**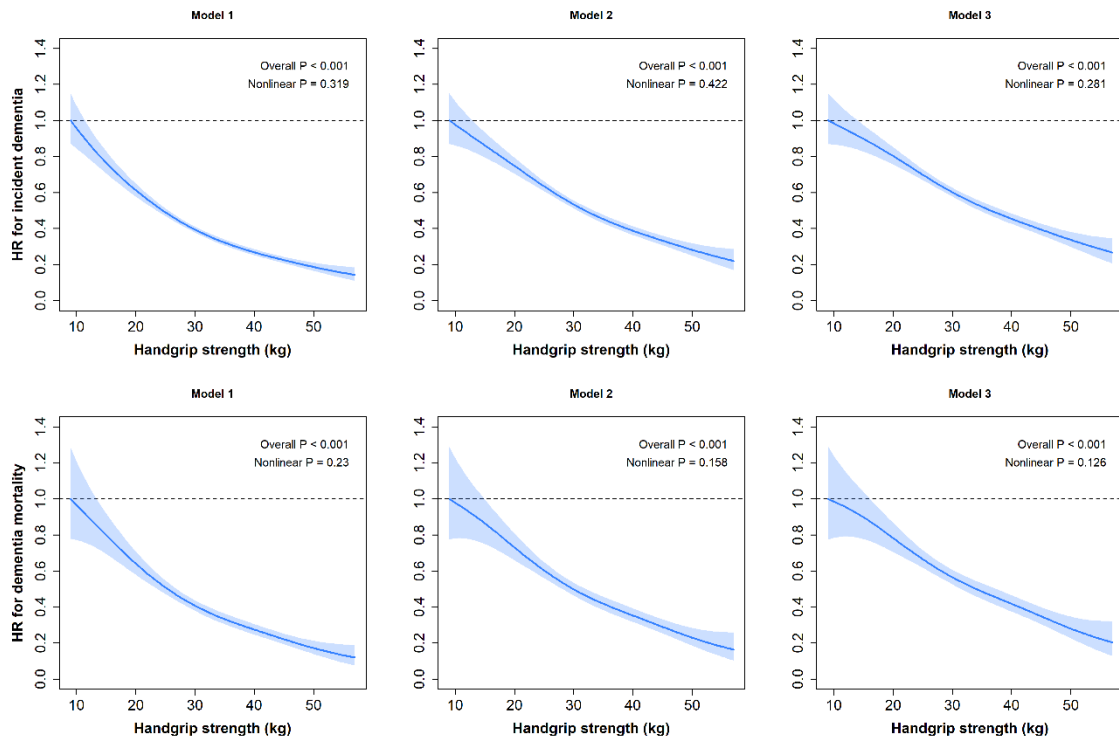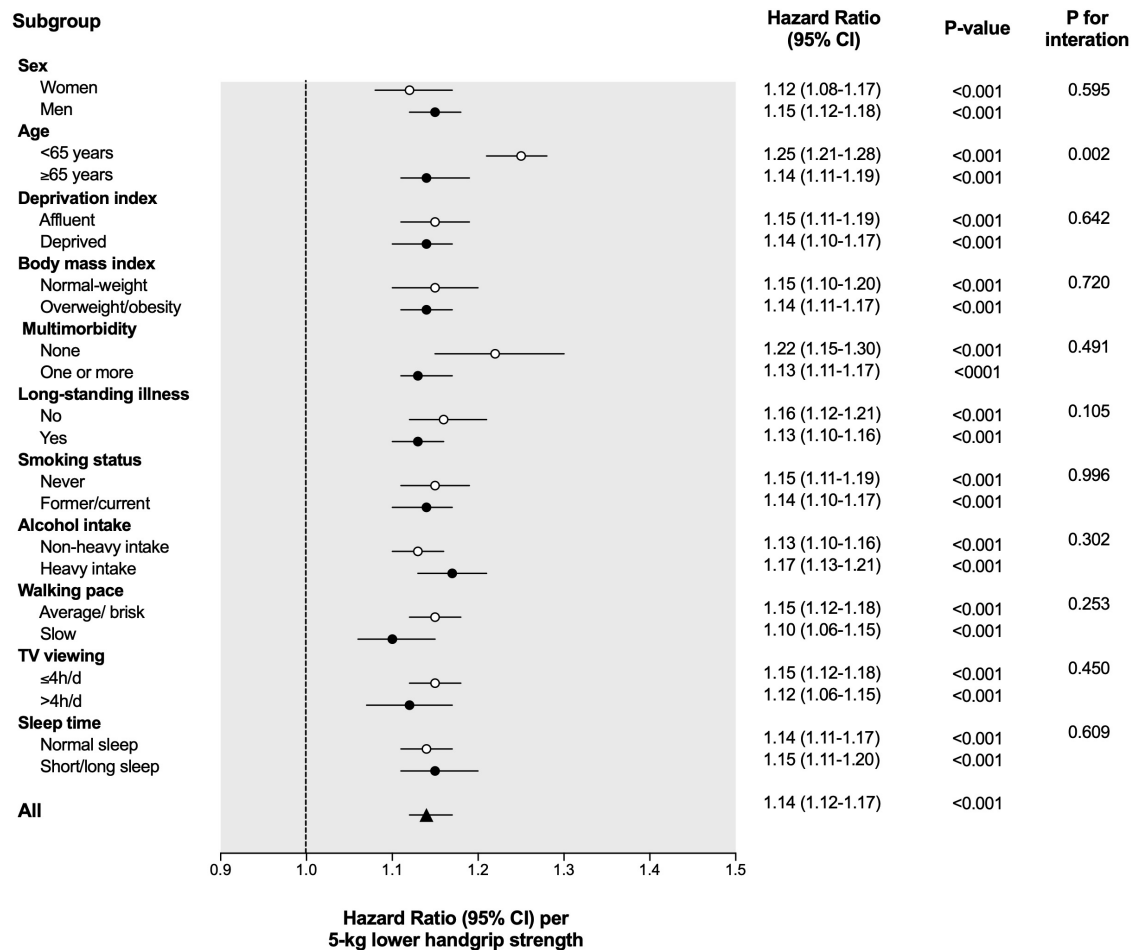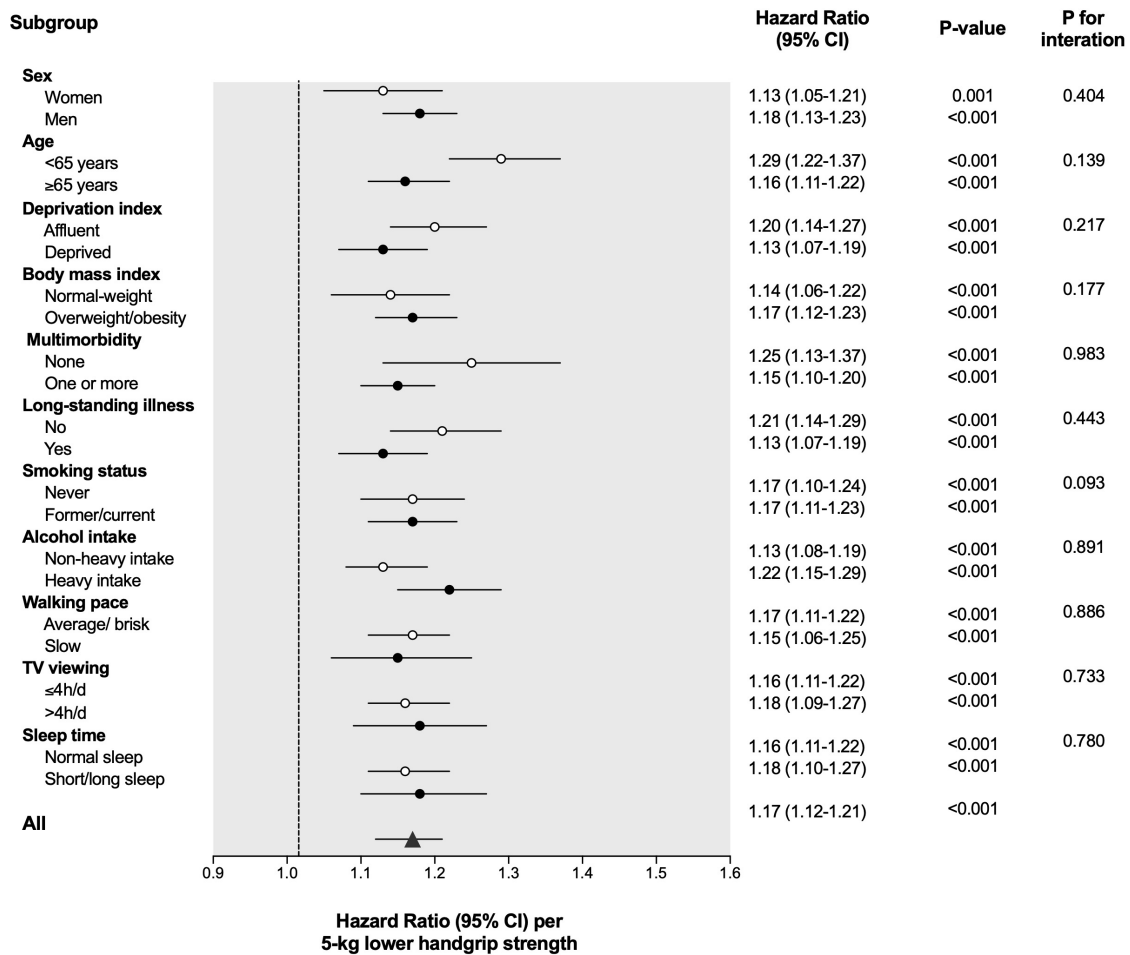Appendix Figure S1.** Association of handgrip strength with all-cause dementia incidence (top graphs) and mortality (bottom graphs) with a 4-years landmark analyses.

Data is presented as hazard ratios and their 95% CI. Handgrip strength was expressed in absolute terms. Model 1 was adjusted for age, sex, ethnicity and deprivation index. Model 2 was additionally adjusted for health-related factors including body mass index categories, multimorbidity (prevalent diabetes, hypertension, CVD and cancer) as well as long-standing illness. Model 3 was additionally adjusted by lifestyle behaviors including walking pace, sleep duration, watching TV, smoking and dietary intake (alcohol, fruits and vegetables, red meat, processed meat and oily fish intake).

| Subgroup | | Hazard Ratio (95% CI) | P-value | P for interation |
|---|---|---|---|---|
| **Sex** | | | | |
| Women | | 1.12 (1.08-1.17) | <0.001 | 0.595 |
| Men | | 1.15 (1.12-1.18) | <0.001 | |
| **Age** | | | | |
| <65 years | | 1.25 (1.21-1.28) | <0.001 | 0.002 |
| ≥65 years | | 1.14 (1.11-1.19) | <0.001 | |
| **Deprivation index** | | | | |
| Affluent | | 1.15 (1.11-1.19) | <0.001 | 0.642 |
| Deprived | | 1.14 (1.10-1.17) | <0.001 | |
| **Body mass index** | | | | |
| Normal-weight | | 1.15 (1.10-1.20) | <0.001 | 0.720 |
| Overweight/obesity | | 1.14 (1.11-1.17) | <0.001 | |
| **Multimorbidity** | | | | |
| None | | 1.22 (1.15-1.30) | <0.001 | 0.491 |
| One or more | | 1.13 (1.11-1.17) | <0001 | |
| **Long-standing illness** | | | | |
| No | | 1.16 (1.12-1.21) | <0.001 | 0.105 |
| Yes | | 1.13 (1.10-1.16) | <0.001 | |
| **Smoking status** | | | | |
| Never | | 1.15 (1.11-1.19) | <0.001 | 0.996 |
| Former/current | | 1.14 (1.10-1.17) | <0.001 | |
| **Alcohol intake** | | | | |
| Non-heavy intake | | 1.13 (1.10-1.16) | <0.001 | 0.302 |
| Heavy intake | | 1.17 (1.13-1.21) | <0.001 | |
| **Walking pace** | | | | |
| Average/ brisk | | 1.15 (1.12-1.18) | <0.001 | 0.253 |
| Slow | | 1.10 (1.06-1.15) | <0.001 | |
| **TV viewing** | | | | |
| ≤4h/d | | 1.15 (1.12-1.18) | <0.001 | 0.450 |
| >4h/d | | 1.12 (1.06-1.15) | <0.001 | |
| **Sleep time** | | | | |
| Normal sleep | | 1.14 (1.11-1.17) | <0.001 | 0.609 |
| Short/long sleep | | 1.15 (1.11-1.20) | <0.001 | |
| **All** | | 1.14 (1.12-1.17) | <0.001 | |

Hazard Ratio (95% CI) per
5-kg lower handgrip strength

(x-axis: 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5)

**Appendix Figure S2.** Association between 5-kg lower handgrip strength and incident dementia by sociodemographic, health-related and lifestyle factors.

Data is presented as hazard ratios and 95% CI. All analyses were conducted using a 2-years landmark. Model was adjusted for age, sex, ethnicity, deprivation index, body mass index categories, multimorbidity (prevalent diabetes, hypertension, CVD and cancer) as well as long-standing illness, walking pace, sleep duration, watching TV, smoking and dietary intake (alcohol, fruits and vegetables, red meat, processed meat and oily fish intake), excluding the appropriated grouping variable. Non-heavy intake was defined as drinking alcohol less than twice or one time a week; normal sleep was defined as sleeping 7-9hour/day.

| Subgroup | Hazard Ratio (95% CI) | P-value | P for interaction |
|---|---|---|---|
| **Sex** | | | |
| Women | 1.13 (1.05-1.21) | 0.001 | 0.404 |
| Men | 1.18 (1.13-1.23) | <0.001 | |
| **Age** | | | |
| <65 years | 1.29 (1.22-1.37) | <0.001 | 0.139 |
| ≥65 years | 1.16 (1.11-1.22) | <0.001 | |
| **Deprivation index** | | | |
| Affluent | 1.20 (1.14-1.27) | <0.001 | 0.217 |
| Deprived | 1.13 (1.07-1.19) | <0.001 | |
| **Body mass index** | | | |
| Normal-weight | 1.14 (1.06-1.22) | <0.001 | 0.177 |
| Overweight/obesity | 1.17 (1.12-1.23) | <0.001 | |
| **Multimorbidity** | | | |
| None | 1.25 (1.13-1.37) | <0.001 | 0.983 |
| One or more | 1.15 (1.10-1.20) | <0.001 | |
| **Long-standing illness** | | | |
| No | 1.21 (1.14-1.29) | <0.001 | 0.443 |
| Yes | 1.13 (1.07-1.19) | <0.001 | |
| **Smoking status** | | | |
| Never | 1.17 (1.10-1.24) | <0.001 | 0.093 |
| Former/current | 1.17 (1.11-1.23) | <0.001 | |
| **Alcohol intake** | | | |
| Non-heavy intake | 1.13 (1.08-1.19) | <0.001 | 0.891 |
| Heavy intake | 1.22 (1.15-1.29) | <0.001 | |
| **Walking pace** | | | |
| Average/ brisk | 1.17 (1.11-1.22) | <0.001 | 0.886 |
| Slow | 1.15 (1.06-1.25) | <0.001 | |
| **TV viewing** | | | |
| ≤4h/d | 1.16 (1.11-1.22) | <0.001 | 0.733 |
| >4h/d | 1.18 (1.09-1.27) | <0.001 | |
| **Sleep time** | | | |
| Normal sleep | 1.16 (1.11-1.22) | <0.001 | 0.780 |
| Short/long sleep | 1.18 (1.10-1.27) | <0.001 | |
| **All** | 1.17 (1.12-1.21) | <0.001 | |

Hazard Ratio (95% CI) per
5-kg lower handgrip strength

**Appendix Figure S3.** Association between 5-kg lower handgrip strength and dementia mortality by sociodemographic, health-related and lifestyle factors.

Data is presented as hazard ratios and 95% CI. All analyses were conducted using a 2-years landmark. Model was adjusted for age, sex, ethnicity, deprivation index, body mass index categories, multimorbidity (prevalent diabetes, hypertension, CVD and cancer) as well as long-standing illness, walking pace, sleep duration, watching TV, smoking and dietary intake (alcohol, fruits and vegetables, red meat, processed meat and oily fish intake), excluding the appropriated grouping variable. Non-heavy intake was defined as drinking alcohol less than twice or one time a week; normal sleep was defined as sleeping 7-9hour/day.

**Appendix Table S1.** Associations of handgrip strength with incidence and mortality from Alzheimer's and Vascular Dementia.

| | | Alzheimer incidence | | |
|---|---|---|---|---|
| | | Model 1 | Model 2 | Model 3 |
| Quintiles of grip strength | n/events | HR (95% CI) | HR (95% CI) | HR (95% CI) |
| Q5 (highest) | 90145/211 | Ref. | Ref. | Ref. |
| Q4 | 87830/257 | 1.22 (1.02; 1.46) | 1.20 (1.00; 1.43) | 1.18 (0.98;1.42) |
| Q3 | 92957/362 | 1.44 (1.21; 1.70) | 1.39 (1.17; 1.64) | 1.37 (1.15; 1.62) |
| Q2 | 99096/408 | 1.60 (1.35; 1.88) | 1.50 (1.27; 1.78) | 1.47 (1.25; 1.74) |
| Q1 (lowest) | 96679/546 | 2.12 (1.81; 2.49) | 1.89 (1.61; 2.22) | 1.81 (1.54; 2.13) |
| Quintile change | 466707/1784 | 1.20 (1.16; 1.24) | 1.16 (1.12; 1.20) | 1.15 (1.11; 1.19) |
| *P* for trend | | <0.001 | <0.001 | <0.001 |
| HR per 5kg lower handgrip strength | 466707/1784 | 1.20 (1.16-1.24) | 1.16 (1.12-1.20) | 1.14 (1.11-1.18) |
| | | Alzheimer mortality | | |
| | | Model 1 | Model 2 | Model 3 |
| Quintiles of handgrip | n/events | HR (95% CI) | HR (95% CI) | HR (95% CI) |
| Q5 (highest) | 90148/67 | Ref. | Ref. | Ref. |
| Q4 | 87841/87 | 1.37 (0.99; 1.88) | 1.34 (0.98; 1.85) | 1.33 (0.97; 1.83) |
| Q3 | 92964/96 | 1.30 (0.95; 1.77) | 1.26 (0.92; 1.72) | 1.25 (0.91; 1.71) |
| Q2 | 99121/93 | 1.29 (0.94; 1.76) | 1.24 (0.91; 1.70) | 1.23 (0.90; 1.67) |
| Q1 (lowest) | 96714/135 | 1.94 (1.45; 2.61) | 1.86 (1.38; 2.50) | 1.82 (1.35; 2.46) |
| Quintile change | 466788/478 | 1.14 (1.07; 1.22) | 1.13 (1.06; 1.21) | 1.12 (1.05; 1.20) |
| *P* for trend | | <0.001 | <0.001 | 0.001 |
| HR per 5kg lower handgrip strength | 466788/478 | 1.14 (1.07-1.22) | 1.13 (1.06-1.21) | 1.12 (1.05-1.20) |
| | | Vascular dementia incidence | | |
| | | Model 1 | Model 2 | Model 3 |
| Quintiles of grip strength | n/events | HR (95% CI) | HR (95% CI) | HR (95% CI) |
| Q5 (highest) | 90145/100 | Ref. | Ref. | Ref. |
| Q4 | 87830/115 | 1.15 (0.88; 1.50) | 1.12 (0.85; 1.46) | 1.09 (0.83; 1.42) |
| Q3 | 92957/185 | 1.56 (1.22; 1.99) | 1.49 (1.17; 1.90) | 1.44 (1.13; 1.84) |
| Q2 | 99096/193 | 1.59 (1.25; 2.02) | 1.44 (1.13; 1.84) | 1.37 (1.08; 1.75) |
| Q1 (lowest) | 96679/325 | 2.64 (2.11; 3.30) | 2.09 (1.66; 2.62) | 1.88 (1.49; 2.37) |
| Quintile change | 466707/918 | 1.27 (1.21; 1.34) | 1.20 (1.14; 1.26) | 1.17 (1.11; 1.23) |
| *P* for trend | | <0.001 | <0.001 | <0.001 |
| HR per 5kg lower handgrip strength | 466707/918 | 1.29 (1.23-1.35) | 1.20 (1.15-1.25) | 1.17 (1.12-1.22) |
| | | Vascular dementia mortality | | |
| | | Model 1 | Model 2 | Model 3 |
| Quintiles of handgrip | n/events | HR (95% CI) | HR (95% CI) | HR (95% CI) |
| Q5 (highest) | 90148/28 | Ref. | Ref. | Ref. |
| Q4 | 87841/37 | 1.37 (0.84; 2.25) | 1.35 (0.82; 2.20) | 1.30 (0.79; 2.12) |
| Q3 | 92964/50 | 1.60 (1.01; 2.55) | 1.53 (0.96; 2.44) | 1.47 (0.93; 2.34) |
| Q2 | 99121/57 | 1.85 (1.17; 2.91) | 1.68 (1.06; 2.64) | 1.57 (0.99; 2.48) |
| Q1 (lowest) | 96714/83 | 2.77 (1.80; 4.26) | 2.22 (1.44; 3.44) | 1.98 (1.27; 3.08) |
| Quintile change | 466788/255 | 1.27 (1.16; 1.39) | 1.20 (1.09; 1.32) | 1.17 (1.06; 1.28) |
| *P* for trend | | <0.001 | <0.001 | 0.001 |
| HR per 5kg lower handgrip strength | 466788/255 | 1.26 (1.16-1.37) | 1.18 (1.08-1.28) | 1.14 (1.05-1.24) |

Data presented as hazard ratio (HR, 95%CI). All analyses were conducted using a 2-years landmark. Model 1 was adjusted for age, sex, ethnicity and deprivation index. Model 2 was additionally adjusted for health-related factors including body mass index categories, multimorbidity (prevalent diabetes, hypertension, CVD and cancer) as well as long-standing illness. Model 3 was additionally adjusted by lifestyle behaviors including walking pace, sleep duration, watching TV, smoking and dietary intake (alcohol, fruits and vegetables, red meat, processed meat and oily fish intake).

**Appendix Table S2.** Hazard ratio (95% CI) for all-cause dementia incidence per 5kg lower handgrip strength stratified by subgroups

| | N | Events | HR | Lower (95% CI) | Upper (95% CI) | P | P for interaction |
|---|---|---|---|---|---|---|---|
| Body mass index | | | | | | | |
|    Normal weight | 153797 | 1220 | 1.15 | 1.10 | 1.20 | <0.001 | 0.752 |
|    Overweight | 198749 | 1717 | 1.15 | 1.11 | 1.19 | <0.001 | |
|    Obesity | 111758 | 1119 | 1.12 | 1.08 | 1.17 | <0.001 | |
| Smoking status | | | | | | | |
|    Never | 256839 | 1880 | 1.15 | 1.11 | 1.19 | <0.001 | 0.895 |
|    Former | 162194 | 1784 | 1.14 | 1.10 | 1.17 | <0.001 | |
|    Current | 47674 | 423 | 1.14 | 1.07 | 1.22 | <0.001 | |
| Walking pace | | | | | | | |
|    Slow pace | 36097 | 792 | 1.10 | 1.06 | 1.15 | <0.001 | 0.284 |
|    Average pace | 245210 | 2198 | 1.13 | 1.09 | 1.16 | <0.001 | |
|    Brisk pace | 185400 | 1097 | 1.20 | 1.14 | 1.25 | <0.001 | |
| Sleep time | | | | | | | |
|    Normal sleep (7-9 h/d) | 345077 | 2873 | 1.14 | 1.11 | 1.17 | <0.001 | 0.530 |
|    Short sleep (<7 h/d) | 113694 | 1029 | 1.16 | 1.11 | 1.21 | <0.001 | |
|    Long sleep (>9 h/d) | 7936 | 185 | 1.12 | 1.02 | 1.23 | 0.022 | |

Data presented as hazard ratio (HR, 95%CI). All analyses were conducted using a 2-years landmark. Model was adjusted for age, sex, ethnicity, deprivation index, body mass index categories, multimorbidity (prevalent diabetes, hypertension, CVD and cancer) as well as long-standing illness , walking pace, sleep duration, watching TV, smoking and dietary intake (alcohol, fruits and vegetables, red meat, processed meat and oily fish intake), excluding the appropriated grouping variable .

**Appendix Table S3.** Hazard ratio (95% CI) for all-cause dementia mortality per 5kg lower handgrip strength stratified by subgroups

| | N | Events | HR | Lower (95% CI) | Upper (95% CI) | P | P for interaction |
|---|---|---|---|---|---|---|---|
| Body mass index | | | | | | | |
| Normal-weight | 153823 | 444 | 1.14 | 1.06 | 1.22 | <0.001 | 0.626 |
| Overweight | 198786 | 558 | 1.20 | 1.13 | 1.27 | <0.001 | |
| Obesity | 111775 | 298 | 1.12 | 1.04 | 1.21 | 0.004 | |
| Walking pace | | | | | | | |
| Slow pace | 36115 | 232 | 1.15 | 1.06 | 1.25 | <0.001 | 0.846 |
| Average pace | 245255 | 700 | 1.12 | 1.06 | 1.18 | <0.001 | |
| Brisk pace | 185418 | 377 | 1.25 | 1.16 | 1.35 | <0.001 | |
| Smoking status | | | | | | | |
| Never | 256879 | 575 | 1.17 | 1.10 | 1.24 | <0.001 | 0.035 |
| Former | 162225 | 611 | 1.15 | 1.09 | 1.21 | <0.001 | |
| Current | 47684 | 123 | 1.26 | 1.12 | 1.43 | <0.001 | |
| Sleep time | | | | | | | |
| Normal sleep (7-9 h/d) | 345140 | 958 | 1.16 | 1.11 | 1.22 | <0.001 | 0.886 |
| Short sleep (<7 h/d) | 113707 | 284 | 1.19 | 1.09 | 1.29 | <0.001 | |
| Long sleep (>9 h/d) | 7941 | 67 | 1.15 | 0.98 | 1.35 | 0.083 | |

Data presented as hazard ratio (HR, 95%CI). All analyses were conducted using a 2-years landmark. Model was adjusted for age, sex, ethnicity, deprivation index, body mass index categories, multimorbidity (prevalent diabetes, hypertension, CVD and cancer) as well as long-standing illness, walking pace, sleep duration, watching TV, smoking and dietary intake (alcohol, fruits and vegetables, red meat, processed meat and oily fish intake), excluding the appropriated grouping variable.