

SUPPLEMENTARY MATERIALS

Supp. Table 1

List of All Cognitive Constructs and Their Corresponding Tasks Used as Outcome Measures in All Studies.

Note: A Representative Publication That Reported Using The Task As A Cognitive Outcome Measure Is Listed Next To The Task

Cognitive Construct	Tasks	Representative Study
Executive Control/Working Memory	<ul style="list-style-type: none"> • 2-back accuracy • Alpha span • Auditory working memory • Alternating runs • Avoiding distractions • Block span • Card Prediction • Computation Span • CANTAB dimensional set shifting errors • Conflicting instructions • Cross-modality dual task divided • Digit span backward • Dot matrix • Dual Task • Executive functions domain • Executive functions • Everyday cognitive battery Memory • Frontal assessment battery • Flanker incongruent accuracy • Flanker incongruent RT • Global local-task switching • Hayling test (sentence completion) RT B-A • Inhibition • Letter number • Listening span test • Matrix task • Memory load cost • Mental counters • Number memory • Numerical updating easy • Numerical updating difficult • Operation span • Plus-minus • Reading span 	<ul style="list-style-type: none"> • Basak 2008 • Craik 2007 • Shatil 2013 • Sandberg 2013 • Shatil 2013 • Buschkuehl 2008 • Bozoki 2013 • Sandberg 2013 • Finn 2011 • Uchida 2008 • Gagnon 2012 • Carretti 2013 • Carretti 2013 • Anguera 2013 • Lampit 2014 • Peretz 2011 • Whitlock 2012 • Miller 2013 • Boot 2013 • Boot 2013 • van Muijden 2012 • Zimmerman 2014 • Shatil 2013

	<ul style="list-style-type: none"> • Span board backward • Spatial working memory • Self-ordered pointing task • Shifting • Smiling faces • Stop RT • Stroop • Trail making B • Trails B-Trails A • TS accuracy • TS Switch accuracy • TS Switch RT • Verbal 2-back • Verbal complex span • Verbal task switching • Working memory ascendant order of digits • Working memory auditory word span in sentences • Working memory, attend to distraction • Working memory, ignore distraction • Working memory, no distraction • Working memory span intrusions • Working memory span recall • Wisconsin card sort category completed 	<ul style="list-style-type: none"> • Stern 2011 • Moro 2015 • Borella 2014 • Basak 2008 • van Muijden 2012 • Sandberg 2013 • Xin 2014 • Xin 2014 • Basak 2008 • Sandberg 2013 • Buerki 2014 • Brehmer 2012 • Simpson 2012 • Legault 2011 • Shatil 2013 • van Muijden 2012 • Basak 2008 • Dustman 1992 • Shatil 2014 • Legault 2011 • Basak 2008 • Basak 2008 • Basak 2008 • Buerki 2014 • von Bastian 2013 • von Bastian 2013 • Zimmerman 2014 • Zimmerman 2014 • Anguera 2013 • Anguera 2013 • Anguera 2013 • Borella 2014 • Borella 2014 • Zimmerman 2014
Attentional Processes	<ul style="list-style-type: none"> • 1 back accuracy • 1 back RT • Addenbrooke attention and orientation • Attention blink • Attentional matrices • Bell's test 	<ul style="list-style-type: none"> • Sandberg 2013 • Sandberg 2013 • Ordonez 2011 • Salminen 2016 • Moro 2012 • Moro 2012

<ul style="list-style-type: none"> • Bourdon test • Calculation • Card rotation • Change detection task • Clock drawing test • Complex choice accuracy • Complex choice RT • Digit symbol substitution test • Filter task • Focused attention • Go RT • Go-No Go false alarm • Hidden pattern • Information processing speed • Hand-eye coordination • Letter comparison • Mattis dementia attention • Mental rotation accuracy • Mental rotation RT • Monitoring • Number comparison • Object perspective • Paced auditory serial addition task • Pattern comparison • Rapid visual information processing • RBANS attention • Simple choice accuracy • Simple choice RT • Selective attention • Sustained attention • Speed of visual-spatial information processing • Stimulation detection task • Symbol digit modalities test • Symbol search • Trail making A • Test of attention performance • Test of variables of attention • UFOV • Visual scanning • Visual search far • Visual search middle • Visual search near • Visual selective attention 	<ul style="list-style-type: none"> • Moro 2012 • Hwang 2012 • Stine-Morrow 2008 • Anguera 2013 • Lima-Silva 2010 • Boot 2013 • Boot 2013 • Uchida 2008 • Anguera 2013 • Peretz 2011 • Basak 2008 • Wilkinson 2011 • Stine-Morrow 2008 • Theill 2013 • Shatil 2013 • Buerki 2014 • Kwok 2013 • Whitlock 2012 • Whitlock 2012 • Bozoki 2013 • Boot 2013 • Whitlock 2012 • Brehmer 2012 • Borella 2010 • Kim 2015 • Lee 2013 • Boot 2013 • Boot 2013 • Theill 2013 • Bailey 2011 • Shatil 2013 • Anguera 2013 • Dustman 1992 • Nouchi 2012 • Shatil 2014 • van Muijden 2012 • Anguera 2013 • Anguera 2013 • Shatil 2013 • Boot 2013 • Boot 2013 • Boot 2013
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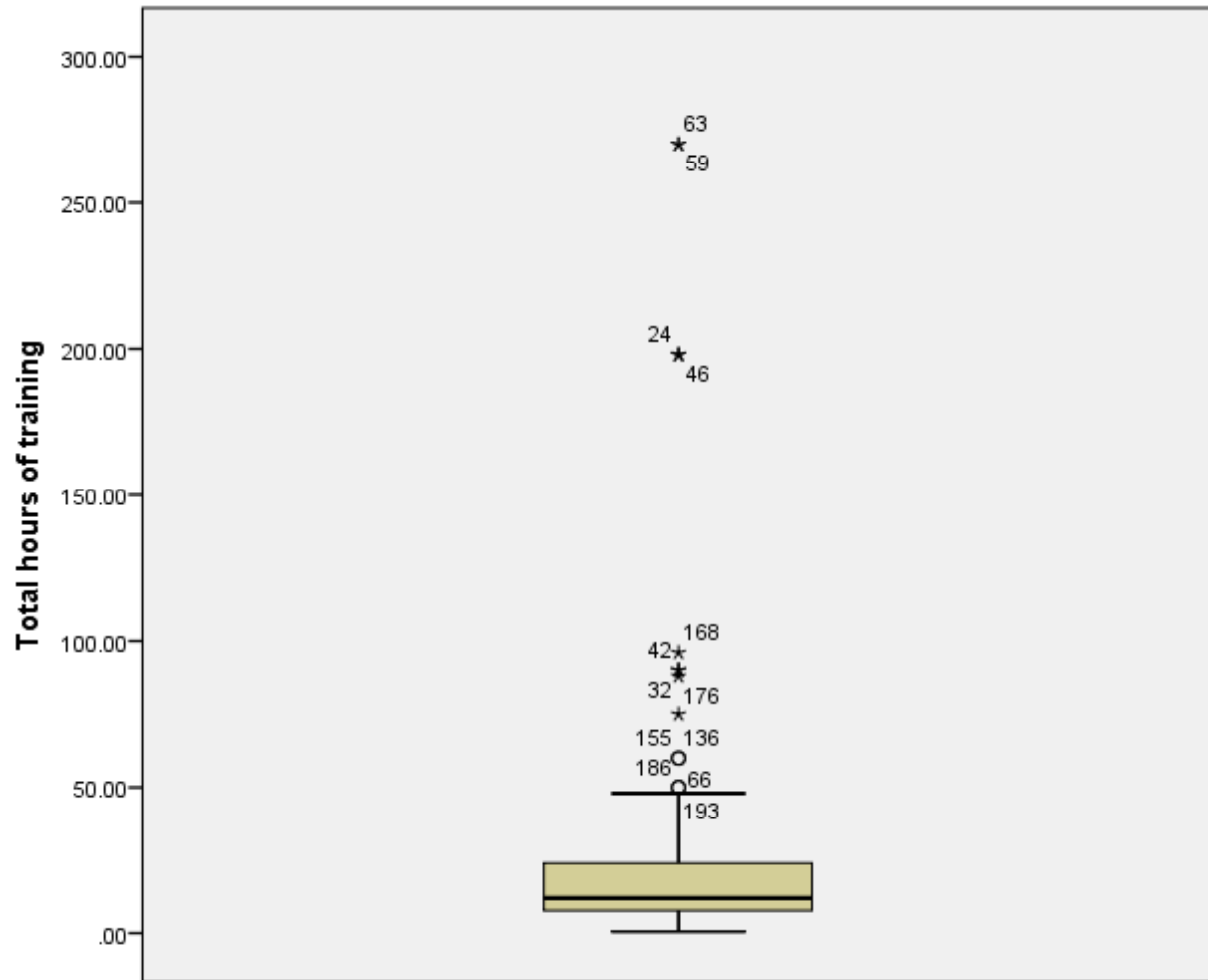
	<ul style="list-style-type: none"> • Verbal 0-back 	<ul style="list-style-type: none"> • Gagnon 2012 • Buerki 2014
Short Term Memory	<ul style="list-style-type: none"> • Benton visual retention test • Brown Peterson primary memory performance • Corsi Block tapping 4 • Corsi Block tapping 5 • Corsi Block tapping 6 • Corsi Block tapping 7 • Counting span • Digit span forward • Enumeration • Memory span • Motor series • Short term memory • Visual STM 	<ul style="list-style-type: none"> • Dustman 1992 • Craik 2007 • Boot 2013 • Boot 2013 • Boot 2013 • Boot 2013 • van Muijden 2012 • Mahncke 2006 • Basak 2008 • Theill 2013 • Uchida 2008 • Buiza 2008 • Basak 2008
Reasoning	<ul style="list-style-type: none"> • Cattell • Abstraction • Analogies • Arithmetic • Block design • Everyday cognitive battery: Reasoning • Everyday problem solving • Figure classification • Letter series test • Letter sets test • Map drawing • Planning • Problem solving • Progressive matrices • Raven • Reasoning • TONI-3 • Tower of Hanoi • Visual reasoning 	<ul style="list-style-type: none"> • Tranter 2007 • Buiza 2008 • Moro 2012 • McDougall 2012 • Stern 2011 • Boot 2013 • Stine-Morrow 2008 • Stine-Morrow 2008 • Margrett 2006 • Ball 2010 • Caretti 2013 • Shatil 2013 • Noice 2009 • Whitlock 2012 • Basak 2008 • Theill 2013 • Shatil 2014 • Zinke 2014 • Cheng 2012
Semantic Knowledge	<ul style="list-style-type: none"> • Animal fluency • Animal naming • Boston naming test • Category fluency • COWAT animals • Integral narrative discourse 	<ul style="list-style-type: none"> • Hwang 2012 • Miller 2013 • Miller 2013 • Stern 2011 • Mowszowski 2014 • Zimmerman 2014

	<ul style="list-style-type: none"> • Language domain • Letter fluency (FAS) • Lexical fluency • Naming • Narrative discourse questions • Opposites • Orthographic verbal fluency • Phonemic fluency • PVF (FAS) • RBANS Language • Reading comprehension • Semantic verbal fluency • Unconstrained verbal fluency • Verbal fluency • Vocabulary • Word association fluency 	<ul style="list-style-type: none"> • Lampit 2014 • Sandberg 2013 • Uchida 2008 • Shatil 2013 • Zimmerman 2014 • Stine-Morrow 2008 • Zimmerman 2014 • Buiza 2008 • Murphy 2014 • Lee 2013 • Carretti 2013 • Zimmerman 2014 • Zimmerman 2014 • Noice 2009 • McDougall 2012 • Stine-Morrow 2008
Everyday functioning	<ul style="list-style-type: none"> • Activities of daily living • Brief assessment of prospective memory • Cognitive failure questionnaire • Dysexecutive questionnaire • Everyday cognition battery • Everyday memory questionnaire • Everyday problem solving • Functional activity questionnaire • Hopkins prospective memory test • Instrumental activities of daily living • Memory controllability inventory • Object misplacement • The everyday attention test • Rivermead behavioral memory test 	<ul style="list-style-type: none"> • Ceccato 2012 • Lee 2013 • Finn 2015 • Craik 2007 • Boot 2013 • Diamond 2015 • Stine-Morrow 2008 • Hyer 2015 • Rasmusson 1999 • McDougall 2010 • Rasmusson 1999 • Fairchild 2010 • Moro 2015 • Rasmusson 1999

Supp. Table 2*Publications Excluded From the Meta-Analyses and the Reasons for Exclusion*

Excluded Publication	Reasons for Exclusion
Nozawa et al., 2015	No sufficient data
Brom & Kliegel, 2014	No sufficient data
Optale et al., 2010	No sufficient data
Chambon, Herrera, Romaiguere, Paban, & Alescio-Lautier, 2014	No sufficient data
Mcdaniel et al., 2014	No sufficient data
Gaitán et al., 2013	No sufficient data
Stepankova, Lukavsky, Kopecek, Steinova, & Ripova, 2012	No random assignment
Miller, Taler, Davidson, & Messier, 2012	No control
Peng, Wen, Wang, & Gao, 2012	No sufficient data
Brehmer, Shing, Heekeren, Lindenberger, & Bäckman, 2016	No sufficient data
Hastings & West, 2009	No sufficient data
Li et al., 2008	No sufficient data
Kwok et al., 2011	No sufficient data
Stavros, Fotini, & Magda, 2010	No sufficient data
Stine-Morrow et al., 2014	No sufficient data
Tesky, Thiel, Banzer, & Pantel, 2011	No sufficient data
Benjamin M Hampstead, Sathian, et al., 2012	No sufficient data
Kramer, Larish, & Strayer, 1995	No age matched control
Vermeij, Claassen, Dautzenberg, & Kessels, 2016	No control
Horning, Young, Myhre, Osato, & Wilkins, 2016	No sufficient data
Barnes et al., 2013	Combined cognitive and physical training
B. M. Hampstead et al., 2011	No control
Lima-Silva et al., 2012	No random assignment
Tamura et al., 2015	No random assignment
Anand et al., 2011	No control
Barcelos et al., 2015	Combined cognitive and physical training
Engvig et al., 2014	No mental status matched control
Belleville et al., 2011	No mental status matched control
Benjamin M Hampstead, Stringer, Stilla, Giddens, & Sathian, 2012	No mental status matched control
Quayhagen & Quayhagen, 1989	Alzheimer's disease patients
Cipriani, Bianchetti, & Trabucchi, 2006	No control
Pieramico et al., 2012	Combined cognitive and physical training
Ngandu et al., 2015	Combined cognitive and physical training
Heinzel et al., 2014	Combined cognitive and physical training
Hoogenhout, de Groot, van der Elst, & Jolles, 2012	Prospective study
Rahe et al., 2015	No control

Foster, Rosenblatt, & Kuljiš, 2011	Alzheimer's disease patients
Legault, Allard, & Faubert, 2013	No age matched control
Hughes et al., 2014	Feasibility study
Kirchhoff, Anderson, Smith, Barch, & Jacoby, 2012	No age matched control
Schwenk, Zieschang, Oster, & Hauer, 2010	Alzheimer's disease patients
Grandjean & Collette, 2011	No age matched control
Bottino et al., 2005	Alzheimer's disease patients
Lövdén et al., 2012	No age matched control
Candela, Zucchetti, Magistro, & Rabaglietti, 2015	Combined cognitive and physical training
Klusmann et al., 2010	Combined cognitive and physical training
León, Ureña, Bolaños, Bilbao, & Oña, 2015	Combined cognitive and physical training
Linde & Alfermann, 2014	Combined cognitive and physical training
Sugano et al., 2012	Combined cognitive and physical training
Cheng et al., 2014	Alzheimer's disease patients
Yáguiez, Shaw, Morris, & Matthews, 2011	Alzheimer's disease patients
Van Vleet et al., 2016	No control
Noice, Noice, & Staines, 2004	Combined cognitive and physical training
Noice & Noice, 2009	Combined cognitive and physical training
Bahar-Fuchs et al., 2017	Mixed MCI and depression patients
Almondes, Leonardo, & Moreira, 2017	No sufficient data
Rolle, Anguera, Skinner, Voytek, & Gazzaley, 2017	No sufficient data
Sandberg & Stigsdotter Neely, 2016	No age matched control
Gajewski & Falkenstein, 2018	No sufficient data
Gaál & Czigler, 2018	No sufficient data
de Lange et al., 2017	No sufficient data
Goghari & Lawlor-Savage, 2018	No sufficient data
Carlson et al., 2015	Combined cognitive and physical training
Fried et al., 2004	Combined cognitive and physical training
Ross, Freed, Edwards, Phillips, & Ball, 2016	No cognitive outcome reported



Supp. Figure 1. Outlier analysis on total hours of training in all studies.