

## *Supplemental Methods*

For SDOC analyses, data from the baseline visit of each study were used, except for Health ABC where the Year 7 (visit 8) data were used; the Study of Osteoporotic Fractures (SOF) where year 10 (visit 6) data were used; and the Cardiovascular Health Study (CHS) where Year 6 data were used.

### *Grip strength*

Grip strength was measured in kilograms (kg) using handheld dynamometry; procedures for measuring grip strength in each cohort are summarized in Supplementary Table S3. The maximum value from either hand was used as the analysis variable.

### *Walking speed*

Walking speed was assessed at the participant's usual pace over 20 meters in Health ABC; over 6 meters in MrOS, Mr&MsOS Hong Kong, MrOS Sweden, SOF, CHAMP; and over 4.6 meters (15 feet) in CHS. In the Johnston County Arthritis Study, walking speed was assessed over 2.4 meters (8 feet). To account for the fact that walking speed is slower over shorter distances due to the acceleration phase when initiating movement, walking speed on this course was converted to an equivalent speed that would have been observed over 4-6 meters using equations previously published by Guralnik.<sup>1</sup> The procedures for measuring walking speed for each cohort are summarized in Supplementary Table S4.

### *Falls*

Falls were by self-report. There was some variation in how falls were ascertained by cohort; the procedures for fall assessment are summarized in Supplementary Table S5.

### *Death*

All cohorts adjudicated vital status, date and cause of death by review of death certificates or registry; the cohort specific methods for ascertaining death are described in Supplementary Table S6. The cohorts that adjudicated hip fractures from medical records were included in the fracture analyses; similar protocols were used for fracture assessment in these cohorts as summarized in Supplementary Table S7.

### *Mobility limitation*

Incident self-reported mobility limitation was defined as any difficulty walking a quarter mile or climbing stairs at the follow-up visit (follow-up ranged from 1.9-6.8 years). Generally, there was little to no variation as to how these questions were asked across the cohorts, although the time between the first and subsequent assessment of mobility limitation varied across cohort. (Supplementary Table S8).

#### *Other variables*

Height (m) and weight (kg) were measured in the clinic for all cohorts, and BMI was calculated. Lean mass and fat were determined by DXA, as well as total hip bone mineral density (BMD). Harmonization of the DXA lean mass values did not materially change the CART analyses, so the non-harmonized values were used. Other clinical variables harmonized across cohorts included: age, self-reported health, statin use, pain, diabetes, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), cancer, stroke and cognitive impairment. Poor cognitive function was defined as score of <88 on the Modified Mini-Mental State examination<sup>2</sup> or <23 on the Mini-Mental State Examination<sup>3</sup>.

#### *Follow-up time*

Follow-up time for mortality was  $8.4 \pm 2.5$  overall for men  $8.8 \pm 2.3$  years overall for women. By study, follow-up for mortality was  $8.7 \pm 2.4$  years in MrOS,  $8.2 \pm 2.6$  years in SOF,  $7.9 \pm 2.5$  years in Health ABC men,  $7.9 \pm 2.5$  years in Health ABC women,  $8.5 \pm 2.5$  years in MrOS Sweden,  $8.9 \pm 2.2$  years for Mr&MsOS Hong Kong men,  $9.5 \pm 1.6$  for Mr&MsOS Hong Kong women,  $7.0 \pm 2.0$  years for CHAMP men,  $7.7 \pm 3.0$  for CHS men,  $8.6 \pm 2.5$  for CHS women. Follow-up time for hip fractures was  $10.2 \pm 4.4$  overall for men and  $8.9 \pm 3.5$  overall for women. By study, follow-up time for hip fracture was  $11.7 \pm 4.6$  years for MrOS,  $10.2 \pm 5.3$  years for SOF,  $6.6 \pm 2.5$  years for Health ABC men,  $7.1 \pm 2.3$  years for Health ABC women,  $9.8 \pm 2.8$  years for Mr&MsOS Hong Kong men,  $8.7 \pm 1.7$  years for Mr&MsOS Hong Kong women, and  $6.3 \pm 2.0$  years for CHAMP. Follow-up time for mobility limitation was  $5.8 \pm 1.4$  years for men and  $3.8 \pm 1.4$  years for women. By study, it was  $6.8 \pm 0.3$  years for MrOS,  $5.2 \pm 0.5$  years for SOF,  $1.9 \pm 0.1$  years for Health ABC men,  $1.9 \pm 0.1$  years for Health ABC women,  $5.9 \pm 0.5$  years for CHAMP,  $4.0 \pm 0.1$  years for CHS men and  $4.0 \pm 0.1$  years for CHS women.

#### *Supplemental Results*

In general, low grip strength was a risk factor for both falls and mortality in each cohort separately, for both men and women, but this association did not always reach statistical significance (Supplementary Figures

S1 and S2). When Grip/BMI was analyzed using the secondary cut-point of <1.46 in men, those with values below this cut-point were more likely to have a fall, hip fracture, mobility limitation or die than those with higher values (Supplementary Table S10). In sensitivity analyses for hip fracture that accounted for the competing risk of mortality, associations between the individual grip strength and DXA lean mass variables and fracture were generally somewhat attenuated and no longer significant, although in men, low grip strength/arm lean mass remained a risk factor for hip fracture, and low ALM remained protective for hip fracture (data not shown).

Supplementary Table S1. Characteristics of included cohorts

Study	Eligibility	Year		N	BMI, kg/m <sup>2</sup>	Walking speed, m/s	Grip Strength, m/s
Osteoporotic Fractures in Men (MrOS) Study	Ambulatory community dwelling men, age ≥ 65 yrs	Baseline	Men	5833	27.4 ± 3.8	1.25 ± 0.24	41.6 ± 8.5
			Women	0	N/A	N/A	N/A
Study of Osteoporotic Fractures (SOF)	Ambulatory community dwelling women, age ≥ 65 yrs	Year 10	Men	0	N/A	N/A	N/A
			Women	1232	28.3 ± 5.7	0.88 ± 0.21	20.5 ± 5.1
Health, Aging and Body Composition Study (Health ABC)	Non-disabled black and white men and women aged 70-80	Year 7	Men	650	27.0 ± 4.0	1.10 ± 0.21	37.7 ± 8.1
			Women	746	27.3 ± 5.2	1.02 ± 0.21	23.6 ± 6.2
MrOS Sweden	Men age ≥ 70 years in three Swedish communities	Baseline	Men	2876	26.4 ± 3.5	1.27 ± 0.24	43.0 ± 7.9
			Women	0	N/A	N/A	N/A
Mr&MsOS Hong Kong	Men and women age ≥ 65 years residing in Hong Kong	Baseline	Men	2000	23.5 ± 3.1	1.07 +/- 0.23	32.9 +/- 6.7
			Women	2000	23.9 ± 3.5	0.96 ± 0.21	21.5 ± 4.4
Concord Health and Aging in Men Project (CHAMP)	Men age ≥ 65 years living near Concord, Australia	Baseline	Men	1514	27.8 ± 3.9	0.93 ± 0.21	35.8 ± 7.5
			Women	0	N/A	N/A	N/A
Cardiovascular Health Study	Age ≥ 65 years at original study enrollment	Year 6	Men	626	26.6 ± 3.62	0.92 +/- 0.22	39.9 +/- 8.8
			Women	852	27.1 ± 4.99	0.87 ± 0.23	24.9 ± 5.7
Johnston County Arthritis Study	Rural white and black residents of Johnston County, North Carolina	Baseline & Year 7	Men	153	29.0 ± 4.0	0.78 ± 0.2	38.4 ± 9.1
			Women	285	29.1 ± 6.1	0.70 ± 0.21	22.7 ± 6.0
Overall			Men	13652	26.6 ± 3.9	1.16 ± 0.27	39.7 ± 8.8
			Women	5115	26.3 ± 5.1	0.92 ± 0.23	22.2 ± 5.4

Supplementary Table S2. Studies included in analysis, and frequency of outcomes by cohort

Study	Mortality		Incident Fall		Hip Fracture		Mobility limitation	
	N in model	N (%) outcome	N in model	N (%) outcome	N in model	N (%) outcome	N in model	N (%) outcome
Osteoporotic Fractures in Men study (MrOS) - Men	5769	1620 (28.1%)	5744	1460 (25.4%)	5835	274 (4.7%)	3363	462 (13.7%)
Study of Osteoporotic Fractures (SOF) - Women	1236	398 (32.2%)	1077	324 (30.1%)	1240	130 (10.5%)	539	132 (24.5%)
Health Aging and Body Composition - Men	628	356 (56.7%)	603	134 (22.2%)	652	33 (5.1%)	466	66 (14.2%)
Health Aging and Body Composition - Women	721	318 (44.1%)	718	172 (24%)	746	44 (5.9%)	465	93 (20%)
MrOS Sweden - Men	2876	1073 (37.3%)	-	-	-	-	1711	273 (16%)
Mr&MsOS Hong Kong - Men	2000	494 (24.7%)	2000	158 (7.9%)	2000	63 (3.2%)	-	-
Mr&MsOS Hong Kong - Women	2000	285 (14.3%)	2000	257 (12.9%)	2000	69 (3.5%)	-	-
Concord Health and Ageing in Men Project (CHAMP) - Men	1510	425 (28.2%)	1518	267 (17.6%)	1529	39 (2.6%)	849	43 (5.1%)
Cardiovascular Health Study (CHS) - Men	638	329 (51.6%)	602	73 (12.1%)	-	-	412	84 (20.4%)
Cardiovascular Health Study (CHS) - Women	871	303 (34.8%)	841	175 (20.8%)	-	-	537	128 (23.8%)
Overall - men	13421	4297 (32%)	10467	2092 (20%)	10016	409 (4.1%)	6801	928 (13.7%)
Overall - women	4828	1304 (27%)	4636	928 (20%)	3986	243 (6.1%)	1541	353 (22.9%)

Follow-up time for mortality was  $8.4 \pm 2.5$  overall for men  $8.8 \pm 2.3$  years overall for women. Follow-up time for hip fractures was  $10.2 \pm 4.4$  overall for men and  $8.9 \pm 3.5$  overall for women. Follow-up time for mobility limitation was  $5.8 \pm 1.4$  years for men and  $3.8 \pm 1.4$  years for women.

Supplementary Table S3. Grip strength protocols

<b>Grip strength parameter</b>	<b>Health ABC</b>	<b>MrOS</b>	<b>SOF</b>	<b>CHS</b>	<b>CHAMP</b>	<b>MROS Sweden</b>	<b>Johnston Co Arthritis Study</b>	<b>MrOS Hong Kong</b>
<b>Equipment manufacturer</b>	Jamar Dynamometer	Jamar Dynamometer	Preston Grip Dynamometer	Jamar Dynamometer	Jamar Dynamometer	Jamar Dynamometer	Jamar Dynamometer	Jamar Dynamometer
<b>Dominant hand question (yes or no)</b>	Not found	Not found			Not found	Yes	Yes	Not found
<b>Arm position</b>	Resting on the table and the elbow held at approximately a right angle	Resting on the table and the elbow held at approximately a right angle.	Arm flexed at 90 degrees at the elbow and the forearm parallel to the floor	Sitting position with the arm to be tested resting at a right angle on a table.	Resting on the table	Ask the patient to sit back in the chair and rest the forearm of the dominant side against the armrest	Resting on the table	Resting on the table and the elbow held at approximately a right angle.
<b>How many trials</b>	2 trails of each hand	2 trails of each hand	2 trails of each hand	3 trials of each hand	2 trails of each hand	2 on each side	3 trials of each hand	2 trails of each hand
<b>Other notes</b>		Perform two trials with at least 15 to 20 sec rest in between.						Perform two trials with at least 15 to 20 sec rest in between.



Supplementary Table S5. Falls outcome protocol

	<b>Health ABC</b>	<b>MROS</b>	<b>SOF</b>	<b>CHS</b>	<b>CHAMP</b>	<b>MROS Sweden</b>	<b>Johnston Co</b>	<b>MrOS Hong Kong</b>
<b>Origin of fall</b>	Self-report	Self-report	Self-report	Self-report	Self-report	Self-report	Self-report	Self-report
<b>Indication of the date of fall occurred</b>	No	No	No	No	Yes	No	No	No
<b>Interval of fall ascertainment</b>	6 months or 12 months depending on visit	3x/year	3x/year	Annually	Every 4 months	Every 4 months	N/A	Every 4 months
<b>Injurious fall ascertainment - required medical attention</b>	Yes	Yes	Yes	No	No	N/A	N/A	No
<b>How is the fall defined (unintentionally fell to lower surface...)</b>	-	-	-	-	Any fall	-	-	Unintentionally fell to lower surface



Supplementary Table S6. Mortality outcome protocol

	<b>Health ABC</b>	<b>MROS</b>	<b>SOF</b>	<b>CHS</b>	<b>CHAMP</b>	<b>MROS Sweden</b>	<b>MrOS Hong Kong</b>
<b>How was a death found</b>	Non-response to 6 month interviews or clinic visit	Non-response to 4 month questionnaire or clinic visit	Non -response to 4 month questionnaire or clinic visit	Non -response to 6 month contact or clinic visit	4 monthly follow-up and New South Wales Registry of Births, Deaths and Marriages	National registry (Sweden)	Self-report from relative or death registry
<b>Verification of death</b>	Central review of death certificate; hospital records and discharge summaries if available	Central review of death certificate, and discharge summaries if available	Central review of death certificate	Review of medical records, proxy interviews, death certificates	New South Wales Registry of Births, Deaths and Marriages	By registry; >99% accurate	Death registry from Department of Health Hong Kong
<b>Was a death index used</b>	Unknown	No	No	Unknown	New South Wales Registry of Births, Deaths and Marriages	Yes	ICD - 10
<b>Completeness of follow-up</b>	>99% at 10 years	>99% at 10 years	>99% at 10 years	>99% at 10 years	68% by April 15, 2016	>99%	For 4Y FU, 1566 M and 1587 F come back (baseline 2000 M+2000 F)
<b>Interval of death ascertainment</b>	Every six months	Every four months	Every four months	Every six months	Four monthly follow-up	Registry updated every 6 months	2001 to April 2014
<b>Is death considered to be loss of follow-up</b>	No	No	No	No	Yes (non-participation)	No	No
<b>Length of mortality follow-up</b>	15+ years	12+ years	20+ years	20+ years	Mean: 6.87 years	10+ years	14 years

Supplementary Table S7. Hip fracture outcome protocol

	<b>Health ABC</b>	<b>MROS</b>	<b>SOF</b>	<b>CHAMP</b>	<b>MrOS Hong Kong</b>
<b>Origin of fracture - self-report or medical record search</b>	Self-report	Self-report from 3x/year contact	Self-report from 3x/year contact	Self-report	Self-report with medical validation or medical record search
<b>Indication of when the fracture occurred</b>	Past six months (date of event recorded)	Past four months (date of event recorded)	Past four months (date of event recorded)	Yes	The time of fracture is from self-report or medical record
<b>Adjudication</b>	Yes	Yes	Yes	Yes	Yes
<b>Adjudicated how</b>	Central adjudication committee review of radiology report	Central physician review of radiology report	Central physician review of radiology report	Verified all reported fractures by radiographic reports	X-ray or medical record from hospital
<b>How often was fractures asked</b>	Every six months	Every four months plus clinic visits	Every four months plus clinic visits	Every 4 months	Every 4 months for first 4 years, medical record only afterwards
<b>Radiology reports</b>	Yes	Yes	Yes	Yes	
<b>Vertebral fracture excluded from adjudication?</b>	Clinical vertebral fractures adjudicated separately from non-spine fractures	Clinical vertebral fractures adjudicated separately by comparison of community acquired films to baseline radiographs; separately, radiograph vertebral fractures assessed from centrally acquired radiographs	Clinical vertebral fractures excluded; separately, radiograph vertebral fractures assessed from centrally acquired radiographs	No	Clinical fracture will be validated
<b>Finger or toe fracture excluded from adjudication?</b>	Possible to analyze data excluding these but not standardly excluded	Possible to analyze data excluding these but not standardly excluded	Possible to analyze data excluding these but not standardly excluded	Yes	No
<b>What fractures are included in the adjudication</b>	All non-spine; hip; many other locations (e.g. "major osteoporotic")	Any fracture; all non-spine; hip; many other locations (e.g. "major osteoporotic")	Any fracture; all non-spine; hip; many other locations (e.g. "major osteoporotic")	All, non-vertebral, hip	All clinical fractures

Supplementary Table S8. Self-reported incident mobility limitation protocol

	<b>Health ABC</b>	<b>MROS</b>	<b>SOF</b>	<b>CHS</b>	<b>CHAMP</b>	<b>MROS Sweden</b>
<b>Walking complaint question</b>	Because of a health or physical problem, do you have any difficulty walking a quarter of a mile - that is about 2 or 3 blocks?	Do you have ANY difficulty walking 2 or 3 blocks outside on level ground?	By yourself and without using special aids or equipment: Do you have any difficulty walking 2 or 3 blocks outside on level ground?	Do you have difficulty walking a 1/2 mile, about 5-6 blocks?	Are you able to walk half a mile (approx. 1 km) without any help?	Do you have ANY difficulty walking 2 or 3 blocks outside on level ground?
<b>Stair climb question</b>	Because of a health or physical problem, do you have any difficulty walking up 10 steps - that is about 1 flight, without resting?	Do you have ANY difficulty climbing up 10 steps without resting?	By yourself and without using special aids or equipment: Do you have any difficulty climbing up 10 steps without stopping/ resting?	Do you have any difficulty walking up 10 steps?	Are you able to walk up and down stairs to the first floor without help?	Do you have ANY difficulty climbing up 10 steps without resting?
<b>Difficulty assessment?</b>	(If yes): How much difficulty do you have?	(If yes): How much difficulty do you have doing this? (If I don't do it): Is this because of a health or physical problem?	By yourself and without using any aids, how much difficulty do you have?	How much difficulty do you have?	<i>No difficulty level assessment</i>	(If yes): How much difficulty do you have doing this? (If I don't do it): Is this because of a health or physical problem?
<b>RESPONSE</b>	A little difficulty Some difficulty A lot of difficulty Or are you unable to do it? Don't know	(If yes): Some difficulty Much difficulty Unable to do it (If I don't do it): Yes, No, I don't know	Some difficulty Much difficulty Unable to do it Don't know	Some, A lot, unable to do, Don't know	-	(If yes): Some difficulty Much difficulty Unable to do it (If I don't do it): Yes, No, I don't know
<b>Time frame</b>	Baseline: Yr 7 (V8) Follow up: Yr 9 (V10)	Baseline: Baseline Follow up: Visit 3	Baseline: Yr 10 (V6) Follow up: Yr 16 (V8)	Baseline: Yr 6 Follow up: Yr 10	Baseline: Baseline Follow up: Yr 7	Baseline: Baseline Follow up: Year 5

Supplementary Table S9. Covariate protocols

		<b>Health ABC</b>	<b>MROS</b>	<b>SOF</b>	<b>CHS</b>	<b>CHAMP</b>	<b>MROS Sweden</b>	<b>MrOS Hong Kong</b>
<b>Self-rated health</b>	<i>Question</i>	In general, how would you say your health is?	Compared to other people your own age, how would you rate your overall health?	Compared to other people your own age, how would you rate your overall health?	Would you say, in general, your health is:	Compared to other people your own age, how would you rate your overall health?	Compared to other people your own age, how would you rate your overall health?	Compared to other people your own age, how would you rate your overall health?
	<i>Response</i>	Excellent, very good, good, fair, poor, don't know, refused	Excellent for my age, good, fair, poor, very poor	Excellent for my age, good, fair, poor, very poor	Excellent, very good, good, fair, poor	Excellent for my age, good, fair, poor, very poor	Excellent for my age, good, fair, poor, very poor	Excellent for my age, good, fair, poor, very poor
<b>Pain</b>	<i>Question</i>	In the past 30 days, have you had any pain, aching or stiffness in your left/right knee?	In the past 12 months, have you had pain, aching or stiffness in either knee on most days for at least one month?	Have you ever had pain lasting at least a month in or around the knee, including the back of the knee?	Pain in any bones/joints in last year... knees?	In the past 12 months, have you had pain, aching or stiffness in either knee on most days for at least one month?	Past 12 months: Knee pain on most days for at least one month	Back pain in the past 12 months
	<i>Response</i>	Yes, no, don't know, refused	Yes, No	Yes, No	Yes, No	Yes, No	Yes, No	Yes, No
<b>Use of statins</b>	<i>Question</i>	Medication Inventory Form	Medication Inventory Form	Medication Inventory Form	Medication form	Medication Inventory Form	Medication Inventory Form	Medication Inventory Form
<b>Cognitive function</b>	<i>Question</i>	Modified Mini-Mental State examination	Modified Mini-Mental State examination	Mini-Mental State Examination	Modified Mini-Mental State examination	Mini-Mental State Examination	Modified Mini-Mental State examination	Modified Mini-Mental State examination
<b>Cancer</b>	<i>Question</i>	Since we last spoke to you about 6 months ago, has a doctor told you that you had cancer?	Has a doctor or other health care provider ever told you that you have cancer?	In the past two years, has a doctor told you that you have cancer?	Told by a doctor that you currently have... Cancer?	Has a doctor or other health care provider ever told you that you have prostate cancer? Any other cancer?	Has a doctor or other health care provider ever told you that you have cancer?	Has a doctor or other health care provider ever told you that you have cancer?

	<i>Response</i>	Yes, no, don't know, refused	Yes, No	Yes, no, don't know	Yes, no, don't know	Yes, No	Yes, No	Yes, No
<b>Congestive heart failure</b>	<i>Question</i>	Since we last spoke to you about 6 months ago, has a doctor told you that you had congestive heart failure?	Has a doctor or other health care provider ever told you that you had or have: Congestive heart failure or enlarged heart?	In the last two years, has a doctor told you that you have congestive heart failure, an enlarged heart?	Has a doctor ever told you that you had... a new incident of heart failure or CHF?	Has a doctor or other health care provider ever told you that you had or have: Congestive heart failure or enlarged heart?	Has a doctor or other health care provider ever told you that you had or have: Congestive heart failure or enlarged heart?	Has a doctor or other health care provider ever told you that you had or have: Congestive heart failure or enlarged heart?
	<i>Response</i>	Yes, no, don't know, refused	Yes, No	Yes, No	Yes, no, don't know	Yes, No	Yes, No	Yes, No
<b>COPD</b>	<i>Question</i>	Has a doctor ever told you that you had COPD? Chronic bronchitis? Emphysema?	Has a doctor or other health care provider ever told you that you had or have: Chronic obstructive lung disease, chronic bronchitis, asthma, emphysema or COPD?	Has a doctor EVER told you have you had emphysema, chronic bronchitis, or chronic obstructive lung disease?	Have you had an attack of bronchitis since we saw you last year?	Has a doctor or other health care provider ever told you that you had or have: Chronic obstructive lung disease, chronic bronchitis, asthma, emphysema or COPD?	Has a doctor or other health care provider ever told you that you had or have: Chronic obstructive lung disease, chronic bronchitis, asthma, emphysema or COPD?	Has a doctor or other health care provider ever told you that you had or have: Chronic obstructive lung disease, chronic bronchitis, asthma, emphysema or COPD?
	<i>Response</i>	Yes, no, don't know, refused	Yes, No	Yes, no, don't know	Yes, no, don't know	Yes, No	Yes, No	Yes, No
<b>Stroke</b>	<i>Question</i>	Since we last spoke to you about 6 months ago, has a doctor told you that you had a stroke, mini-stroke, or TIA?	Has a doctor or other health care provider ever told you that you had or have: A stroke, blood clot in the brain or bleeding in the brain?	In the last two years, has a doctor told you that you had a stroke?	Has a doctor ever told you that you had... a new transient ischemic attack or TIA or silent stroke since we last spoke?	Has a doctor or other health care provider ever told you that you had or have: A stroke, blood clot in the brain or bleeding in the brain?	Has a doctor or other health care provider ever told you that you had or have: A stroke, blood clot in the brain or bleeding in the brain?	Has a doctor or other health care provider ever told you that you had or have: A stroke, blood clot in the brain or bleeding in the brain?
	<i>Response</i>	Yes, no, don't know, refused	Yes, No	Yes, no, don't know	Yes, no, don't know	Yes, No	Yes, No	Yes, No

<b>Diabetes</b>	<i>Question</i>	Since your last clinic visit about 12 months ago, has a doctor told you that you had... diabetes or sugar diabetes?	Has a doctor or other health care provider ever told you that you had or have: Diabetes?	Has a doctor EVER told you that you have diabetes (not borderline)?	Has a doctor ever told you that you had any of the following conditions or diseases: Diabetes	Has a doctor or other health care provider ever told you that you had or have: Diabetes?	Has a doctor or other health care provider ever told you that you had or have: Diabetes?	Has a doctor or other health care provider ever told you that you had or have: Diabetes?
	<i>Response</i>	Yes, no, don't know, refused	Yes, No	Yes, No	Never told, 1st told during the past year, 1st told more than one year ago	Yes, No	Yes, No	Yes, No

Supplementary Table S10. Characteristics [N (%) or mean± SD] of participants by categories of grip strength

Characteristic	Men			Women		
	Low grip strength (<35.5 kg)	High grip strength (≥35.5 kg)	p-value	Low grip strength (<20 kg)	High grip strength (≥20 kg)	p-value
Age (years)	76.4 ± 5.9	73.8 ± 5.0	<0.001	77.0 ± 5.8	74.8 ± 5.4	<0.001
Weight (kg)	71.8 ± 14.3	81.8 ± 13.1	<0.001	60.0 ± 14.2	65.3 ± 14.5	<0.001
Height (m)	1.7 ± 0.1	1.7 ± 0.1	<0.001	1.5 ± 0.1	1.6 ± 0.1	<0.001
BMI (kg/m <sup>2</sup> )	25.6 ± 4.1	27.0 ± 3.7	<0.001	25.5 ± 5.0	26.6 ± 5.2	<0.001
Maximum grip strength (kg)	29.8 ± 4.3	44.1 ± 6.3	<0.001	16.3 ± 2.5	24.7 ± 4.2	<0.001
Grip strength/BMI	1.2 ± 0.2	1.7 ± 0.3	<0.001	0.7 ± 0.2	1 ± 0.2	<0.001
DXA Appendicular lean mass (ALM) (kg)	20.9 ± 3.5	24.3 ± 3.4	<0.001	14.7 ± 3.1	16.0 ± 3.3	<0.001
DXA ALM/ht <sup>2</sup> (kg/m <sup>2</sup> )	7.43 ± 0.97	8.02 ± 0.91	<0.001	6.22 ± 1.03	6.50 ± 1.13	<0.001
Race						
White	2653 (62.9)	8070 (85.2)	<0.001	610 (39.4)	1357 (37.7)	<0.001
Black	163 (3.9)	417 (4.4)	<0.001	281 (18.1)	895 (24.9)	<0.001
Asian	1366 (32.4)	819 (8.7)	<0.001	658 (42.5)	1344 (37.3)	<0.001
Other	33 (0.8)	163 (1.7)	<0.001	0 (0)	3 (0.1)	<0.001
Walking speed (m/s)	1.04 ± 0.26	1.23 ± 0.25	<0.001	0.87 ± 0.22	0.97 ± 0.23	<0.001
Mortality	1738 (42)	2559 (27.6)	<0.001	495 (33.6)	809 (24.1)	<0.001
Incident Fall*	794 (21.8)	1298 (19)	0.001	331 (23.6)	597 (18.5)	<0.001
Hip Fracture**	176 (4.97)	233 (3.6)	0.001	85 (13.5)	86 (7.2)	<0.001
Incident self-reported mobility limitation***	249 (19.4)	679 (12.3)	<0.001	100 (27.7)	253 (21.4)	0.028
Good or better self-rated health	2842 (68.5)	7644 (81.7)	<0.001	860 (58.1)	2153 (63.8)	<0.001
Pain	1444 (34.9)	2726 (29.2)	<0.001	738 (50.2)	1595 (47.7)	0.118
Use statins	878 (21.5)	2130 (23.2)	0.027	150 (10.1)	416 (12.3)	0.028
Poor cognitive function	777 (19.1)	1112 (12.0)	<0.001	403 (27.4)	815 (24.2)	0.019
Cancer	788 (19.0)	1969 (21.0)	0.006	121 (8.2)	230 (6.8)	0.089
Congestive heart failure	286 (6.9)	500 (5.4)	<0.001	85 (5.7)	143 (4.2)	0.022
COPD	513 (12.4)	831 (8.9)	<0.001	123 (8.3)	211 (6.3)	0.009
Stroke	355 (8.6)	467 (5.0)	<0.001	78 (5.3)	127 (3.8)	0.016
Diabetes	720 (17.3)	947 (10.1)	<0.001	202 (13.7)	433 (12.8)	0.422

Men: low grip strength N=4215, high grip strength, N=9469; Women: low grip strength, N=1549, high grip strength N=3599.

\* limited to 10467 men and 4636 women with incident fall data

\*\* limited to 9995 men and 1825 women from cohorts with incident hip fracture data and BMD.

\*\*\* limited to 6801 men and 1541 women without mobility limitation at the time of grip strength assessment, and participating in cohorts with mobility limitation assessment

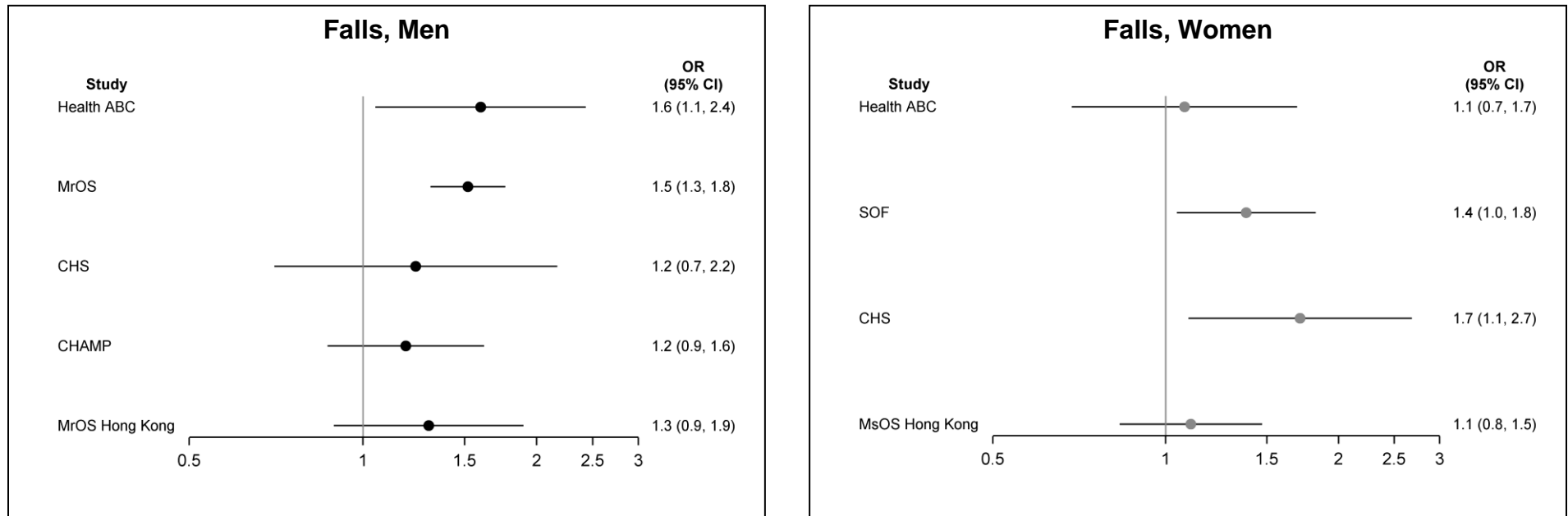
Supplementary Table S11. Association\* of Grip/BMI <1.46 in men and clinical outcomes in the SDOC project

Outcome	OR or HR
Falls	1.18 (1.06, 1.31)
Mobility Limitation	1.50 (1.29, 1.75)
Hip Fractures	1.25 (1.01, 1.55)
Mortality	1.18 (1.10, 1.25)

\*models are adjusted for age, self-rated health, pain, use of statins, cognitive function, cancer, congestive heart failure, stroke, COPD and diabetes. Hip fracture model additionally adjusted for BMD

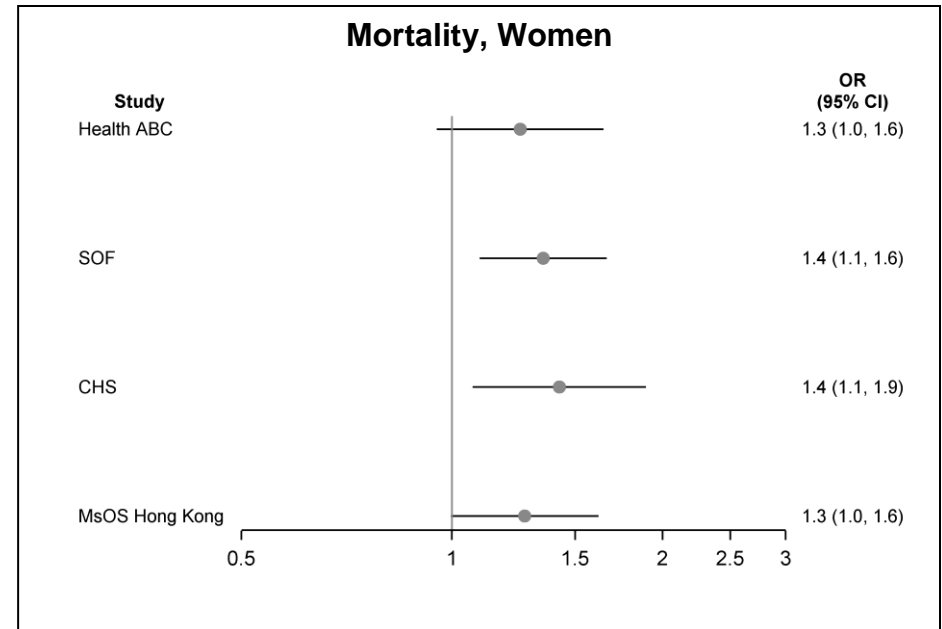
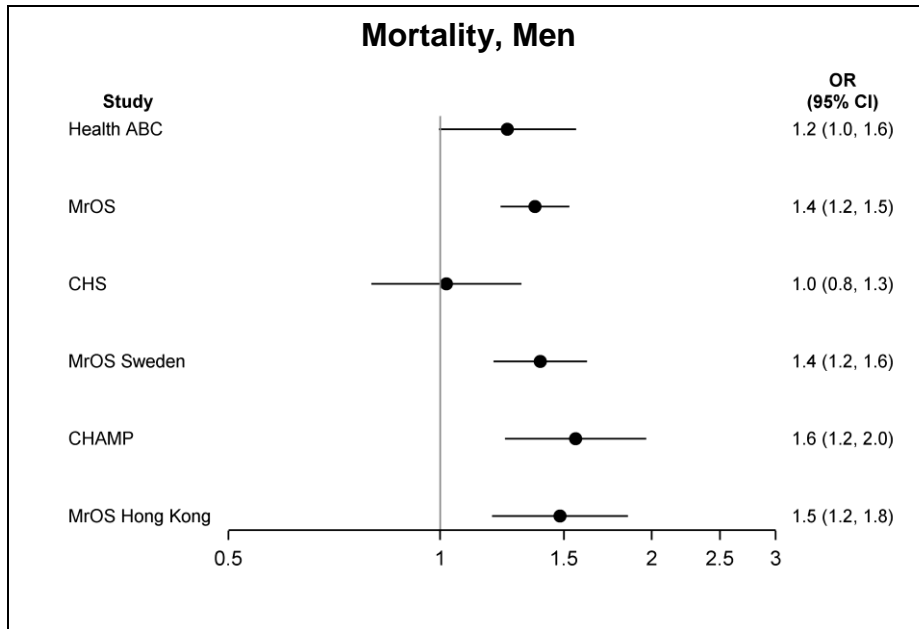


Supplementary Figure S1. Association (odds ratio\*, 95% CI) of grip strength and incident falls for each cohort individually



\*models are adjusted for age, self-rated health, pain, use of statins, cognitive function, cancer, congestive heart failure, stroke, COPD and diabetes

Supplementary Figure S2. Association (hazard ratio, 95% CI) of grip strength and mortality for each cohort individually



\*models are adjusted for age, self-rated health, pain, use of statins, cognitive function, cancer, congestive heart failure, stroke, COPD and diabetes

## Supplementary References

1. Guralnik JM, Ferrucci L, Pieper CF, et al. Lower extremity function and subsequent disability: consistency across studies, predictive models, and value of gait speed alone compared with the short physical performance battery. *The journals of gerontology Series A, Biological sciences and medical sciences*. 2000;55:M221-M231.
2. Teng EL, Chui HC. The modified Mini-Mental State (3MS) Examination. *J Clin Psychiatry*. 1987;48(8):314-317.
3. Folstein MF, Robins LN, Helzer JE. The Mini-Mental State Examination. *Arch Gen Psychiatry*. 1983;40(7):812.