.24], k = 8 NR
	subgroup analysis	Zhang et al. 2019 [8]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate ≤ 10 hours > 10 hours between-group difference		g^+ = 0.23, p = 0.09, 95 % CI [-0.04 to 0.50], k = 9 g^+ = 0.30, p = 0.06, 95 % CI [-0.01 to 0.61], k = 4 g^+ = 0.20, p = 0.44, 95 % CI [-0.31 to 0.71], k = 5 Chi^2 = 0.11, p = 0.74, I^2 = 0 %
	meta-regression	Shermann et al. 2017 [14]	☒ COG ☐ PHYS ☐ DUAL	volume (in hours)		Coefficient = -0.0005, Z-value = -0.07, p = 0.9412
Attention:						

Volume / Dose (continued)	subgroup analysis	Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate tot. time$_{training}$ ≤ 24h tot. time$_{training}$ > 24h between-group difference		SMD$^+$ = 0.04, p = 0.52, 95 % CI [-0.07 to 0.15], k = 15 SMD$^+$ = 0.05, 95 % CI [-0.09 to 0.19], k = 10 SMD$^+$ = -0.01, 95 % CI [-0.28 to 0.25], k = 5 NR

	Executive Function:
	  Working Memory:
	    subgroup analysis
		Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate
				tot. time$_{training}$ ≤ 24h
				between-group difference
						SMD$^+$ = 0.28, 95 % CI [0.04 to 0.52], k = 8
						SMD$^+$ = 0.30, 95 % CI [0.02 to 0.58], k = 7
						NR

	Learning and Memory: subgroup analysis	Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate tot. time$_{training}$ ≤ 24h between-group difference		SMD$^+$ = 0.15, 95 % CI [-0.04 to 0.34], k = 11 SMD$^+$ = 0.16, 95 % CI [-0.04 to 0.36], k = 7 NR
	Language: subgroup analysis	Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate tot. time$_{training}$ ≤ 24h* tot. time$_{training}$ > 24h between-group difference		SMD$^+$ = 0.15, p = 0.11, 95 % CI [-0.03 to 0.34], k = 15 SMD$^+$ = 0.22, 95 % CI [0.02 to 0.42], k = 9 SMD$^+$ = 0.08, 95 % CI [-0.28 to 0.43], k = 5 NR

Mixed Healthy Older Adults and Older Adults with mNCD or Dementia:

	Global Cognition: bivariate correlation	Gomes-Osman et al. 2018 [46]	☐ COG ☒ PHYS ☐ DUAL	tot. length of int.(hours)**	↑**	r = 0.24, p = 0.01

Healthy Older Adults:

	Global Cognition:
	  moderator analysis
		Mewborn et al. 2017 [13]	☒ COG ☐ PHYS ☐ DUAL	moderator effect*
				pooled estimate**
				  > 20h**
				  < 20h**
				  > 20 sessions
				  < 20 session
					↑**	Q = 329.20, p = 0.035 AND Q = 885.04, p < 0.001
						g$^+$ = 0.298, p < 0.001, 95 % CI [0.25 to 0.35], k = 279
						g$^+$ = 0.341, p < 0.001, 95 % CI [0.23 to 0.45], k = 69
						g$^+$ = 0.286, p < 0.001, 95 % CI [0.23 to 0.34], k = 208
						g$^+$ = 0.329, p < 0.001, 95 % CI [0.24 to 0.42], k = 102
						g$^+$ = 0.288, p < 0.001, 95 % CI [0.23 to 0.35], k = 172

	subgroup analysis	Lampit et al. 2014 [17]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate**
				  ≤ 20 h*
				  > 20 h*
				between-group difference
					→	g$^+$ = 0.22, p < 0.001, 95 % CI [0.15 to 0.29], k = 52
						g$^+$ = 0.23, p < 0.05, 95 % CI [0.15 to 0.32], k = 36
						g$^+$ = 0.20, p < 0.05, 95 % CI [0.07 to 0.33], k = 15
						p = 0.69

	Complex Attention: meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	total duration (h)	→	coefficient (SE) = -0.01 (0.02), p = 0.46
	Processing Speed: meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	total duration (h)	→	coefficient (SE) = -0.01 (0.18), p = 0.18

	Executive Function:
	  Inhibition:
	    meta-regression
		Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	total duration (h)	→	coefficient (SE) = -0.01 (0.01), p = 0.29

	Shifting: meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	total duration (h)**	↓**	coefficient (SE) = -0.04 (0.01), p < 0.01
	Updating: meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	total duration (h)	→	coefficient (SE) = 0.00 (0.1), p = 0.92
	Reasoning: meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	total duration (h)	→	coefficient (SE) = -0.02 (0.02), p = 0.24
	Learning and Memory: meta-regression	Mansor et al. 2020 [3]	☐ COG ☐ PHYS ☒ DUAL	total duration (h)	→	coefficient (SE) = -0.03 (0.15), p = 0.07

☒ Brain / Neurochemicals / HRV

Healthy Older Adults:

	Heart Rate Variability:
	  ST-SDNN
	    meta-regression
		Raffin et al. 2019 [25]	☐ COG ☒ PHYS ☐ DUAL	number of sessions	→	coefficient (SE) = 0.002 (0.002), p = 0.286

	RMSSD meta-regression	Raffin et al. 2019 [25]	☐ COG ☒ PHYS ☐ DUAL	number of sessions	→	coefficient (SE) = 0.000 (0.002), p = 0.948
	HF-HRV meta-regression	Raffin et al. 2019 [25]	☐ COG ☒ PHYS ☐ DUAL	number of sessions	→	coefficient (SE) = 0.002 (0.001), p = 0.134

☒ Physical Outcomes, Mobility, and Activities of Daily Living

Healthy Older Adults:

	Fall Rate
	  meta-regression
		Sherrington et al. 2017 [33]	☐ COG ☒ PHYS ☐ DUAL	hours per week of training
				  2+ hours/week
				  3+ hours/week*
					↑*	RR$^-$ (95 % CI) = 0.98 (0.83 to 1.16), p = 0.83, ΔI^2 = - 6 %
						RR$^-$ (95 % CI) = 0.77 (0.65 to 0.91), p = 0.003, ΔI^2 = 61 %

	Funct. Exerc. Capacity:					

Volume / Dose (continued)	subgroup analysis	Howes et al. 2017 [45]	☐ COG ☐ PHYS ☒ DUAL	pooled estimate** ↑ < 120 min/week > 120 min/week** > 150 min/week* subgroup difference →	SMD$^+$ = 0.29, p = 0.01, 95 % CI [0.04 to 0.55], k = 7 SMD$^+$ = 0.10, p = 0.58, 95 % CI [-0.24 to 0.44], k = 2 SMD$^+$ = 0.53, p = 0.006, 95 % CI [0.15 to 0.90], k = 5 SMD$^+$ = 0.85, p = 0.01, 95 % CI [0.19 to 1.51], k = 2 p = 0.17, I^2 = 45.8 %
	☒ Psychosocial Outcomes				
	Older Adults with mNCD/Dementia:				
	Behavioral Problems: subgroup analysis	Law et al. 2020 [22]	☐ COG ☒ PHYS ☐ DUAL	pooled estimate** tot. time$_{training}$ ≤ 24h* between-group difference	SMD$^+$ = 0.35, p = 0.01, 95 % CI [0.07 to 0.64], k = 9 SMD$^+$ = 0.28, 95 % CI [0.10 to 0.46], k = 6 NR
Progression & Periodization	☐ Cognition				
	☐ Brain / Neurochemicals / HRV				
	☐ Physical Outcomes, Mobility, and Activities of Daily Living				
	☐ Psychosocial Outcomes				
Variability / Variation	☒ Cognition				
	Healthy Older Adults:				
	Global Cognition: moderator analysis	Toril et al. 2014 [16]	☒ COG ☐ PHYS ☐ DUAL	moderator effect → pooled estimate** many (7 – 12) games** few (1 – 6) games**	Q(1) = 0.37, p > 0.05 d$^+$ = 0.37, p < 0.01, 95 % CI [0.26 to 0.48] d$^+$ = 0.30, p < 0.01, 95 % CI [0.07 to 0.54] d$^+$ = 0.39, p < 0.01, 95 % CI [0.26 to 0.51]
	☐ Brain / Neurochemicals / HRV				
	☐ Physical Outcomes, Mobility, and Activities of Daily Living				
	☐ Psychosocial Outcomes				
Specificity	☒ Cognition				
	Older Adults with mNCD/Dementia:				
	Global Cognition: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate* single-domain training* multi-domain training* between-group difference →	SMD$^+$ = 0.42, p < 0.001, 95 % CI [0.23 to 0.61], k = 27 SMD$^+$ = 0.35, p = 0.01, 95 % CI [0.1 to 0.59], k = 10 SMD$^+$ = 0.44, p = 0, 95 % CI [0.18 to 0.71], k = 17 Chi^2 = 0.28, p = 0.6, I^2 = 0 %
	subgroup analysis	Zhang et al. 2019 [8]	☒ COG ☐ PHYS ☐ DUAL	pooled effect ↑* single-domain training multi-domain training* between-group difference	g$^+$ = 0.30, p = 0.002, 95 % CI 0.11 to 0.50], k = 13 g$^+$ = 0.31, p = 0.23, 95 % CI [-0.19 to 0.81], k = 3 g$^+$ = 0.30, p = 0.008, 95 % CI [0.08 to 0.53], k = 10 Chi^2 = 0.00, p = 0.99, I^2 = 0 %
	subgroup analysis	Shermann et al. 2017 [14]	☒ COG ☐ PHYS ☐ DUAL	pooled effect** → attention-specific processing speed-specific memory-specific* multi-domain training** between-group difference**	g$^+$ = 0.420, p = 0.001, 95 % CI [0.182 to 0.659], k = 26 g$^+$ = 0.585, p = 0.212, 95 % CI [-0.334 to 1.504], k = 2 g$^+$ = 0.636, p = 0.120, 95 % CI [0.166 to 1.438], k = 2 g$^+$ = 0.671, p = 0.005, 95 % CI [0.207 to 1.136], k = 8 g$^+$ = 0.449, p = 0.005, 95 % CI [0.449 to 0.763], k = 14 Q(3) = 3.449, p = 0.001
	Complex Attention: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate* single-domain training multi-domain training between-group difference	SMD$^+$ = 0.56, p = 0.02, 95 % CI [0.07 to 0.95], k = 12 SMD$^+$ = 0.68, p = 0.10, 95 % CI [-0.14 to 1.49], k = 4 SMD$^+$ = 0.5, p = 0.12, 95 % CI [-0.14 to 1.15], k = 8 Chi^2 = 0.11, p = 0.74, I^2 = 0 %

Specificity (continued)					
	Executive Function: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate* single-domain training multi-domain training* ↑* between-group difference*	SMD^+ = 0.75, p = 0, 95 % CI [0.28 to 1.22], k = 12 SMD^+ = 0.08, p = 0.8, 95 % CI [-0.53 to 0.68], k = 3 SMD^+ = 0.99, p = 0, 95 % CI [0.44 to 1.55], k = 9 Chi^2 = 4.78, p = 0.03, I^2 = 79.08 %
	Learning and Memory: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	immediate memory: pooled estimate* single-domain training** multi-domain training** between-group difference delayed memory: pooled estimate* single-domain training multi-domain training* between-group difference	SMD^+ = 0.74, p < 0.001, 95 % CI [0.04 to 1.02], k = 18 SMD^+ = 0.58, p = 0, 95 % CI [0.22 to 0.94], k = 7 SMD^+ = 0.8, p = 0, 95 % CI [0.24 to 1.35], k = 11 Chi^2 = 0.41, p = 0.52, I^2 = 0 % SMD^+ = 0.81, p = 0, 95 % CI [0.29 to 1.32], k = 11 SMD^+ = 0.41, p = 0.12, 95 % CI [-0.11 to 0.94], k = 5 SMD^+ = 1.15, p = 0.01, 95 % CI [0.32 to 1.97], k = 6 Chi^2 = 2.15, p = 0.14, I^2 =53.48 %
	subgroup analysis	Shermann et al. 2017 [14]	☒ COG ☐ PHYS ☐ DUAL	pooled effect** memory-specific training* between group difference	g^+ = 0.659, p = 0.000, 95 % CI [0.383 to 0.936], k = 20 g^+ = 1.219, p = 0.007, 95 % CI [0.338 to 2.100], k = 6 NR
	Language Fluency: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate* single-domain training multi-domain training* between-group difference* ↑*	SMD^+ = 0.52, p = 0.0005, 95 % CI [0.23 to 0.81], k = 9 SMD^+ = 0.14, p = 0.49, 95 % CI [- 0.25 to 0.52], k = 3 SMD^+ = 0.70, p < 0.0001, 95 % CI [0.38 to 1.02], k = 6 Chi^2 = 3.81, p = 0.03, I^2 = 79.22 %
	Healthy Older Adults:				
	Global cognition: moderator analysis	Mewborn et al. 2017 [13]	☒ COG ☐ PHYS ☐ DUAL	moderator effect* pooled estimate** working memoy train.** memory training** multi-domain training** single-domain training** processing speed train.* attention training execut. funct. train. reasoning training	Q = 322.32, p = 0.035 g^+ = 0.298, p < 0.001, 95 % CI [0.25 to 0.35], k = 279 g^+ = 0.479, p < 0.001, 95 % CI [0.33 to 0.63], k = 56 g^+ = 0.349, p < 0.001, 95 % CI [0.24 to 0.46], k = 51 g^+ = 0.313, p < 0.001, 95 % CI [0.22 to 0.40], k = 106 g^+ = 0.288, p < 0.001, 95 % CI [0.23 to 0.35], k = 173 g^+ = 0.140, p < 0.05, 95 % CI [0.00 to 0.28], k = 28 g^+ = 0.169, p > 0.05, 95 % CI [-0.04 to 0.38], k = 7 g^+ = 0.125, p > 0.05, 95 % CI [-0.01 to 0.26], k = 24 g^+ = 0.081, p > 0.05, 95 % CI [-0.12 to 0.29], k = 7
	moderator analysis	Toril et al. 2014 [16]	☒ COG ☐ PHYS ☐ DUAL	moderator effect pooled estimate** brain training** video games**	Q(3) = 3.449, p = 0.001 d^+ = 0.37, p < 0.01, 95 % CI [0.26 to 0.48 d^+ = 0.34, p < 0.01, 95 % CI [0.17 to 0.50] d^+ = 0.40, p < 0.01, 95 % CI [0.25 to 0.55]
	subgroup analysis	Lampit et al. 2014 [17]	☒ COG ☐ PHYS ☐ DUAL	pooled estimate** video games* attention CCT* speed of proc. CCT* multidomain CCT* working memory CCT between-group heterog.	g^+ = 0.22, p < 0.001, 95 % CI [0.15 to 0.29], k = 52 g^+ = 0.42, p < 0.05, 95 % CI [0.09 to 0.76], k = 4 g^+ = 0.34, p < 0.05, 95 % CI [0.08 to 0.60], k = 6 g^+ = 0.25, p < 0.05, 95 % CI [0.10 to 0.39], k = 9 g^+ = 0.18, p < 0.05, 95 % CI [0.08 to 0.29], k = 23 g^+ = 0.17, p > 0.05, 95 % CI [-0.03 to 0.38], k = 9 p = 0.57
	Learning and Memory: subgroup analysis	Bahar-Fuchs et al. 2019 [5]	☒ COG ☐ PHYS ☐ DUAL	immediate memory: pooled estimate* single-domain training** multi-domain training** between-group difference delayed memory: pooled estimate* single-domain training multi-domain training* between-group difference	SMD^+ = 0.74, p < 0.001, 95 % CI [0.04 to 1.02], k = 18 SMD^+ = 0.58, p = 0, 95 % CI [0.22 to 0.94], k = 7 SMD^+ = 0.8, p = 0, 95 % CI [0.24 to 1.35], k = 11 Chi^2 = 0.41, p = 0.52, I^2 = 0 % SMD^+ = 0.81, p = 0, 95 % CI [0.29 to 1.32], k = 11 SMD^+ = 0.41, p = 0.12, 95 % CI [-0.11 to 0.94], k = 5 SMD^+ = 1.15, p = 0.01, 95 % CI [0.32 to 1.97], k = 6 Chi^2 = 2.15, p = 0.14, I^2 =53.48 %
	subgroup analysis	Shermann et al. 2017 [14]	☒ COG ☐ PHYS ☐ DUAL	pooled effect** memory-specific training* between group difference	g^+ = 0.659, p = 0.000, 95 % CI [0.383 to 0.936], k = 20 g^+ = 1.219, p = 0.007, 95 % CI [0.338 to 2.100], k = 6 NR

☐ Brain / Neurochemicals / HRV

☐ Physical Outcomes, Mobility, and Activities of Daily Living

☐ Psychosocial Outcomes

1   References

1.	Bonnechère, B., C. Langley, and B.J. Sahakian, *The use of commercial computerised cognitive games in older adults: a meta-analysis.* Scientific Reports, 2020. **10**(1): p. 15276.

2.	Chan, J.Y.C., et al., *Cognitive training interventions and depression in mild cognitive impairment and dementia: a systematic review and meta-analysis of randomized controlled trials.* Age Ageing, 2020. **49**(5): p. 738-747.

3.	Mansor, N.S., C.M. Chow, and M. Halaki, *Cognitive effects of video games in older adults and their moderators: a systematic review with meta-analysis and meta-regression.* Aging Ment Health, 2020. **24**(6): p. 841-856.

4.	Gates, N.J., et al., *Computerised cognitive training for 12 or more weeks for maintaining cognitive function in cognitively healthy people in late life.* Cochrane Database Syst Rev, 2020. **2**(2): p. Cd012277.

5.	Bahar-Fuchs, A., et al., *Cognitive training for people with mild to moderate dementia.* Cochrane Database Syst Rev, 2019. **3**(3): p. Cd013069.

6.	Gates, N.J., et al., *Computerised cognitive training for preventing dementia in people with mild cognitive impairment.* Cochrane Database Syst Rev, 2019. **3**(3): p. Cd012279.

7.	Vaportzis, E., M.A. Niechcial, and A.J. Gow, *A systematic literature review and meta-analysis of real-world interventions for cognitive ageing in healthy older adults.* Ageing Res Rev, 2019. **50**: p. 110-130.

8.	Zhang, H., et al., *Effect of computerised cognitive training on cognitive outcomes in mild cognitive impairment: a systematic review and meta-analysis.* BMJ Open, 2019. **9**(8): p. e027062.

9.	Liang, J.H., et al., *Comparison of multiple interventions for older adults with Alzheimer disease or mild cognitive impairment: A PRISMA-compliant network meta-analysis.* Medicine (Baltimore), 2018. **97**(20): p. e10744.

10.	Sala, G., K.S. Tatlidil, and F. Gobet, *Video game training does not enhance cognitive ability: A comprehensive meta-analytic investigation.* Psychological bulletin, 2018. **144**(2): p. 111.

11.	García-Casal, J.A., et al., *Computer-based cognitive interventions for people living with dementia: a systematic literature review and meta-analysis.* Aging Ment Health, 2017. **21**(5): p. 454-467.

12.	Hill, N.T., et al., *Computerized Cognitive Training in Older Adults With Mild Cognitive Impairment or Dementia: A Systematic Review and Meta-Analysis.* Am J Psychiatry, 2017. **174**(4): p. 329-340.

13.	Mewborn, C.M., C.A. Lindbergh, and L. Stephen Miller, *Cognitive Interventions for Cognitively Healthy, Mildly Impaired, and Mixed Samples of Older Adults: A Systematic Review and Meta-Analysis of Randomized-Controlled Trials.* Neuropsychol Rev, 2017. **27**(4): p. 403-439.

14.	Sherman, D.S., et al., *The Efficacy of Cognitive Intervention in Mild Cognitive Impairment (MNCD): a Meta-Analysis of Outcomes on Neuropsychological Measures.* Neuropsychol Rev, 2017. **27**(4): p. 440-484.

15.	Melby-Lervåg, M., T.S. Redick, and C. Hulme, *Working Memory Training Does Not Improve Performance on Measures of Intelligence or Other Measures of "Far Transfer": Evidence*

From a Meta-Analytic Review. Perspectives on Psychological Science, 2016. **11**(4): p. 512-534.

16.   Toril, P., J.M. Reales, and S. Ballesteros, *Video game training enhances cognition of older adults: a meta-analytic study.* Psychol Aging, 2014. **29**(3): p. 706-16.

17.   Lampit, A., H. Hallock, and M. Valenzuela, *Computerized cognitive training in cognitively healthy older adults: a systematic review and meta-analysis of effect modifiers.* PLoS medicine, 2014. **11**(11): p. e1001756.

18.   Karbach, J. and P. Verhaeghen, *Making working memory work: a meta-analysis of executive-control and working memory training in older adults.* Psychological science, 2014. **25**(11): p. 2027-2037.

19.   Biazus-Sehn, L.F., et al., *Effects of physical exercise on cognitive function of older adults with mild cognitive impairment: A systematic review and meta-analysis.* Arch Gerontol Geriatr, 2020. **89**: p. 104048.

20.   Chen, F.T., et al., *Effects of Exercise Training Interventions on Executive Function in Older Adults: A Systematic Review and Meta-Analysis.* Sports Med, 2020. **50**(8): p. 1451-1467.

21.   Zhou, X.L., et al., *Effects of exercise interventions for specific cognitive domains in old adults with mild cognitive impairment: A meta-analysis and subgroup analysis of randomized controlled trials.* Medicine (Baltimore), 2020. **99**(31): p. e20105.

22.   Law, C.-K., et al., *Physical exercise attenuates cognitive decline and reduces behavioural problems in people with mild cognitive impairment and dementia: a systematic review.* Journal of Physiotherapy, 2020. **66**(1): p. 9-18.

23.   Jia, R.X., et al., *Effects of physical activity and exercise on the cognitive function of patients with Alzheimer disease: a meta-analysis.* BMC Geriatr, 2019. **19**(1): p. 181.

24.   Marinus, N., et al., *The Impact of Different Types of Exercise Training on Peripheral Blood Brain-Derived Neurotrophic Factor Concentrations in Older Adults: A Meta-Analysis.* Sports Med, 2019. **49**(10): p. 1529-1546.

25.   Raffin, J., et al., *Exercise Frequency Determines Heart Rate Variability Gains in Older People: A Meta-Analysis and Meta-Regression.* Sports Med, 2019. **49**(5): p. 719-729.

26.   Sanders, L.M.J., et al., *Dose-response relationship between exercise and cognitive function in older adults with and without cognitive impairment: A systematic review and meta-analysis.* PLoS One, 2019. **14**(1): p. e0210036.

27.   Wang, S., et al., *Efficacy of different types of exercises on global cognition in adults with mild cognitive impairment: a network meta-analysis.* Aging Clin Exp Res, 2019. **31**(10): p. 1391-1400.

28.   Firth, J., et al., *Effect of aerobic exercise on hippocampal volume in humans: a systematic review and meta-analysis.* Neuroimage, 2018. **166**: p. 230-238.

29.   Lam, F.M., et al., *Physical exercise improves strength, balance, mobility, and endurance in people with cognitive impairment and dementia: a systematic review.* J Physiother, 2018. **64**(1): p. 4-15.

30.   Northey, J.M., et al., *Exercise interventions for cognitive function in adults older than 50: a systematic review with meta-analysis.* Br J Sports Med, 2018. **52**(3): p. 154-160.

31.   Panza, G.A., et al., *Can Exercise Improve Cognitive Symptoms of Alzheimer's Disease?* Journal of the American Geriatrics Society, 2018. **66**(3): p. 487-495.

32.   de Souto Barreto, P., et al., *Exercise Training for Preventing Dementia, Mild Cognitive Impairment, and Clinically Meaningful Cognitive Decline: A Systematic Review and Meta-analysis.* J Gerontol A Biol Sci Med Sci, 2018. **73**(11): p. 1504-1511.

33.   Sherrington, C., et al., *Exercise to prevent falls in older adults: an updated systematic review and meta-analysis.* Br J Sports Med, 2017. **51**(24): p. 1750-1758.

34.   Kelly, M.E., et al., *The impact of exercise on the cognitive functioning of healthy older adults: a systematic review and meta-analysis.* Ageing Res Rev, 2014. **16**: p. 12-31.

35.   Forbes, D., et al., *Exercise programs for people with dementia.* Cochrane Database Syst Rev, 2015(4): p. Cd006489.

36.   Groot, C., et al., *The Effect of Physical Activity on Cognitive Function in Patients with Dementia: A Meta-Analysis of Randomized Control Trials.* Ageing research reviews, 2015. **25**.

37.   Ströhle, A., et al., *Drug and Exercise Treatment of Alzheimer Disease and Mild Cognitive Impairment: A Systematic Review and Meta-Analysis of Effects on Cognition in Randomized Controlled Trials.* Am J Geriatr Psychiatry, 2015. **23**(12): p. 1234-1249.

38.   Corregidor-Sánchez, A.I., et al., *Effectiveness of virtual reality technology on functional mobility of older adults: systematic review and meta-analysis.* Age and Ageing, 2020. **50**(2): p. 370-379.

39.   Gavelin, H.M., et al., *Combined physical and cognitive training for older adults with and without cognitive impairment: A systematic review and network meta-analysis of randomized controlled trials.* Ageing Res Rev, 2021. **66**: p. 101232.

40.   Chan, J.S.Y., et al., *The effectiveness of dance interventions on cognition in patients with mild cognitive impairment: A meta-analysis of randomized controlled trials.* Neuroscience & Biobehavioral Reviews, 2020. **118**: p. 80-88.

41.   Pacheco, T.B.F., et al., *Effectiveness of exergames for improving mobility and balance in older adults: a systematic review and meta-analysis.* Syst Rev, 2020. **9**(1): p. 163.

42.   Zhu, Y., et al., *Effects of Aerobic Dance on Cognition in Older Adults with Mild Cognitive Impairment: A Systematic Review and Meta-Analysis.* J Alzheimers Dis, 2020. **74**(2): p. 679-690.

43.   Wu, C., et al., *Effects of Mind-Body Exercises on Cognitive Function in Older Adults: A Meta-Analysis.* J Am Geriatr Soc, 2019. **67**(4): p. 749-758.

44.   Stanmore, E., et al., *The effect of active video games on cognitive functioning in clinical and non-clinical populations: A meta-analysis of randomized controlled trials.* Neurosci Biobehav Rev, 2017. **78**: p. 34-43.

45.   Howes, S.C., et al., *Gaming for Health: Systematic Review and Meta-analysis of the Physical and Cognitive Effects of Active Computer Gaming in Older Adults.* Physical Therapy, 2017. **97**(12): p. 1122-1137.

46.   Gomes-Osman, J., et al., *Exercise for cognitive brain health in aging: A systematic review for an evaluation of dose.* Neurol Clin Pract, 2018. **8**(3): p. 257-265.