

**SUPPLEMENTARY MATERIALS**

**Supplementary Table S1.** The person-year incidence of type 2 diabetes and time to follow-up for walking pace, grip strength and combined walking pace and grip strength

<b>Exposures</b>	<b>Person-time</b>	<b>Failures</b>	<b>Incident case per 1,000 person-years (95% CI)</b>	<b>Time to follow-up Median (95% CI)</b>
<b>Walking pace</b>				
Brisk	471,196.4	1,130	2.4 (2.3; 2.5)	5.4 (4.8; 6.3)
Average	601,409.4	3,067	5.1 (4.9; 5.3)	5.4 (4.8; 6.3)
Slow	79,085.9	885	11.2 (10.5; 12.0)	5.4 (4.7; 6.3)
<b>Grip strength</b>				
Strong	387,626.2	1,347	3.5 (3.3; 3.7)	5.6 (4.9; 7.0)
Average	365,443.0	1,521	4.2 (4.0; 4.4)	5.4 (4.8; 6.3)
Weak	398,622.4	2,214	5.6 (5.3; 5.8)	5.3 (4.7; 6.0)
<b>Combined walking pace and grip strength</b>				
Brisk/Strong	190,549.1	372	2.0 (1.8; 2.2)	5.6 (4.9; 7.0)
Brisk /Average	153,058.5	373	2.4 (2.2; 2.7)	5.4 (4.8; 6.2)

Brisk /Weak	127,588.8	385	3.0 (2.7; 3.3)	5.3 (4.7; 6.0)
Average/Strong	183,802.3	829	4.5 (4.2; 4.8)	5.6 (4.9; 7.0)
Average /Average	193,312.8	944	4.9 (4.6; 5.2)	5.4 (4.8; 6.3)
Average /Weak	224,294.3	1,294	5.8 (5.5; 6.1)	5.3 (4.7; 6.0)
Slow/Strong	13,274.8	146	11.0 (9.4; 12.9)	5.6 (4.8; 7.0)
Slow /Average	19,071.8	204	10.7 (9.3; 12.3)	5.4 (4.8; 6.6)
Slow /Weak	46,739.3	535	11.4 (10.5; 12.5)	5.3 (4.7; 6.1)
<b>Total</b>	1,151,691.7	5,082	4.4 (4.3; 4.5)	

Data is presented as cases per 1,000 person-years for type 2 diabetes incident rate and median with 95% CI for time for follow-up. The analysis was adjusted for age, sex, ethnicity, deprivation index, smoking, fruit and vegetable intake, red meat intake, processed meat intake, alcohol intake, total sedentary time, sleep time, multimorbidity and body mass index. The analysis was conducted using 2-years landmark analyses and excluding participants with prevalent diabetes or unknown diabetes at baseline.

**Supplementary Table S2.** Cohort characteristics of participants by combined walking pace and grip strength in women

Cohort characteristics	Overall	Brisk			Average			Slow		
		Strong	Average	Weak	Strong	Average	Weak	Strong	Average	Weak
Total participants, n (%)	115,139 (100.0)	18,135 (15.8)	14,936 (13.0)	13,027 (11.3)	17,399 (15.1)	19,215 (16.7)	23,963 (20.8)	1,286 (1.1)	1,932 (1.7)	5,246 (4.6)
Age, years (mean, SD)	56.2 ± 8.0	52.2 ± 7.6	55.8 ± 7.7	58.3 ± 7.3	53.4 ± 7.9	57.0 ± 7.7	59.2 ± 7.2	55.0 ± 7.9	57.6 ± 7.5	59.1 ± 7.2
<b>Deprivation Index, n (%)</b>										
Lower deprivation	39,042 (33.9)	6,793 (37.5)	5,449 (36.5)	4,468 (34.3)	6,077 (34.9)	6,660 (34.7)	7,588 (31.7)	338 (26.3)	501 (25.9)	1,168 (22.3)
Middle deprivation	39,764 (34.5)	6,320 (34.9)	5,256 (35.2)	4,561 (35.0)	6,048 (34.8)	6,682 (34.8)	8,282 (34.6)	421 (32.7)	610 (31.6)	1,584 (30.2)
Higher deprivation	36,333 (31.6)	5,022 (27.7)	4,231 (28.3)	3,998 (30.7)	5,274 (30.3)	5,873 (30.6)	8,093 (33.8)	527 (41.0)	821 (42.5)	2,494 (47.5)
<b>Ethnicity, n (%)</b>										
White	110,689 (96.1)	17,671 (97.4)	14,545 (97.4)	12,596 (96.7)	16,759 (96.3)	18,515 (96.4)	22,802 (95.2)	1,206 (93.8)	1,796 (93.0)	4,799 (91.5)
South Asian	1,418 (1.2)	212 (1.2)	157 (1.1)	140 (1.1)	209 (1.2)	228 (1.2)	284 (1.2)	22 (1.7)	41 (2.1)	125 (2.4)
Mixed	1,582 (1.4)	68 (0.4)	108 (0.7)	171 (1.3)	116 (0.7)	222 (1.2)	608 (2.5)	13 (1.0)	48 (2.5)	228 (4.4)
Black	1,135 (1.0)	164 (0.9)	99 (0.7)	91 (0.7)	267 (1.5)	191 (1.0)	178 (0.7)	35 (2.7)	38 (2.0)	72 (1.4)
Chinese	315 (0.3)	20 (0.1)	27 (0.2)	29 (0.2)	48 (0.3)	59 (0.3)	91 (0.4)	10 (0.8)	9 (0.5)	22 (0.4)
<b>Lifestyles</b>										
<b>Smoking status, n (%)</b>										
Never	68,999 (59.9)	11,210 (61.8)	9,162 (61.3)	7,899 (60.6)	10,286 (59.1)	11,424 (59.5)	14,548 (60.7)	652 (50.7)	1,020 (52.8)	2,798 (53.3)
Previous	35,933 (31.2)	5,395 (29.8)	4,719 (31.6)	4,196 (32.2)	5,390 (31.0)	6,069 (31.6)	7,415 (30.9)	438 (34.1)	616 (31.9)	1,695 (32.3)
Current	10,207 (8.9)	1,530 (8.4)	1,055 (7.1)	932 (7.2)	1,723 (9.9)	1,722 (9.0)	2,000 (8.4)	196 (15.2)	296 (15.3)	753 (14.4)
<b>Alcohol intake, n (%)</b>										
Daily or almost daily	18,419 (16.0)	3,299 (18.2)	2,785 (18.7)	2,372 (18.2)	2,805 (16.1)	2,938 (15.3)	3,328 (13.9)	156 (12.1)	232 (12.0)	504 (9.6)



Body mass index (BMI), kg/m <sup>2</sup> (mean, SD)	26.9 ± 5.0	25.2 ± 3.9	25.0 ± 3.7	25.1 ± 3.8	27.9 ± 5.1	27.6 ± 4.8	27.6 ± 4.8	32.3 ± 7.4	31.5 ± 6.7	30.9 ± 6.6
<b>BMI category, n (%)</b>										
Underweight (<18.5 kg/m <sup>2</sup> )	837 (0.7)	148 (0.8)	162 (1.1)	179 (1.4)	67 (0.4)	81 (0.4)	154 (0.6)	1 (0.1)	9 (0.5)	36 (0.7)
Normal weight (18.5-24.9 kg/m <sup>2</sup> )	45,283 (39.3)	9,722 (53.6)	8,094 (54.2)	6,923 (53.1)	,5420 (31.2)	6,166 (32.1)	7,533 (31.4)	188 (14.6)	295 (15.3)	942 (18.0)
Overweight (25.0-29.9 kg/m <sup>2</sup> )	43,286 (37.6)	6,233 (34.4)	5,278 (35.3)	4,535 (34.8)	6,875 (39.5)	7,889 (41.1)	9,962 (41.6)	366 (28.5)	569 (29.5)	1,579 (30.1)
Obese (≥30.0 kg/m <sup>2</sup> )	25,733 (22.4)	2,032 (11.2)	1,402 (9.4)	1,390 (10.7)	5,037 (29.0)	5,079 (26.4)	6,314 (26.4)	731 (56.8)	1,059 (54.8)	2,689 (51.3)

Data is presented as mean and standard deviation (SD) for continuous variables and as frequency and % for categorical variables.

**Supplementary Table S3.** Cohort characteristics of participants by combined walking pace and grip strength in men

Cohort characteristics	Overall	Brisk			Average			Slow		
		Strong	Average	Weak	Strong	Average	Weak	Strong	Average	Weak
Total participants, n (%)	90,599 (100.0)	14,803 (16.3)	12,474 (13.8)	10,323 (11.4)	14,537 (16.0)	15,338 (16.9)	17,223 (19.0)	1,054 (1.2)	1,486 (1.6)	3,361 (3.7)
Age, years (mean, SD)	56.5 ± 8.2	53.1 ± 7.9	56.0 ± 8.0	57.7 ± 8.0	54.3 ± 8.0	57.4 ± 7.9	59.3 ± 7.7	55.9 ± 8.0	59.4 ± 7.3	60.1 ± 7.2
<b>Deprivation Index, n (%)</b>										
Lower deprivation	31,241 (34.5)	5,926 (40.0)	4,594 (36.8)	3,492 (33.8)	5,322 (36.6)	5,426 (35.4)	5,192 (30.2)	287 (27.2)	381 (25.6)	621 (18.5)
Middle deprivation	30,737 (33.9)	5,117 (34.6)	4,367 (35.0)	3,520 (34.1)	5,079 (34.9)	5,255 (34.3)	5,768 (33.5)	303 (28.8)	425 (28.6)	903 (26.9)
Higher deprivation	28,621 (31.6)	3,760 (25.4)	3,513 (28.2)	3,311 (32.1)	4,136 (28.5)	4,657 (30.4)	6,263 (36.4)	464 (44.0)	680 (45.8)	1837 (54.7)
<b>Ethnicity, n (%)</b>										
White	87,051 (96.1)	14,508 (98.0)	12,216 (97.9)	9,976 (96.6)	14,006 (96.4)	14,753 (96.2)	16,120 (93.6)	981 (93.1)	1,406 (94.6)	3,085 (91.8)
South Asian	891 (1.0)	120 (0.8)	88 (0.7)	99 (1.0)	148 (1.0)	122 (0.8)	215 (1.3)	20 (1.9)	24 (1.6)	55 (1.6)
Mixed	1,684 (1.9)	75 (0.5)	104 (0.8)	176 (1.7)	136 (0.9)	285 (1.9)	672 (3.9)	28 (2.7)	33 (2.2)	175 (5.2)
Black	795 (0.9)	92 (0.6)	47 (0.4)	55 (0.5)	221 (1.5)	143 (0.9)	161 (0.9)	25 (2.4)	19 (1.3)	32 (1.0)
Chinese	178 (0.2)	8 (0.1)	19 (0.2)	17 (0.2)	26 (0.2)	35 (0.2)	55 (0.3)	0 (0.0)	4 (0.3)	14 (0.4)
<b>Lifestyles</b>										
<b>Smoking status, n (%)</b>										
Never	45,643 (50.4)	8,399 (56.7)	6,801 (54.5)	5,642 (54.7)	7,181 (49.4)	7,358 (48.0)	8,243 (47.9)	402 (38.1)	501 (33.7)	1,116 (33.2)
Previous	34,052 (37.6)	4,950 (33.4)	4,450 (35.7)	3,723 (36.1)	5,479 (37.7)	6,041 (39.4)	6,788 (39.4)	435 (41.3)	696 (46.8)	1,490 (44.3)
Current	10,904 (12.0)	1,454 (9.8)	1,223 (9.8)	958 (9.3)	1,877 (12.9)	1,939 (12.6)	2,192 (12.7)	217 (20.6)	289 (19.5)	755 (22.5)
<b>Alcohol intake, n (%)</b>										
Daily or almost daily	23,091 (25.5)	3,838 (25.9)	3,505 (28.1)	2,816 (27.3)	3,527 (24.3)	3,890 (25.4)	4,251 (24.7)	233 (22.1)	317 (21.3)	714 (21.2)
3-4 times a week	24,759 (27.3)	4,577 (30.9)	3,660 (29.3)	2,917 (28.3)	3,971 (27.3)	4,115 (26.8)	4,390 (25.5)	211 (20.0)	322 (21.7)	596 (17.7)

Once or twice a week	23,886 (26.4)	3,901 (26.4)	,3186 (25.5)	2,476 (24.0)	4,157 (28.6)	4,157 (27.1)	4,520 (26.2)	295 (28.0)	371 (25)	823 (24.5)
1-3 times a month	7,884 (8.7)	1,268 (8.6)	1,010 (8.1)	871 (8.4)	1,360 (9.4)	1,352 (8.8)	1,485 (8.6)	84 (8.0)	140 (9.4)	314 (9.3)
Special occasions only	5,953 (6.6)	726 (4.9)	613 (4.9)	647 (6.3)	919 (6.3)	1,011 (6.6)	1,314 (7.6)	118 (11.2)	176 (11.8)	429 (12.8)
Never	5,026 (5.6)	493 (3.3)	500 (4.0)	596 (5.8)	603 (4.2)	813 (5.3)	1,263 (7.3)	113 (10.7)	160 (10.8)	485 (14.4)
<b>Sleep categories, n (%)</b>										
Normal (7-9 h per day)	67,015 (74)	11,273 (76.2)	9,480 (76.0)	7,716 (74.8)	10,871 (74.8)	11,497 (75)	12,584 (73.1)	660 (62.6)	949 (63.9)	1985 (59.1)
Short sleep (<7 h per day)	22,258 (24.6)	3,454 (23.3)	2,889 (23.2)	2,508 (24.3)	3,510 (24.2)	3,648 (23.8)	4,335 (25.2)	342 (32.5)	456 (30.7)	1116 (33.2)
Long sleep (>9 h per day)	1,326 (1.5)	76 (0.5)	105 (0.8)	99 (1.0)	156 (1.1)	193 (1.3)	304 (1.8)	52 (4.9)	81 (5.5)	260 (7.7)
<b>Total Sedentary time, n (%)</b>										
Low (0-4 hrs/day)	34,732 (38.3)	6,293 (42.5)	5,387 (43.2)	4,616 (44.7)	4,965 (34.2)	5,397 (35.2)	6,306 (36.6)	281 (26.7)	424 (28.5)	1,063 (31.6)
Middle (5-6 hrs/day)	32,144 (35.5)	5,095 (34.4)	4,303 (34.5)	3,555 (34.4)	5,361 (36.9)	5,669 (37.0)	6,260 (36.4)	354 (33.6)	491 (33.0)	1,056 (31.4)
High (7-20 hrs/day)	23,723 (26.2)	3,415 (23.1)	2,784 (22.3)	2,152 (20.9)	4,211 (29.0)	4,272 (27.9)	4,657 (27.0)	419 (39.8)	571 (38.4)	1,242 (37.0)
<b>Diet and physical activity</b>										
Fruit and vegetable intake, g/day (mean, SD)	299.3 ± 192.3	314.1 ± 191.6	318.0 ± 192.3	313.1 ± 188.6	287.4 ± 181.8	288.3 ± 183.6	292.1 ± 201.2	279.2 ± 203.0	284.1 ± 208.9	274.5 ± 216.5
Red meat intake, portion/week (mean, SD)	2.3 ± 1.5	2.2 ± 1.4	2.2 ± 1.4	2.2 ± 1.5	2.3 ± 1.5	2.3 ± 1.4	2.3 ± 1.5	2.4 ± 1.7	2.4 ± 1.6	2.3 ± 1.6
Process meat intake, portion/week (mean, SD)	2.2 ± 1.0	2.1 ± 1.0	2.1 ± 1.1	2.1 ± 1.1	2.2 ± 1.0	2.2 ± 1.0	2.2 ± 1.0	2.4 ± 1.1	2.3 ± 1.0	2.3 ± 1.1
Handgrip, kg (mean, SD)	39.9 ± 8.8	49.4 ± 4.9	40.0 ± 1.9	31.3 ± 4.3	49.2 ± 4.7	39.9 ± 1.9	30.7 ± 4.7	48.6 ± 4.5	39.7 ± 1.9	27.5 ± 7
<b>Adiposity</b>										
Body mass index (BMI), kg/m <sup>2</sup> (mean, SD)	27.6 ± 4.0	27.0 ± 3.3	26.5 ± 3.4	26.2 ± 3.5	28.6 ± 4.0	28.0 ± 4.0	27.8 ± 4.1	30.5 ± 5.3	29.9 ± 5.0	29.3 ± 5.4

<b>BMI category, n (%)</b>										
Underweight (<18.5 kg/m <sup>2</sup> )	206 (0.23)	9 (0.1)	33 (0.3)	47 (0.5)	8 (0.1)	17 (0.1)	64 (0.4)	1 (0.1)	0 (0.0)	27 (0.8)
Normal weight (18.5-24.9 kg/m <sup>2</sup> )	23,385 (25.8)	4,159 (28.1)	4,355 (34.9)	3,957 (38.3)	2,450 (16.9)	3,364 (21.9)	4,107 (23.9)	123 (11.7)	221 (14.9)	649 (19.3)
Overweight (25.0-29.9 kg/m <sup>2</sup> )	45,811 (50.6)	8,053 (54.4)	6,354 (50.9)	4,960 (48.1)	7,580 (52.1)	7,911 (51.6)	8,558 (49.7)	447 (42.4)	606 (40.8)	1342 (39.9)
Obese (≥30.0 kg/m <sup>2</sup> )	21,197 (23.4)	2,582 (17.4)	1,732 (13.9)	1,359 (13.2)	4,499 (31.0)	4,046 (26.4)	4,494 (26.1)	483 (45.8)	659 (44.4)	1343 (40.0)

Data is presented as mean and standard deviation (SD) for continuous variables and as frequency and % for categorical variables.

**Supplementary Table S4.** Association between walking pace and type 2 diabetes incidence

Walking pace category	Event	Average pace	Slow pace
		HR (95% CI)	HR (95% CI)
<b><u>Overall</u></b>	5,082		
Model 1		1.97 (1.84; 2.11)**	3.80 (3.47; 4.16)**
Model 2		1.72 (1.61; 1.85)**	2.57 (2.34; 2.83)**
<b><u>Women</u></b>	2,159		
Model 1		2.15 (1.92; 2.40)**	4.64 (4.05; 5.32)**
Model 2		1.83 (1.63; 2.04)**	3.00 (2.60; 3.46)**
<b><u>Men</u></b>	2,923		
Model 1		1.87 (1.71; 2.04)**	3.27 (2.89; 3.7)**
Model 2		1.67 (1.52; 1.82)**	2.28 (2.01; 2.59)**

\*p-value <0.05

\*\*p-value <0.0001

Data is presented as hazard ratio (HR) and 95% CI. Brisk walking pace was the reference group (HR=1.00). Model 1 (minimally adjusted model) was adjusted for age, sex, deprivation index and ethnicity. Model 2 (lifestyle model) was adjusted for all variables in model 1 plus, fruit and vegetable intake, red meat intake, processed meat intake, smoking status, alcohol intake, total sedentary time, sleep time and multimorbidity. All analyses were conducted using 2-years landmark analyses and excluding participants with prevalent diabetes or unknown diabetes at baseline.

**Supplementary Table S5.** Association between grip strength and type 2 diabetes incidence

Grip strength tertiles	Event	Average	Weak
		HR (95% CI)	HR (95% CI)
<b><u>Overall</u></b>	5,082		
Model 1		1.07 (1.00; 1.16)	1.30 (1.21; 1.40)**
Model 2		1.04 (0.97; 1.12)	1.18 (1.09; 1.26)**
<b><u>Women</u></b>	2,159		
Model 1		1.15 (1.02; 1.29)*	1.34 (1.20; 1.50)**
Model 2		1.09 (0.97; 1.22)	1.15 (1.03; 1.29)*
<b><u>Men</u></b>	2,923		
Model 1		1.03 (0.93; 1.13)	1.28 (1.17; 1.41)
Model 2		1.01 (0.92; 1.11)**	1.20 (1.09; 1.31)**

\*p-value <0.05

\*\*p-value <0.0001

Data is presented as hazard ratio (HR) and 95% CI. Strong grip strength was the reference group (HR=1.00). Grip strength was sex-specific values. Model 1 (minimally adjusted model) was adjusted for age, sex, deprivation index and ethnicity. Model 2 (lifestyle model) was adjusted for all variables in model 1 plus, fruit and vegetable intake, red meat intake, processed meat intake, smoking status, alcohol intake, total sedentary time, sleep time and multimorbidity. All analyses were conducted using 2-years landmark analyses and excluding participants with prevalent diabetes or unknown diabetes at baseline.

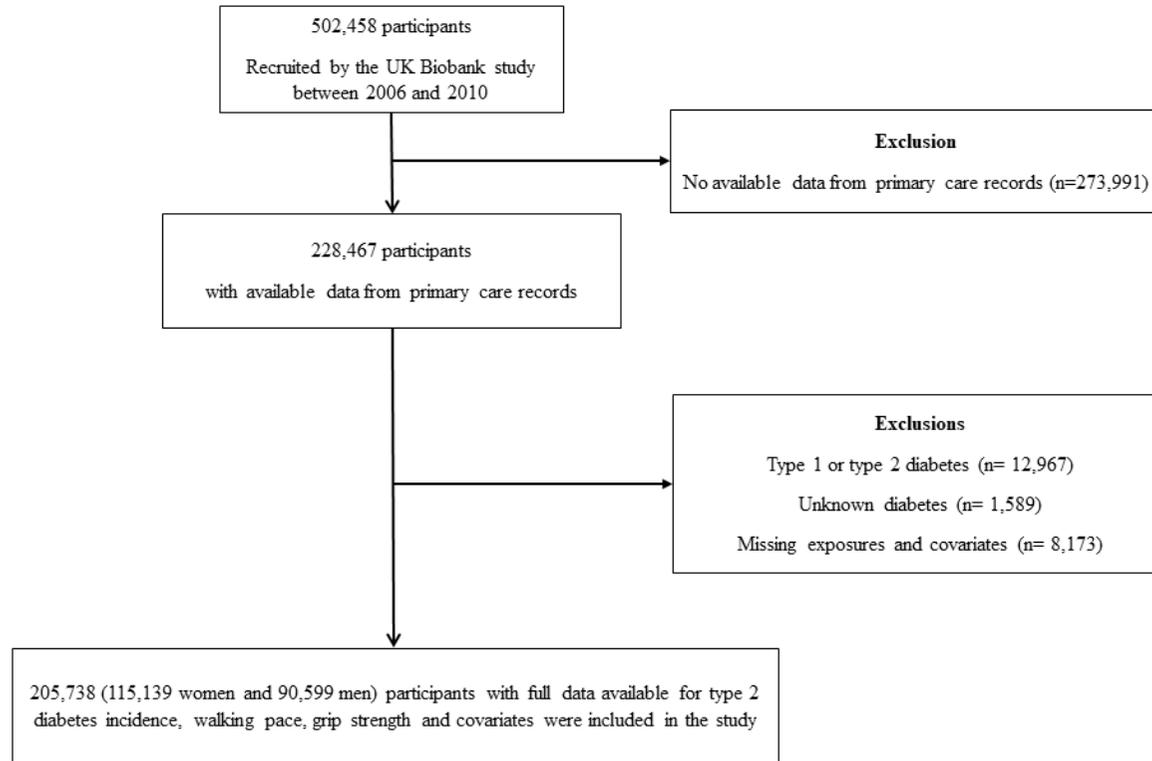
**Supplementary Table S6.** Combined association of walking pace and grip strength with type 2 diabetes incidence

Walking pace categories	Grip strength tertiles	Model 1		Model 2	
		HR (95% CI)	p-value	HR (95% CI)	p-value
<b><u>Overall</u></b>					
Brisk	Strong	1.00 (Ref.)		1.00 (Ref.)	
	Average	1.14 (0.99; 1.31)	0.078	1.12 (0.97; 1.30)	0.120
	Weak	1.33 (1.15; 1.53)	<0.0001	1.26 (1.09; 1.45)	0.002
Average	Strong	2.16 (1.91; 2.44)	<0.0001	1.9 (1.68; 2.15)	<0.0001
	Average	2.17 (1.92; 2.45)	<0.0001	1.87 (1.66; 2.12)	<0.0001
	Weak	2.40 (2.13; 2.70)	<0.0001	2.00 (1.77; 2.25)	<0.0001
Slow	Strong	4.64 (3.83; 5.62)	<0.0001	3.18 (2.62; 3.86)	<0.0001
	Average	4.24 (3.57; 5.04)	<0.0001	2.88 (2.42; 3.43)	<0.0001
	Weak	4.37 (3.81; 5.01)	<0.0001	2.83 (2.46; 3.26)	<0.0001
<b><u>Women</u></b>					
Brisk	Strong	1.00 (Ref.)		1.00 (Ref.)	
	Average	1.27 (0.99; 1.61)	0.055	1.23 (0.96; 1.56)	0.095

	Weak	1.48 (1.17; 1.88)	0.001	1.36 (1.07; 1.73)	0.011
Average	Strong	2.62 (2.13; 3.21)	<0.0001	2.25 (1.83; 2.76)	<0.0001
	Average	2.66 (2.17; 3.26)	<0.0001	2.20 (1.79; 2.70)	<0.0001
	Weak	2.69 (2.20; 3.28)	<0.0001	2.12 (1.73; 2.59)	<0.0001
Slow	Strong	5.70 (4.20; 7.73)	<0.0001	3.62 (2.66; 4.93)	<0.0001
	Average	5.93 (4.56; 7.72)	<0.0001	3.88 (2.98; 5.07)	<0.0001
	Weak	5.71 (4.60; 7.09)	<0.0001	3.46 (2.78; 4.32)	<0.0001
<b><u>Men</u></b>					
Brisk	Strong	1.00 (Ref.)		1.00 (Ref.)	
	Average	1.07 (0.90; 1.28)	0.450	1.07 (0.89; 1.28)	0.482
	Weak	1.25 (1.04; 1.50)	0.017	1.21 (1.01; 1.45)	0.036
Average	Strong	1.92 (1.65; 2.24)	<0.0001	1.72 (1.48; 2.01)	<0.0001
	Average	1.92 (1.65; 2.23)	<0.0001	1.71 (1.46; 1.99)	<0.0001
	Weak	2.27 (1.96; 2.63)	<0.0001	1.97 (1.70; 2.29)	<0.0001
Slow	Strong	4.11 (3.21; 5.28)	<0.0001	2.96 (2.30; 3.80)	<0.0001
	Average	3.34 (2.64; 4.23)	<0.0001	2.33 (1.83; 2.95)	<0.0001

	Weak	3.60 (3; 4.31)	<0.0001	2.44 (2.03; 2.94)	<0.0001
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Data is presented as HRs and their 95% CI. Brisk walkers with strong grip strength were used as a reference group (HR = 1.00). Model 1 (minimally adjusted model) was adjusted for age, sex, deprivation index and ethnicity. Model 2 (lifestyle model) was adjusted for all variables in model 1 plus, fruit and vegetable intake, red meat intake, processed meat intake, smoking status, alcohol intake, total sedentary time, sleep time and multimorbidity. All analyses were conducted using 2-years landmark analyses and excluding participants with prevalent diabetes or unknown diabetes at baseline.



1

2 **Supplementary Figure S1.** Flowchart of participants throughout the study