

Supplementary Information

Supplementary Table S1. Characteristics of the included studies.

Study (authors, year)	Target condition	Participants			Reference Standard	Index Test (Digital Solution)		
		Sample size	Age	Gender	Name	Name	Domain	Type
Curiel et al. (2016)	MCI	n = 98 CN (n = 64) MCI (n = 34)	CN - 74 (7) MCI - 78 (6)	F - 74 / M - 24	Clinical assessment protocol, CDR, MMSE, Neuropsychological test battery	MITSI-L	Semantic memory	Innovative digital solutions
Alegret et al. (2020)	MCI (naMCI; aMCI)	n = 276 CH (n = 154) MCI (naMCI / aMCI) (n = 122)	CH - 68 (8) naMCI - 66 (9) aMCI - 68 (8)	CH - 61 (39.61) M / naMCI - 19 (31.15) M / aMCI - 23 (37.70) M	NBACE, neurological history and examination, a semi-structured psychosocial interview, including assessment by the BDRS	FACEmemory®	Memory	Paper-based digital solutions
Kokubo et al. (2018)	MCI & D	n = 53 HC (n = 29) MCI&D (n = 24)	HC - 56 (14) PD - 69 (7) MCI&D - 80 (8)	HC - 11M18F / PD - 13M15F / MCI&D - 13M11F	Diagnostic by professionals	UX-TMT	Visuospatial working memory, executive function, interference inhibition quantitatively	Paper-based digital solutions
Rhodus-Meester et al. (2020)	MCI	n = 278 CN (n = 195) MCI (n = 83)	CN - 64 (9) MCI - 71(7)	CN - F66% M34% / MCI F37% M63%	Standard Neuropsychological tests (MMSE, RAVLT or CERAD word list memory task, TMT-A, TMT-B, categorical (animals) verbal fluency, and digit span test)	cCOG	Episodic memory, attention, reaction, visuomotor speed, attention, and executive function	Paper-based digital solutions
Ichii et al. (2019)	MCI	n = 224 Normal (n = 121) MCI (n = 103)	Normal - 77 (7) MCI - 81 (6)	Normal F107 MCI F95	MMSE	CogEvo	Orientation, visual attention, memory, executive function and spatial cognition	Innovative digital solutions
Wong et al. (2017)	CI	n = 160 CN (n = 101) CI (n = 59)	CN - 71 (9) CI - 78 (8)	CN - F78,2% 21,8%M CI - F76,3% 23,7%M	MoCA	CoCoSc	Memory, executive function, orientation, attention, working memory and prospective memory	Innovative digital solutions
Buckley et al. (2017)	SCI	n = 50 TP (n = 37) SCI (n = 13)	69 (8)	F:62% M:38%	PACC	NIH Toolbox Cognition Battery / Cogstate-C3	Multidomain	Paper-based digital solutions
Memória et al. (2014)	MCI	n = 76 NC (n = 41) MCI (n = 35)	NC - 72 (5) MCI - 74 (6)	NC F 33/41 MCI F 27/35	Medical, neuropsychological, laboratorial, and neuroimaging data, MMSE, Peterson Criteria	CANS-MCI	Executive function, language fluency and memory	Paper-based digital solutions
Ke Yu et al. (2015)	MCI	n = 118	NC - 72 (5) MCI - 74 (5)	NC F 13 (13/55)	Criteria established by Peterson	MoCA-CC	Attention	Paper-based digital solutions

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		NC (n = 55) MCI (n = 63)		MCI F 18 (18/63)			and concentration, executive function, memory, language, visuoconstructional skills, conceptual thinking, calculation, and orientation.	
Scharre et al. (2017)	MCI	n = 45 Normal (n = 21) MCI (n = 24)	75 (7)	Total F= 67%	Standard clinical assessment and neuropsychological evaluation (MMSE, WCST, SAGE, MOCA, HVL, WAIS III subscales, Boston Naming Test, FAS verbal fluency test)	eSAGE	Orientation, language, memory, executive function, abstraction, calculations and visuospatial abilities	Paper-based digital solutions
Tierney et al. (2014)	CI	n = 259 Normal (n = 204) CI (n = 55)	--	--	Battery of standardized neuropsychological tests to provide an independent reference Standard (subtests of HVL, TMT-A, TMT-B, Clock Drawing Test)	CAMCI	Attention, executive function, processing speed, verbal memory, nonverbal memory, functional memory, and incidental memory	Paper-based digital solutions
Brandt et al. (2014)	MCI	n = 24 Normal (n = 20) MCI (n = 4)	--	--	Complete histories, neurological and psychiatric examinations (including MMSE), blood laboratory studies, EEG, brain imaging, and comprehensive neuropsychological assessment	DRA	History of health risk factors (including 12 neurological conditions, and 2 psychological disorders); associative memory	Paper-based digital solutions
Van Mierlo et al. (2017)	MCI	n = 61 SCD (n = 33) MCI (n = 28)	SCD - 62 (7) MCI - 66 (8)	SCD - F16 (47%) M18 (53%) MCI - F9 (30%) M21 (70%)	Clinical history, medical and neurological examination, screening laboratory tests, MRI, EEG, neuropsychological assessment (MMSE, WAIS-III, TMT, Stroop test, Visual association test, Auditory Verbal Learning Test), GDS	Online and telephone-based automated self-tests of cognitive function	Cognitive function - screening for MCI and dementia	Paper-based digital solutions
Dougherty Jr. et al. (2010)	CI (include severe)	n = 215 Control (n = 104) MCI (n = 27) Early AD (n = 22) Mild to Moderate (n = 33) Moderate to Severe (n = 24) Severe (n = 5)	Control - 75 (7) MCI - 67 (6) Early AD - 77 (5) Mild to Moderate - 75 (9) Moderate to Severe - 78 (7) Severe - 75 (4)	Control - M41 F63 / MCI - M24 F3 / Early AD - M6 F16 / Mild to Mod. - M14 F19 / Mod. to Sev. - M14 F10 / Sev. - M1 F4	Diagnoses are based on a composite of measures: MMSE, test of executive functions, test of verbal fluency, Mini-Cog, MoCA, GDS, caregiver/family member interview, and clinical examination	CST	Verbal fluency, visual-spatial functions, memory, attention, executive functions, and perceptual/processing speed	Paper-based digital solutions
Van der Hoek et al. (2019)	MCI	n = 82 Normal (n = 45) MCI (n = 37)	84 (5) NC - 83 (5) MCI - 85 (5)	F55(67%) M27(33%) NC - F27(60%) M18(40%) MCI - F28(76%) M9(24%)	MoCA	MTX	Cognitive function, memory	Paper-based digital solutions

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Scanlon et al. (2015)	MCD	n = 60 Normal (n = 20) MCD (n = 33) D (MCD+D) (n = 40)	Normal - 73 (12) Dementia (D)* - 77 (13)	F31(51.7%) M29 (48.3%); Normal - F8 M12 / D* - F23 M17	DSM-IV criteria by professional	CCS - three tasks, from from Rosetta Stone	Concentration, memory, visuospatial functioning	Innovative digital solutions
Fung et al. (2020)	MCI	n = 606 HC (n = 509) MCI (n = 97)	70 (7) HC - 69 (6) MCI - 73 (7)	F53.3% M46.7% ; HC - F54.8% M45.2% / MDI - F45.4% 54.6%	Combined clinical and cognitive criteria (including CMMSE, CVFT, ADAS-Cog Subscale)	HK-VMT	Episodic memory, attention, and visuospatial ability	Innovative digital solutions
Cahn-Hidalgo et al. (2020)	MD+I	n = 92 unl (n = 46) MD+I (n = 46)	--	--	SLUMS	Cognivue®	Visuomotor ability (to calibrate the subsequent tests based on the individual's visual and motor abilities), perceptual processing, and memory processing	Innovative digital solutions
Kalafatis et al. (2021)	CI (MCI + Mild AD)	n = 230 HV (n = 95) MCI (n = 80) mild AD (n = 55)	HV - 67 (8) MCI - 70 (8) Mild AD - 71 (8)	HV F 55.8% MCI F 47.5% Mild AD F 49.1%	Diagnoses made by a professional according to diagnostic criteria	ICA	Information processing speed, semantic processing and translating this into a motor response	Innovative digital solutions
Rodríguez-Salgado et al. (2021)	MCI	n = 99 CH (n = 53) MCI (n = 46)	Controls - 70 (6) MCI - 72 (8)	Controls F 39 (74%) MCI F 24 (52%)	Multidisciplinary consensus conference by professionals based on published criteria using clinical assessments and structural neuroimaging, clinical history, physical and neurological examination, a functional interview including CDR and a neuropsychological assessment	BHA Cuban version	Associative memory, processing speed and executive function, visuospatial skills, and language	Paper-based digital solutions
Liu et al. (2021)	MCI due to AD	n = 100 CON (n = 50) MCI-AD (n = 50)	CON - 68 (8) MCI-AD - 68 (11)	CON M 30 (60%) MCI-AD M 24 (48%)	Based on the guideline in DSM-5	MTX	Episodic memory, attention and processing speed	Paper-based digital solutions
Yan et al. (2021)	MCI	n = 126 HC (n = 64) MCI (n = 62)	HC - 74 (16) MCI - 82 (16)	HC F 13.0 (20.3) M51.0 (79.7) MCI F22.0 (35.5) M40.0 (64.5)	Petersen criteria Montreal Cognitive e CDR, MMSE, GDS-15, ADL, and MoCA	VSP	Learning and memory, executive functions, language, time orientation, and complex attention	Innovative digital solutions
Ye et al. (2022)	MCI	n = 57 NC (n = 35) MCI (n = 22)	NC - 68 (10) MCI - 74 (6)	NC F 25 (71%) M 10 (29%) MCI F 8 (36%) M 14 (64%)	Primary cognitive diagnosis within the registry (participants were placed into the diagnostic groups based on their most recent clinical diagnosis available in their electronic health record, or based on their report of no cognitive symptoms or diagnosis of cognitive impairment)	BrainCheck battery	Memory, executive function, alertness, spatial awareness, visual attention, cognitive flexibility	Paper-based digital solutions
Paterson	aMCI	n = 91	NC - 74 (7) aMCI - 75 (6)	NC F 53%	Neuropsychological assessments (including interview) included	BHA	Memory and executive attention	Paper-based digital solutions

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et al. (2022)		NC (n = 40) aMCI (n = 51)		aMCI F 49%	standardized cognitive tasks examining intellectual ability, attention, processing speed, language, visuospatial abilities, memory, and executive function			
Cheah et al. (2022)	MCI	n = 118 MCI (n = 59) HC (n = 59)	MCI - 68 (6) HC - 63 (6)	MCI F 31 (53%) M 28 (47%) HC F 33 (56%) M 26 (44%)	Comprehensive neuropsychological assessment, including measurements	Digital Screening System for Alzheimer Disease Based on a Neuropsychological Test and a Convolutional Neural Network	Visuospatial constructional capabilities and visual memory function; cognitive functions, such as visuospatial abilities, visual episodic memory, organization skills, attention, and visuomotor coordination	Innovative digital solutions

Target condition and participants

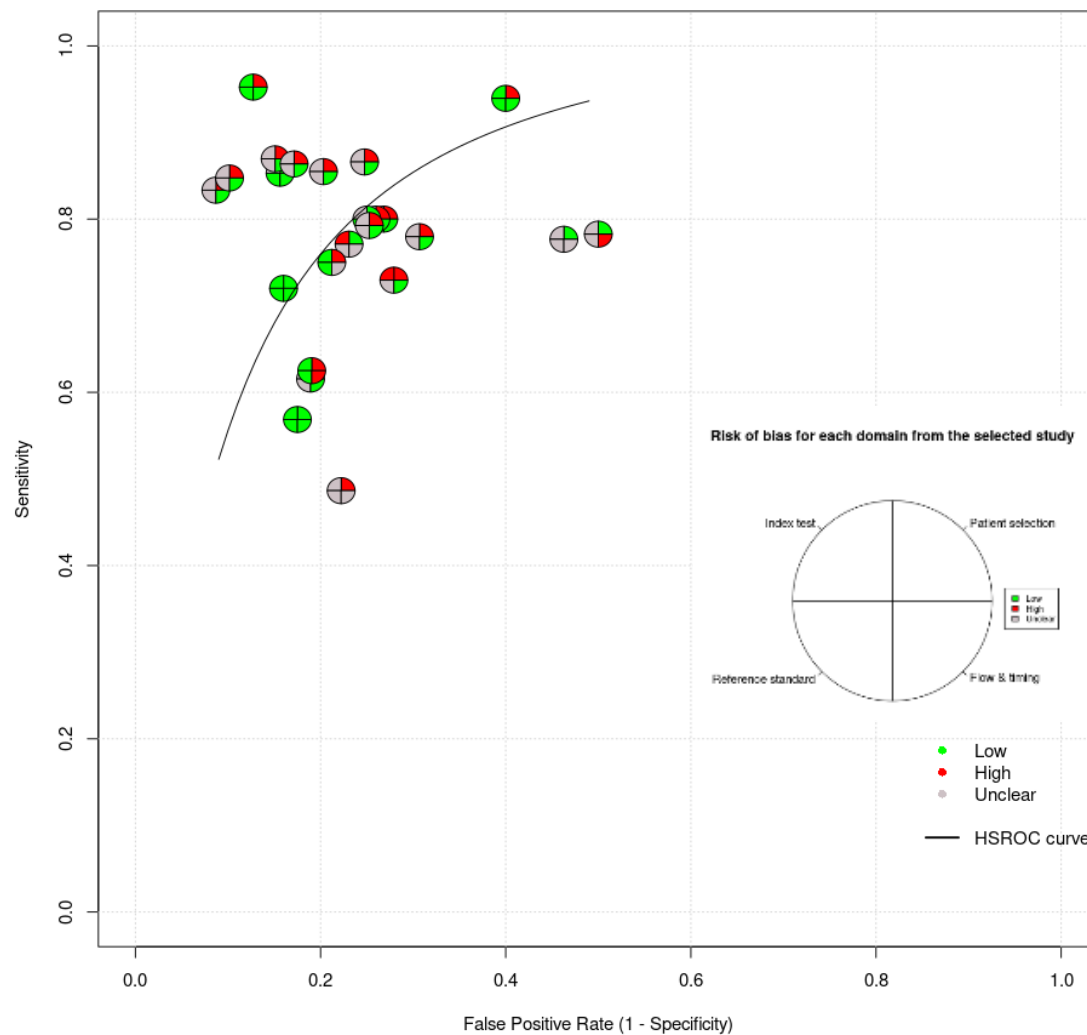
AD: Alzheimer's Disease; aMCI: amnesic Mild Cognitive Impairment; CH: Cognitively Healthy; CI: Cognitive Impairment; CN: Cognitively Normal; CON: Normal Control Subjects; D: Dementia; HC: Healthy Control; HV: Healthy Volunteers; I: Impairment; MCD: Mild Cognitive Dementia; MCI: Mild Cognitive Impairment; MI: Mildly Impaired; naMCI: non-amnesic Mild Cognitive Impairment; NC: Normal Controls / Normal Cognition; SCD: Subjective Cognitive Decline; SCI: Subtle Cognitive Impairment; TP: Typical Performance; unI: Unimpaired.

Reference Standard

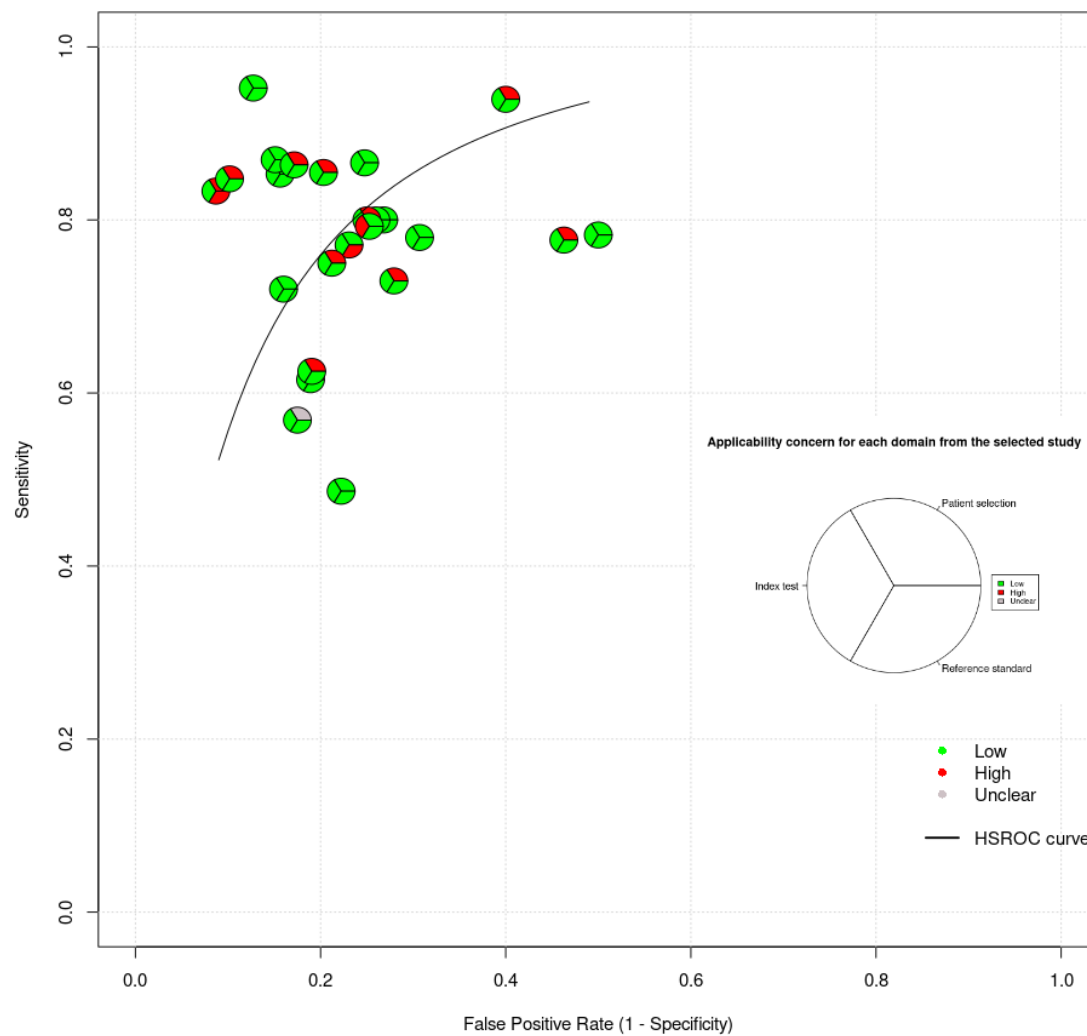
ADAS-Cog: Alzheimer's Disease Assessment Scale Cognitive; ADL: Activities of Daily Living; BDRS: Blessed Dementia Rating Scale; CDR: Clinical Dementia Rating Scale; CERAD: Consortium to Establish a Registry for Alzheimer's Disease; CMMSE: Cantonese version of the mini-mental state examination; CVFT: Category Verbal Fluency Test; DSM: Diagnostic and Statistical Manual of Mental Disorders; EEG: Electroencephalogram; GDS: Geriatric Depression Scale; HVLT: Hopkins Verbal Learning Test; MMSE: Mini Mental State Examination; MoCA: Montreal Cognitive Assessment; MRI: Magnetic resonance imaging; NBACE: Neuropsychological Battery of Fundació ACE; PACC: Preclinical Alzheimer Cognitive Composite; RAVLT: Rey Auditory Verbal Learning Task; SAGE: Self-Administered Gerocognitive Examination; TMT: Trail Making Test; WAIS: Wechsler Adult Intelligence Scale; WCST: Wisconsin Card Sort Test; SLUMS: St. Louis University Mental Status.

Index Test

BHA: Brian Health Assessment; CAMCI: Computerized Assessment of Mild Cognitive Impairment; CANS-MCI: Computer-Administered Neuropsychological Screen for Mild Cognitive Impairment; cCOG: Computerized Cognitive Test; CCS: Battery of Computerised Cognitive Screening; CoCoSc: Computerized Cognitive Screen; CST: The Computerized Self Test; DRA: Dementia Risk Assessment; eSAGE: Digitally translated Self-Administered Gerocognitive Examination; FACEmemory®: Face-Name Associative Memory Exam; HK-VMT: Hong Kong – Vigilance and Memory Test; ICA: Integrated Cognitive Assessment; MITS-I-L: Miami Test of Semantic Interference and Learning; MoCA-CC: Computerized tool for the Chinese version of the MoCA; MTX: MemTrax test; UX-TMT: User Experience-Trail Making Test; VSP: VR game-based test: Virtual Supermarket Program.



Supplementary Figure S1. Random-effects meta-analysis - summary ROC (SROC) curve with quality assessment obtained by the QUADAS-2 tool (risk of bias).



Supplementary Figure S2. Random-effects meta-analysis - summary ROC (SROC) curve with Quality Assessment obtained by the QUADAS-2 tool (applicability concerns).