

Supplementary tables for “Late-life cognitive activity and risk of dementia: a systematic review and bias analysis”

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eTable 1: PubMed Electronic Search Strategy for Cognitive Activity

DATABASE	PUBMED
DATES	Search was conducted on 07/07/2014, and captures citations included in the databases until 06/30/2014.
STRATEGY	#1 AND #2 AND #3 AND #4 AND #5
#1	"dementia"[mesh:noexp] OR "alzheimer Disease"[mesh] OR ("AD"[tw] OR "dementia"[tw] OR "alzheimer"[tw] OR "alzheimers"[tw] OR "alzheimer's"[tw])
#2	"risk"[mesh] OR ("risk"[tw] OR "incident"[tw] OR "incidence"[tw] OR "onset"[tw] OR "prevent"[tw] OR "prevents"[tw] OR "prevented"[tw] OR "cause"[tw] OR "causes"[tw] OR "caused"[tw])
#3	"intervention studies"[mesh:noexp] OR "clinical trials as topic"[mesh] OR "cohort studies"[mesh:noexp] OR "longitudinal studies"[mesh] OR "case-control studies"[mesh:noexp] OR ("longitudinal"[tw] OR "longitudinally"[tw] OR "prospective"[tw] OR "prospectively"[tw] OR "follow"[tw] OR "followed"[tw] OR "follow-up"[tw] OR "follow up"[tw] OR "cohort"[tw] OR "later"[tw] OR "case control"[tw] OR "case-control"[tw] OR "clinical trial"[tw] OR "controlled trial"[tw] OR "intervention study"[tw] OR "intervention studies"[tw])
#4	"cognitive reserve"[mesh:noexp] OR "brain reserve"[mesh:noexp] OR ("cognitive reserve"[tw] OR "brain reserve"[tw] OR "cognitive activity"[tw] OR "cognitive activities"[tw] OR "cognitive engagement"[tw] OR "cognitive stimulation"[tw] OR "leisure activity"[tw] OR "leisure activities"[tw] OR "leisure engagement"[tw] OR "mental activity"[tw] OR "mental activities"[tw] OR "mental engagement"[tw] OR "mental stimulation"[tw] OR "intellectual activity"[tw] OR "intellectual activities"[tw] OR "intellectual engagement"[tw] OR "intellectual stimulation"[tw] OR "cognitive lifestyle"[tw] OR "cognitive inactivity"[tw] OR "mental inactivity"[tw] OR "sudoku"[tw] OR "crossword"[tw] OR "crosswords"[tw] OR "puzzles"[tw] OR "cognitive exercise"[tw] OR "cognitive exercises"[tw] OR "cognitive training"[tw] OR "cognitive intervention"[tw] OR "cognitive interventions"[tw] OR "brain exercise"[tw] OR "brain exercises"[tw] OR "brain training"[tw] OR "brain intervention"[tw] OR "brain interventions"[tw])
#5	0000/00/00:2014/06/30[EDAT]

eTable 2: EMBASE Electronic Search Strategy for Cognitive Activity

DATABASE	EMBASE
DATES	Search was conducted on 07/07/2014, and captures citations included in the databases until 06/30/2014.
STRATEGY	(#1 AND #2 AND #3 AND #4) NOT #5
#1	('dementia' OR 'alzheimer disease')/de OR (ad OR dementia OR alzheimer*):ti,ab
#2	('risk' OR 'risk factor' OR 'population risk' OR 'attributable risk')/de OR (risk OR inciden* OR onset OR prevent* OR caus*):ti,ab
#3	'clinical trial'/exp OR ('intervention study' OR 'cohort analysis' OR 'longitudinal study' OR 'prospective study' OR 'evaluation and follow up' OR 'follow up' OR 'case control study' OR 'population based case control study' OR 'controlled study' OR 'major clinical study')/de OR (longitudinal* OR prospective* OR follow* OR follow-up OR 'follow up' OR cohort OR later OR 'case control' OR 'case-control' OR 'clinical trial' OR 'controlled trial' OR 'intervention study' OR 'intervention studies'):ti,ab
#4	'cognitive reserve'/de OR 'brain reserve'/de OR 'cognitive reserve':ab,ti OR 'brain reserve':ab,ti OR 'cognitive activity':ab,ti OR 'cognitive activities':ab,ti OR 'cognitive engagement':ab,ti OR 'cognitive stimulation':ab,ti OR 'leisure activity':ab,ti OR 'leisure activities':ab,ti OR 'leisure engagement':ab,ti OR 'mental activity':ab,ti OR 'mental activities':ab,ti OR 'mental engagement':ab,ti OR 'mental stimulation':ab,ti OR 'intellectual activity':ab,ti OR 'intellectual activities':ab,ti OR 'intellectual engagement':ab,ti OR 'intellectual stimulation':ab,ti OR 'cognitive lifestyle':ab,ti OR 'cognitive inactivity':ab,ti OR 'mental inactivity':ab,ti OR 'sudoku':ab,ti OR 'crossword':ab,ti OR 'crosswords':ab,ti OR 'puzzles':ab,ti OR 'bridge':ab,ti OR 'cognitive exercise':ab,ti OR 'cognitive exercises':ab,ti OR 'cognitive training':ab,ti OR 'cognitive intervention':ab,ti OR 'cognitive interventions':ab,ti OR 'brain exercise':ab,ti OR 'brain exercises':ab,ti OR 'brain training':ab,ti OR 'brain intervention':ab,ti OR 'brain interventions':ab,ti
#5	[1-7-2014]/sd

eTable 3: Leisure activities deemed to be cognitive in studies of cognitive activity and Alzheimer’s disease/dementia

First Author	Activities considered cognitive
Akbaraly	Stimulating cognitive activities: crossword puzzles, playing cards, attending organizations, attending the cinema/theatre, practising an artistic activity Passive cognitive activities: watching television, listening to the radio, listening to music, knitting/sewing
Eriksson Sorman	reading books, reading magazines, attending movies/concerts/theatre, playing musical instruments, needlework, hunting or fishing
Hughes	reading books, reading magazines, reading newspapers, playing board games, doing crafts, jigsaw puzzles, playing musical instruments, playing bridge, playing other card games
Karp	High mental intensity: reading literature, crossword puzzles, political/cultural interests, cards/chess, attending courses, attending theatres/concerts, attending exhibitions/museums, travelling, painting/drawing/photography, collecting stamps or other items, writing, following the stock market Moderate mental intensity: handicraft, visiting the summerhouse, watching TV, meeting friends/participating in groups, listening to radio, engaging in family/charity, outdoor activities, cooking, attending church activities, playing music, playing solitaire, playing bingo, singing Low mental intensity: playing sport, housekeeping
Wang	reading books/newspapers, writing, studying, working crossword puzzles, painting, or drawing
Scarmeas	reading newspapers or magazines, playing cards/games/bingo, going to classes.
Verghese	reading books or newspapers, writing for pleasure, doing crosswords, playing board games or cards, participating in organized group discussions, playing musical instruments
Wilson, Wilson	watching television, listening to the radio, reading newspapers, reading magazines, reading books, playing cards, checkers, crosswords, or puzzle games, attending museums
Wilson	visiting library, attending museums, attending concerts, time reading, reading newspapers, reading magazines, reading books, writing letters, playing games
Carlson	Stimulating cognitive activities: Reading, studying for courses and extra work Passive cognitive activities: watching television or listening to the radio and going to movies, theater, art or music
Crowe	reading, listening to the radio or watching television, social visits, cultural activities

Citations given in main text.

eTable 4: Summary of characteristics of studies included in review

First Author	Cohort	Mean Age at start of follow-up (Range)	Mean follow-up in years (Max)	Dementia diagnosis	AD diagnosis
Akbaraly	Three-City Study	74 (65+)	NR (4)	DSM-IV	NINCDS-ADRDA
Eriksson Sorman	The Betula Project	74 (65+)	NR (15)	DSM-IV	
Hughes	Monongahela Valley Independent Elders Survey	76 (65+)	6.1 (10.5)	CDR	
Karp	Kungsholmen Project	81 (75+)	NR (NR)	DSM-III-R	
Scarmeas	Washington Heights-Inwood Columbia Aging Project	76 (65+)	2.8 (7.2)	DSM-III-R	
Verghese	Bronx Aging Study	79 (75+)	5.8 (NR)	DSM-III-R	NINCDS-ADRDA
Wang	Kungsholmen Project	81 (75+)	NR (6.4)	DSM-III-R	
Wilson	Religious Orders Study	75 (65+)	4.5 (NR)	NINCDS-ADRDA	NINCDS-ADRDA
Wilson	Chicago Health and Aging Project	76 (65+)	4.1 (NR)		NINCDS-ADRDA
Wilson	Memory and Aging Project	80 (NR)	2.5 (NR)		NINCDS-ADRDA
Carlson	Duke Twins Study of Memory in Aging	45 (NR)	NR (NR)	DSM-III-R	
Crowe	Swedish Twin Registry	57 (NR)	NR (NR)	DSM-III-R	NINCDS-ADRDA

NR: Not Reported. NINCDS-ADRDA: National Institute of Neurological and Communicative Disorders and Stroke-Alzheimer's Disease and Related Disorders Association. DSM-III-R: Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised. DSM-IV Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition. CDR: Clinical Dementia Rating. Citations given in main text.

eTable 5: Bias-corrected AD HR (comparing high versus low participation in cognitive activity), adjusted for U, when $HR_{U-AD} = 3$ or $HR_{U-AD} = 4.5$, given that HR unadjusted for U = 0.71

		HR_{U-AD}	Prevalence of U among low-activity participants, p_0^*						
			1%	10%	25%	50%	75%	90%	99%
Prevalence of U among high-activity participants, p_1^*	1%	3.0	0.71	0.84	1.04	1.39	1.74	1.95	2.07
		4.5	0.71	0.93	1.29	1.89	2.49	2.85	3.06
	10%	3.0	0.60	0.71	0.89	1.18	1.48	1.66	1.76
		4.5	0.54	0.71	0.99	1.45	1.91	2.18	2.35
	25%	3.0	0.48	0.57	0.71	0.95	1.18	1.33	1.41
		4.5	0.39	0.51	0.71	1.04	1.37	1.57	1.69
	50%	3.0	0.36	0.43	0.53	0.71	0.89	0.99	1.06
		4.5	0.27	0.35	0.48	0.71	0.94	1.07	1.15
	75%	3.0	0.29	0.34	0.43	0.57	0.71	0.80	0.85
		4.5	0.20	0.26	0.37	0.54	0.71	0.81	0.87
	90%	3.0	0.26	0.30	0.38	0.51	0.63	0.71	0.76
		4.5	0.18	0.23	0.32	0.47	0.62	0.71	0.76
	99%	3.0	0.24	0.29	0.36	0.48	0.60	0.67	0.71
		4.5	0.16	0.21	0.30	0.44	0.58	0.66	0.71

* conditional on other covariates.

When $HR_{U-AD} = 3$, the bias-corrected AD HR will be exactly 1 at the following combinations of p_1 and p_0 : $p_1 = 1\%$ and $p_0 = 22\%$; $p_1 = 10\%$ and $p_0 = 35\%$; $p_1 = 25\%$ and $p_0 = 56\%$; and $p_1 = 50\%$ and $p_0 = 91\%$. When $HR_{U-AD} = 4.5$, the bias-corrected AD HR will be exactly 1 at the following combinations of p_1 and p_0 : $p_1 = 1\%$ and $p_0 = 13\%$; $p_1 = 10\%$ and $p_0 = 26\%$; $p_1 = 25\%$ and $p_0 = 47\%$; and $p_1 = 50\%$ and $p_0 = 82\%$.

eTable 6: Bias-corrected AD HR (comparing high versus low participation in cognitive activity), adjusted for U, when $HR_{U-AD} = 3$ or $HR_{U-AD} = 4.5$, given that HR unadjusted for U = 0.68

		HR_{U-AD}	Prevalence of U among low-activity participants, p_0^*						
			1%	10%	25%	50%	75%	90%	99%
Prevalence of U among high-activity participants, p_1^*	1%	3.0	0.68	0.8	1	1.33	1.67	1.87	1.99
		4.5	0.68	0.89	1.23	1.81	2.38	2.73	2.93
	10%	3.0	0.58	0.68	0.85	1.13	1.42	1.59	1.69
		4.5	0.52	0.68	0.94	1.39	1.83	2.09	2.25
	25%	3.0	0.46	0.54	0.68	0.91	1.13	1.27	1.35
		4.5	0.38	0.49	0.68	1	1.31	1.51	1.62
	50%	3.0	0.35	0.41	0.51	0.68	0.85	0.95	1.01
		4.5	0.26	0.33	0.46	0.68	0.9	1.03	1.1
	75%	3.0	0.28	0.33	0.41	0.54	0.68	0.76	0.81
		4.5	0.19	0.25	0.35	0.52	0.68	0.78	0.84
	90%	3.0	0.25	0.29	0.36	0.49	0.61	0.68	0.72
		4.5	0.17	0.22	0.31	0.45	0.59	0.68	0.73
	99%	3.0	0.23	0.27	0.34	0.46	0.57	0.64	0.68
		4.5	0.16	0.21	0.29	0.42	0.55	0.63	0.68

*conditional on other covariates.

When $HR_{U-AD} = 3$, the bias-corrected AD HR will be exactly 1 at the following combinations of p_1 and p_0 : $p_1 = 1\%$ and $p_0 = 25\%$; $p_1 = 10\%$ and $p_0 = 39\%$; $p_1 = 25\%$ and $p_0 = 61\%$; and $p_1 = 50\%$ and $p_0 = 98\%$. When $HR_{U-AD} = 4.5$, the bias-corrected AD HR will be exactly 1 at the following combinations of p_1 and p_0 : $p_1 = 1\%$ and $p_0 = 15\%$; $p_1 = 10\%$ and $p_0 = 28\%$; $p_1 = 25\%$ and $p_0 = 50\%$; and $p_1 = 50\%$ and $p_0 = 87\%$.