## Supplementary Tables

### Supplementary Table 1. Negative control analysis.

| Exposures                  | Outcomes | No. of IVs | IVW Estimates | p   | Weighted median Estimates | p   | RAPS Estimates | p   |
|---------------------------|----------|------------|---------------|-----|---------------------------|-----|----------------|-----|
| Right hand grip strength | Myopia   | 169        | −0.006        | 0.747 | −0.026                    | 0.356 | −0.009        | 0.655 |
| Left hand grip strength  | Myopia   | 155        | −0.011        | 0.576 | −0.022                    | 0.440 | −0.015        | 0.476 |
| Right leg FFM            | Myopia   | 495        | 0.006         | 0.571 | −0.006                    | 0.705 | 0.002         | 0.848 |
| Left leg FFM             | Myopia   | 491        | 0.008         | 0.449 | −0.013                    | 0.408 | 0.004         | 0.692 |
| Right arm FFM            | Myopia   | 501        | 2.81E-05      | 0.998 | −0.019                    | 0.245 | −0.001        | 0.936 |
| Left arm FFM             | Myopia   | 507        | −0.004        | 0.682 | −0.019                    | 0.259 | −0.004        | 0.705 |
| Whole body FFM           | Myopia   | 542        | −0.006        | 0.523 | −0.018                    | 0.259 | −0.008        | 0.423 |
| Walking pace             | Myopia   | 56         | −0.029        | 0.494 | −0.006                    | 0.924 | −0.026        | 0.568 |
| Heel-BMD                 | Myopia   | 348        | 0.007         | 0.172 | 0.003                     | 0.726 | 0.004         | 0.428 |
| LS-BMD                   | Myopia   | 22         | 0.002         | 0.823 | −0.004                    | 0.759 | 0.001         | 0.948 |
| FNK-BMD                  | Myopia   | 21         | 0.030         | 0.054 | 0.030                     | 0.357 | 0.026         | 0.154 |

Abbreviations: IVW: inverse variance weighted; RAPS: robust adjusted profile score; IVs: instrumental variables; FFM: fat-free mass.

### Supplementary Table 2. Association of sarcopenia-related traits with Heel-BMD using MR-Egger and IVW analysis.

| Exposures                  | Outcomes    | No. of IVs | Heterogeneity test | MR Egger | IVW (random-effect model) |
|---------------------------|-------------|------------|--------------------|----------|--------------------------|
|                           |             |            | Cochran’s Q (p)    | Intercept | Estimates (95% CI)        | p   |
| Right hand grip strength  | Heel-BMD    | 169        | 1554.446 (<0.001) | 0.003    | 0.226                    | −0.085 (−0.200, 0.029) | 0.143 |
| Left hand grip strength   | Heel-BMD    | 155        | 1293.498 (<0.001) | 0.003    | 0.688                    | −0.079 (−0.193, 0.035) | 0.174 |
| Right leg FFM             | Heel-BMD    | 495        | 4123.616 (<0.001) | 0.003    | 0.001                    | −0.002 (−0.059, 0.054) | 0.934 |
| Left leg FFM              | Heel-BMD    | 491        | 4009.255 (<0.001) | 0.003    | 0.002                    | −0.006 (−0.062, 0.050) | 0.846 |
| Right arm FFM             | Heel-BMD    | 500        | 5091.533 (<0.001) | 0.004    | 0.001                    | −0.023 (−0.089, 0.043) | 0.502 |
| Left arm FFM              | Heel-BMD    | 507        | 4345.443 (<0.001) | 0.003    | 0.005                    | 0.001 (−0.059, 0.060)  | 0.983 |
| Whole body FFM            | Heel-BMD    | 542        | 4753.547 (<0.001) | 0.003    | 0.001                    | −0.032 (−0.088, 0.024) | 0.258 |
| Walking pace              | Heel-BMD    | 56         | 210.402 (<0.001)  | −0.002   | 0.574                    | −0.182 (−0.344, −0.019) | 0.029 |

*p < 0.00625. Abbreviations: MR: mendelian randomization; IVW: inverse variance weighted; IVs: instrumental variables; CI: confidence interval; FFM: fat-free mass.
**Supplementary Table 3. Association of sarcopenia-related traits with Heel-BMD using weighted median, RAPS and MR-PRESSO analysis.**

| Exposures                      | Outcomes        | No. of IVs | Weighted median Estimates (95% CI) | RAPS Estimates (95% CI) | MR-PRESSO Estimates (95% CI) |
|--------------------------------|-----------------|------------|-----------------------------------|-------------------------|-----------------------------|
|                                |                 |            | p                                 | p                       | p                           |
| **Right hand grip strength**   | Heel-BMD        | 169        | -0.096 (−0.174, −0.017)           | 0.017                   | -0.070 (−0.219, 0.079)     | 0.359 (−0.095 (−0.164, −0.025) | 0.009 |
| **Left hand grip strength**    | Heel-BMD        | 155        | -0.069 (−0.149, 0.012)            | 0.096                   | -0.065 (−0.231, 0.101)     | 0.443 (−0.068 (−0.145, 0.008) | 0.084 |
| **Right leg FFM**              | Heel-BMD        | 495        | -0.028 (−0.073, 0.018)            | 0.232                   | -0.046 (−0.108, 0.017)     | 0.151 (0.000 (−0.040, 0.040) | 1.000 |
| **Left leg FFM**               | Heel-BMD        | 491        | -0.008 (−0.052, 0.036)            | 0.723                   | -0.008 (−0.052, 0.036)     | 0.723 (0.008 (−0.03, 0.047) | 0.674 |
| **Right arm FFM**              | Heel-BMD        | 500        | -0.073 (−0.123, −0.024)           | 0.003*                  | -0.082 (−0.155, −0.008)    | 0.029 (−0.027 (−0.069, 0.014) | 0.194 |
| **Left arm FFM**               | Heel-BMD        | 507        | -0.008 (−0.052, 0.036)            | 0.727                   | -0.021 (−0.092, 0.050)     | 0.557 (0.011 (−0.029, 0.051) | 0.580 |
| **Whole body FFM**             | Heel-BMD        | 542        | -0.067 (−0.112, −0.021)           | 0.004*                  | -0.057 (−0.120, 0.007)     | 0.079 (−0.019 (−0.056, 0.019) | 0.334 |
| **Walking pace**               | Heel-BMD        | 56         | -0.125 (−0.258, 0.009)            | 0.068                   | -0.155 (−0.293, −0.018)    | 0.027 (−0.149 (−0.257, −0.040) | 0.010 |

*p < 0.00625. Abbreviations: RAPS: robust adjusted profile score; IVs: instrumental variables; CI: confidence interval; FFM: fat-free mass.

**Supplementary Table 4. Association of sarcopenia-related traits with fracture resulting from simple fall using MR-Egger and IVW analysis.**

| Exposures                      | Outcomes | No. of IVs | Heterogeneity test | MR Egger | IVW (random-effect model) |
|--------------------------------|----------|------------|--------------------|----------|--------------------------|
|                                |          |            | Cochran’s Q (p)    | Intercept | Estimates (95% CI)       |
|                                |          |            |                    | p        | p                        |
| **Right hand grip strength**   | Fracture | 169        | 175.436 (0.331)    | 0.000    | -0.051 (−0.099, −0.003)  | 0.037 |
| **Left hand grip strength**    | Fracture | 155        | 183.406 (0.053)    | -0.001   | -0.045 (−0.099, 0.008)   | 0.999 |
| **Right leg FFM**              | Fracture | 491        | 565.085 (0.011)    | 0.000    | 0.010 (−0.016, 0.037)    | 0.448 |
| **Left leg FFM**               | Fracture | 487        | 554.813 (0.017)    | 0.000    | 0.013 (−0.013, 0.040)    | 0.317 |
| **Right arm FFM**              | Fracture | 495        | 605.811 (0.000)    | -0.001   | -0.001 (−0.030, 0.028)   | 0.941 |
| **Left arm FFM**               | Fracture | 505        | 599.074 (0.002)    | 0.000    | -0.008 (−0.036, 0.019)   | 0.559 |
| **Whole body FFM**             | Fracture | 539        | 641.495 (0.001)    | 0.000    | -0.001 (−0.027, 0.025)   | 0.921 |
| **Walking pace**               | Fracture | 56         | 74.334 (0.042)     | 0.001    | -0.134 (−0.255, −0.013)  | 0.030 |

*p < 0.00625. Abbreviations: MR: mendelian randomization; IVW: inverse variance weighted; IVs: instrumental variables; CI: confidence interval; FFM: fat-free mass.

**Supplementary Table 5. Association of sarcopenia-related traits with fracture resulting from simple fall using weighted median, RAPS and MR-PRESSO analysis.**

| Exposures                      | Outcomes | No. of IVs | Weighted median Estimates (95% CI) | RAPS Estimates (95% CI) | MR-PRESSO Estimates (95% CI) |
|--------------------------------|----------|------------|-----------------------------------|-------------------------|-----------------------------|
|                                |          |            | p                                 | p                       | p                           |
| **Right hand grip strength**   | Fracture | 169        | -0.05 (−0.123, 0.023)             | 0.178                   | -0.043 (−0.094, 0.007)     | 0.095 |
| **Left hand grip strength**    | Fracture | 155        | -0.047 (−0.122, 0.027)            | 0.214                   | -0.032 (−0.087, 0.024)     | 0.264 |
| **Right leg FFM**              | Fracture | 491        | 0.001 (−0.041, 0.042)             | 0.977                   | 0.013 (−0.015, 0.040)      | 0.368 |
| **Left leg FFM**               | Fracture | 487        | 0.010 (−0.031, 0.051)             | 0.640                   | 0.015 (−0.012, 0.042)      | 0.277 |
| **Right arm FFM**              | Fracture | 495        | 0.000 (−0.041, 0.041)             | 0.995                   | 0.003 (−0.028, 0.033)      | 0.858 |
| **Left arm FFM**               | Fracture | 505        | -0.004 (−0.044, 0.036)            | 0.861                   | -0.006 (−0.035, 0.023)     | 0.680 |
| **Whole body FFM**             | Fracture | 539        | 0.001 (−0.037, 0.038)             | 0.969                   | 0.001 (−0.025, 0.028)      | 0.916 |
| **Walking pace**               | Fracture | 56         | -0.216 (−0.374, −0.057)           | 0.008                   | -0.148 (−0.271, −0.025)    | 0.019 |

*p < 0.00625. Abbreviations: RAPS: robust adjusted profile score; IVs: instrumental variables; CI: confidence interval; FFM: fat-free mass.