

eTable 1. Definition of super mover criteria and weighted prevalence in individual studies from the Health and Retirement Studies International Network of Studies

Study	HRS	ELSA	SHARE	CHARLS	MHAS
Wave (baseline)	8 (2006-2007)	2 (2004-005)	2 (2006-2007)	1 (2011-2012)	3 (2012)
Number of older adults $\geq$ 80 years	n=876	n=874	n=1800	n=303	n=136
% of older adults $\geq$ 80 /adults $\geq$ 65 years	25 (876/3915)	23.13 (874/4128)	49 (1800/3940)	12 (303/3170)	13 (136/746)
% of super movers among older adults $\geq$ 80 years	9 (79/876)	8.8 (81/874)	6.4 (152/1800)	7.3 (25/303)	9.8 (21/136)
Super movers prevalence	8.96	8.81	6.40	7.32	9.84
Super movers prevalence using transformed gait speed	7.30 (65/876)	7.14 (65/874)	6.63 (155/1800)	5.91 (22/303)	3.88 (10/136)
Criteria					
Dementia	A doctor diagnosis of a memory problem	A doctor diagnosis of Alzheimer's/dementia	A doctor diagnosis of Alzheimer's/dementia	A doctor diagnosis of a memory problem	Age and education-level adjusted cognitive impairment combined with impairment in both managing money and medication
Gait assessment	Average of 2 walking times over a 98.5 inch area in seconds.	Average of 2 walking times over an 8-foot area in seconds.	Average of 2 walking times over a 2.5 meter area in seconds.	Average of 2 walking times over a 2.5 meter area in seconds.	Average of 2 walking times over a 3 meter area in seconds
Gait Cut scores	$\geq$ 1.5 SD of sex adjusted cut scores for people aged 80 and above				
Men $\geq$ 80	$\geq$ 1.05 m/s	$\geq$ 1.04 m/s	$\geq$ 1.27 m/s	$\geq$ 0.86 m/s	$\geq$ 0.70 m/s
Women $\geq$ 80	$\geq$ 0.91 m/s	$\geq$ 0.90 m/s	$\geq$ 0.96 m/s	$\geq$ 0.61 m/s	$\geq$ 0.61 m/s

Weighted super mover prevalence	8.96%	8.81%	6.40%	7.32%	9.84%
Cognitive Tests	Total recall, orientation, serial 7s, backward counting	Total recall, orientation, verbal fluency	Total recall, orientation, verbal fluency	Total recall, orientation, serial 7s	Total recall, orientation, verbal fluency, visual scan
Cognitive Test used to assess overall cognitive performance in the wave prior	Total recall, serial 7s, backward counting, naming tasks	Total recall, orientation, verbal fluency and mathematic performance tasks	Total recall, orientation, verbal fluency and mathematic performance tasks	Not available	Total recall, immediate and delayed draw, visual scan, orientation
Instrumental Activities of Daily Living	Some difficulty in reading maps, using the telephone, handling money, taking medication, shopping for groceries and making a hot meal				
Education	Upper secondary education or more				
Physical activity	≥1day per week moderate physical activity			≥3 moderate physical activity for at least 10 minutes every week	≥3 vigorous physical activity per week
Sleep	Taking medication to sleep (yes/no)	Restless sleep in the past week (from CES-D)	Trouble sleeping or recent changes in their sleeping pattern (yes/no)	Restless sleep in the past week (from CES-D)-moderately or more	Restless sleep in the past week (from CES-D)-moderately or more
Smoking	Ever smoked or not				

HRS: Health and Retirement Study; ELSA, English Longitudinal Study of Ageing; SHARE Survey of Health, Ageing, and Retirement in Europe; CHARLS, Chinese Health and Retirement Longitudinal Study; MHAS, Mexican Healthy Aging Study

eTable 2. Risks for developing self-reported diagnosis of Alzheimer’s disease or dementia in super movers versus non-super movers in individual studies in Health and Retirement Studies International Network of Studies.

Study (n of aged≥80)	HRS (n=876)	ELSA (n=874)	SHARE (n=1800)	CHARLS (n=303)	Overall
Hazard ratio	0.602	0.302	0.595	0.230	0.405
(95% CI)	(0.333, 1.089)	(0.140, 0.651)	(0.304, 1.167)	(0.046, 1.145)	(0.226, 0.583)
p	0.092	0.002	0.131	0.073	<0.001
Mean survival time	5.630	4.487	4.300	3.799	
95%CI	(5.236, 6.023)	(4.204, 4.770)	(3.969, 4.632)	(3.445, 4.154)	
Number of events	176	119	182	27	

HRS: Health and Retirement Study; ELSA, English Longitudinal Study of Ageing; SHARE Survey of Health, Ageing, and Retirement in Europe; CHARLS, Chinese Health and Retirement Longitudinal Study

eTable 3. Risks for developing cognitive impairment in super movers versus non-super movers (defined using transformed gait speeds) in individual studies in Health and Retirement Studies International Network of Studies.

Study (n of aged $\geq$ 80)	HRS (n=876)	ELSA (n=874)	SHARE (n=1800)	CHARLS (n=303)	MHAS (n=136)	Overall
Hazard ratio (95% CI) p	.675 (.456, .999) 0.050	.248 (.113, .542) 0.000	.478 (.262, .873) 0.016	.878 (.348, 2.211) 0.783	.098 (.009, 1.069) 0.057	0.402 0.160, 0.644) 0.001
Mean survival time 95%CI	5.474259 5.087194 5.861324	4.435181 4.142818 4.727543	4.361655 4.021226 4.702084	3.408947 3.076173 3.741721	3.73174 3.012054 4.451426	
Number of events	229	163	233	57	19	

eTable 4. Differences in participant characteristics between super movers versus non-super movers in the LonGenity study

	Overall (n=197)	Non-super movers (n=183)	Super movers (n=14)	P value
Age (years)	84.6 (3.3)	84.8 (3.3)	82.3 (2.2)	0.0084
Female	114 (57.8)	105 (57.3)	9 (64.2)	0.614
Years of Education	193 (98.4)	16.9 (3.1)	18.4 (2.7)	0.0943
Parental Longevity	78 (39.5)	69 (37.7)	9 (64.2)	0.050
Hypertension	104 (54.7)	97 (55.1)	7 (50.0)	0.711
Diabetes	15 (7.6)	13 (7.1)	2 (14.2)	0.329
Heart problems	14 (7.1)	13 (7.1)	1 (7.1)	0.996
Stroke	10 (5.1)	10 (5.5)	0	0.367
Depression	8 (4.1)	8 (4.5)	0	0.416
Physical activity	68 (43.0)	57 (39.3)	11 (84.6)	0.002
Smoking	103 (52.5)	94 (51.6)	9 (64.2)	0.362
Gait speed (meter/sec)	0.98 (0.20)	0.95 (0.17)	1.36 (0.06)	<0.001
Global cognition	-0.3 (0.4)	-0.3 (0.5)	-0.06 (0.44)	0.0726

eFigure 1. Trajectories of decline in global cognition in super movers and non-super movers before and after the age of 80 (data from the LonGenity study)

