

**Supplementary Table S1.** Longitudinal validity of motor fitness and flexibility tests for falls and hip fracture risk in adults and older adults.

| Author                    | Participants                 | Sample age, years (Range) | Follow-up                   | Fitness test                | Health outcomes | Main outcomes and conclusions   |
|---------------------------|------------------------------|---------------------------|-----------------------------|-----------------------------|-----------------|---|
| Kang et al. 2017 [1]      | Females= 307<br>Males= 234   | 67.4±5.6 (60-86)          | 1 year                      | Gait speed (4m)             | Falls           | Slower gait speed (<0.9m/s): HR= 1.00 (0.99–1.01).<br>The 4m gait test was not associated with falls.   |
| Quach et al. 2011 [2]     | Females= 487<br>Males= 276   | 78.1±5.4                  | 1.5 years                   | Gait speed (4m)             | Falls           | Slower gait speed (<0.6m/s), indoor falls: IRR=2.17 (1.33–3.55).<br>Faster gait speed, outdoor falls: IRR=2.11 (1.40–3.16).<br>There was a nonlinear, U-shaped relationship between gait speed and falls. Those with faster and slower gait speeds were at highest risk of falls. |
| Callisaya et al. 2016 [3] | Females= 266<br>Males= 243   | 74.9±6.8 (60-105)         | 2 years                     | Gait speed (4.2m, 7m, 8.5m) | Falls           | Slower gait speed (<0.8m/s): RR=1.30 (1.14-1.47).<br>Slower gait speed predicted falls.   |
| Luukinen et al. 1995 [4]  | Females= 640<br>Males= 376   | 76.1±4.9 (70-92)          | 2 years                     | Step length (5m)            | Falls           | Short step length (<0.45m): RR=1.6 (1.04-2.46).<br>A shorter step length predicted risk of falling.   |
| Abu et al. 2018 [5]       | Females= 180<br>Males=145    | 67.67±5.5 (60-89)         | ½ year                      | Gait speed (6m)             | Falls           | Slower gait speed: Mean (SD)= 1.06 (0.25), <i>p</i> =0.20.<br>The 6m gait speed test was not associated with falls.   |
| Kwan et al. 2012 [6]      | Females= 120<br>Males= 160   | 74.9±6.4 (65–91)          | 2 years                     | Gait speed (6m)             | Falls           | Slower gait speed: IRR= 0.95 (0.60–0.94).<br>Slower gait speed did not predict falls.   |
| Muraki et al. 2013 [7]    | Females= 1470<br>Males= 745  | 68.5±11.3                 | 3 years                     | Gait speed (6m)             | Falls           | Slower gait speed (0.1m/s decrease), men: OR=1.15 (1.09–1.23),<br>and women: OR=1.05 (1.01–1.10).<br>Slower gait speed predicted falls.   |
| Sanders et al. 2016 [8]   | Females= 2179<br>Males= 1933 | 74.5±5.8 (≥65)            | 13 years; 6 years; 21 years | Gait speed (6m)             | Falls           | Slower gait speed (<0.71m/s): HR=1.3 (1.0-1.5).<br>Slow gait speed predicted falls.   |

|                                 |                             |                     |           |   |                 |  |
|---------------------------------|-----------------------------|---------------------|-----------|---|-----------------|--|
| Luukinen et al. 1995 [4]        | Females= 640<br>Males= 376  | 76.1±4.9<br>(70-92) | 2 years   | Gait speed (10m)  | Falls           | Slower gait speed (<0.77m/s): RR= 2.3 (1.57-3.48).<br>Slow gait speed was an independent risk factor for recurrent falling.                          |
| Doi et al. 2013 [9]             | Females= 42<br>Males= 15    | 79.7±8.2<br>(≥65)   | 1 year    | Gait speed (10m)  | Falls           | Slower gait speed (<0.63m/s): OR=0.02 (0.00–0.23).<br>Gait speed predicted risk of falling.  |
| Stenhagen et al. 2013 [10]      | Females= 840<br>Males= 923  | (60-93)             | 3-6 years | Gait speed (15m)  | Falls           | Slower gait speed: OR=1.77 (1.28–2.46).<br>Slow gait speed predicted falls.  |
| Dargent-Molina et al. 1999 [11] | Females= 5895               | 80.5±3.8<br>(≥75)   | 2 years   | Gait speed (6m)   | Hip fracture    | Slower gait speed: RR=1.8 (1.5–2.0).<br>Gait speed may be a predictor of risk of hip fracture.   |
| Kauppi et al. 2014 [12]         | Females= 1331<br>Males= 969 | 66.38±8.24<br>(≥55) | 10 years  | Gait speed (6.1m)   | Hip fracture    | Slower gait speed (<0.40m/s): HR=0.70 (0.54–0.92).<br>Gait speed predicted hip fracture.   |
| Wihlborg et al. 2015 [13]       | Females= 1044               | 75.2±0.2            | 10 years  | Gait speed (30m)  | Hip fracture    | Slower gait speed (<1.3m/s): HR=1.37 (1.14–1.64).<br>Gait speed predicted hip fracture.  |
| Ersoy et al. 2009 [14]          | Females= 125                | 61.4±7.9<br>(50-79) | ½ year    | Postural balance (Berg Balance Scale; one-leg stance, eyes open, ≥5s) | Falls           | Balance (≤52 points): OR=6.19 (1.32–28.94).<br>Failing one-leg stance (<5s): 0.24 (0.06-1.03).<br>Worse Berg Balance performance predicted falls.    |
| Muir et al. 2010 [15]           | Females= 33<br>Males= 57    | 79.7±4.8<br>(60-90) | 1 year    | Postural balance (Berg Balance Scale)                                 | Falls           | Balance impairment: RR=2.00 (1.13–3.56).<br>Impairment balance was a predictor of falls.   |
| Luukinen et al. 1995 [4]        | Females= 640<br>Males= 376  | 76.1±4.9<br>(70-92) | 2 years   | Postural balance (Tinetti Scale)                                      | Falls           | Balance (>7 points): RR= 2.9 (1.73-4.92).<br>Impairment balance predicted falls.   |
| Austin et al. 2007 [16]         | Females= 1282               | ±75.2<br>(70-85)    | 3 years   | Postural balance (tandem stance, eyes open and closed, ≥10s)          | Fear of falling | Poor balance, eyes open: OR= 1.78 (1.38–2.28).<br>Poor balance, eyes closed: 1.87 (1.44–2.42).<br>Poor balance predicted developing fear of falling. |
| Kwan et al. 2012 [6]            | Females= 120                | 74.9±6.4<br>(65–91) | 2 years   | Postural balance (near-tandem stance,                                 | Falls           | Worse near-tandem stance performance: 0.80 (0.65–0.99).<br>Worse one-leg stance performance: IRR= 0.78 (0.62–0.99).                                  |

|                             |                            |                              |         |   |                           |  |
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|                             | Males= 160                 |                              |         | eyes open and closed, $\geq 30$ s; one-leg stance, eyes open, $\geq 5$ s)   |                           | Poor balance predicted risk of falls.  |
| Vellas et al. 1997 [17]     | Females= 156<br>Males= 111 | 72 $\pm$ 6.1 ( $\geq 60$ )   | 3 years | Postural balance (one-leg stance, eyes open, $\geq 5$ s)  | Falls and injurious falls | Impaired one-leg stance: RR=2.13 (1.04-4.34), for injurious falls.<br>One-leg test predicted injurious falls but not falls.  |
| Mulasso et al. 2017 [18]    | Females= 119<br>Males= 73  | 73.0 $\pm$ 6.2 ( $\geq 65$ ) | 1 year  | Postural balance (one-leg stance, eyes open, 60s)   | Falls                     | One-leg stance: OR=0.99 (0.97–1.01).<br>The one-leg standing balance test was not associated with falls.   |
| Nitz et al. 2013 [19]       | Females= 449               | 59.3 $\pm$ 10.6 (40-80)      | 9 years | Postural balance (bipedal stance, eyes open and closed; one-leg stance, eyes open, 10s. Force platform)                     | Falls                     | Unsteady in bipedal stance, eyes closed: OR=1.99 (1.18–3.38), for single falls.<br>Unsteady in bipedal stance, eyes closed: OR=4.21 (1.79–9.92), for multiple falls.<br>Impairment balance detected potential fallers. |
| Swanenburg et al. 2010 [20] | Females= 225<br>Males= 45  | 73 $\pm$ 7 (60-90)           | 1 year  | Postural balance (bipedal stance, eyes open and closed, 20s. Force platform)  | Falls                     | Amplitude of in medial–lateral directions during single-task condition: OR=21.8 (3.19-149.25).<br>Impairment balance predicted multiple falls.   |
| Maki et al. 1994 [21]       | Females= 83<br>Males= 17   | 83 $\pm$ 6 (62-96)           | 1 year  | Postural balance (bipedal stance, eyes open and closed, 30s. Force platform)  | Falls                     | Lateral spontaneous-sway amplitude (eyes closed): Mean (SD)=3.35 (2.29), $p=0.004$ .<br>Postural balance predicted future risk of falling with moderate accuracy.  |
| Pajala et al. 2008 [22]     | Females= 434               | (63–76)                      | 1 year  | Postural balance (side-by-side, eyes open and closed; tandem stance and semi-tandem stance, eyes open; 30s. Force platform) | Falls                     | Inability to complete the tandem stance: IRR=4.33 (2.17–8.52).<br>Impairment balance predicted risk of falling.  |
| Frames et al. 2018 [23]     | Females= 65<br>Males= 33   | Non obese:                   | 2 years | Postural balance (bipedal stance, eyes  | Falls                     | Obese fallers had higher sway range than non-fallers ( $p=0.001$ , $F=7.44$ ), root mean square values ( $p=0.002$ , $F=6.62$ ) and SD   |

|                           |                            |                                    |          |  |                 |  |
|---------------------------|----------------------------|------------------------------------|----------|--|-----------------|--|
|                           |                            | 77.41±8.49<br>Obese:<br>72.68±7.40 |          | open and closed, 60s.<br>Force platform and<br>an inertial<br>measurement unit<br>affixed at the<br>sternum) |                 | values ( $p=0.002$ , $F=6.62$ ) from the force plate center of pressure time series. Obese fallers had higher sway area than non-fallers (ellipse area, $p=0.003$ , $F=5.89$ ; and circular area $p<0.0002$ , $F=8.97$ ), mean velocity ( $p=0.011$ , $F=4.56$ ), mean radius ( $p<0.0001$ , $F=10.47$ ) and mean path length of center of pressure ( $p=0.011$ , $F=4.56$ ). The postural balance test may help detecting fall risk in elderly persons who are obese. |
| Wihlborg et al. 2015 [13] | Females= 1044              | 75.2±0.2                           | 10 years | Postural balance (one-leg stance, eyes open and closed, ≥60s)  | Hip fracture    | Failing the balance test: HR=1.98 (1.18–3.32).<br>Balance predicted hip fracture.  |
| Abu et al. 2018 [5]       | Females= 180<br>Males=145  | 67.7±5.5<br>(60-89)                | ½ year   | Timed Up&Go (TUG)  | Falls           | TUG (>8s): IQR: 4.8-17.5, with a sensitivity of 83.95%% (74.1-91.2) and specificity of 32.43% (26.3-39.0).<br>The TUG test had predictive validity for risk of falls.  |
| Asai et al. 2020 [24]     | Females= 425<br>Males= 224 | ±76.2<br>(≥60)                     | 1 year   | TUG  | Falls           | Worse TUG performance (>7s): OR=1.14 (1.01-1.29), $p=0.032$ .<br>Worse TUG predicted risk of falls.  |
| Austin et al. 2007 [16]   | Females= 1282              | ±75.2<br>(70-85)                   | 3 years  | TUG  | Fear of falling | TUG (>10s): mean=9.5; IQR=8.1-11.0, for fear of falling, and mean=10.8; IQR=8.7-21.3, for persistent fear.<br>The TUG test predicted fear of falling.  |
| Clemson et al. 2015 [25]  | Females= 533<br>Males= 467 | ±73.4<br>(65-94)                   | 11 years | TUG  | Falls           | TUG (>12s): HR=1.02 (1.01-1.04).<br>Worse TUG performance predicted injurious falls.   |
| Doi et al. 2013 [9]       | Females= 42<br>Males= 15   | 79.7±8.2<br>(≥65)                  | 1 year   | TUG  | Falls           | TUG (>21s): OR=1.08 (1.02–1.15).<br>The TUG test predicted risk of falling.  |
| Ersoy et al. 2009 [14]    | Females= 125               | 61.4±7.9<br>(50-79)                | ½ year   | TUG  | Falls           | TUG (>13s): OR= 4.55 1.95-10.61.<br>The TUG test predicted falls.  |
| Kang et al. 2017 [1]      | Females= 307<br>Males= 234 | 67.4±5.6<br>(60-86)                | 1 year   | TUG  | Falls           | TUG (>16s): HR=1.07 (1.00–1.14).<br>The TUG test predicted falls.  |
| Kwan et al. 2012 [6]      | Females= 120               | 74.9±6.4<br>(65–91)                | 2 years  | TUG  | Falls           | TUG (>11s): IRR=1.27 (1.04–1.56).<br>The TUG test predicted risk of falling.   |

|                          |   |                      |         |  |       |   |
|--------------------------|---|----------------------|---------|--|-------|---|
| Mulasso et al. 2017 [18] | Males= 160<br>Females= 119<br>Males= 73 | 73.0±6.2<br>(≥65)    | 1 year  | TUG                                      | Falls | TUG (>11s): OR=1.076 (0.94–1.21)<br>The TUG test was not associated with falls.   |
| Nitz et al. 2013 [19]    | Females= 449                            | 59.3±10.6<br>(40-80) | 9 years | TUG                                      | Falls | TUG (>8s): 1.32 (1.15, 1.51), for multiple falls.<br>The TUG test predicted multiple falls.   |
| Luukinen et al. 1995 [4] | Females= 640<br>Males= 376              | 76.1±4.9<br>(70-92)  | 2 years | Range Of Motion (ROM) (Hip and knee ROM) | Falls | Hip motion reduced (<120°): RR= 1.4 (0.89-2.04).<br>Knee motion reduced (<100°): 1.4 (0.97-2.04).<br>Reduced ROM was not associated with falls. |

HR, Hazard Ratio; IRR, Incidence Rate Ratio; IQR, Interquartile Range; OR, Odds Ratio; ROM, Range Of Motion; RR, Relative Risk; SD, Standard Deviation; TUG, Timed Up&Go test.

**Supplementary Table S2.** Longitudinal validity of motor fitness and flexibility tests for cognitive outcomes in adults and older adults.

| Author                      | Participants                                    | Sample age, years (Range) | Follow-up                    | Fitness test             | Health outcomes                              | Main outcomes and conclusions   |
|-----------------------------|---|---------------------------|------------------------------|--------------------------|--|---|
| Ojagbemi et al. 2015 [26]   | 2149 participants<br>( <i>unspecified sex</i> ) | (≥65)                     | 2 years                      | Gait speed (3m, 4m)      | Cognitive decline                            | Slower gait speed (>6.52s in 3m; >8.70s in 4m, in total): HR=0.77 (0.43–1.2).<br>Change in gait speed was a significant predictor of reduced cognitive performance.   |
| Hoogendijk et al. 2020 [27] | Females= 2221<br>Males= 1999                    | ±72.0 (≥55)               | 9-25 years                   | Gait speed (4m, 6m, 30m) | Cognitive decline                            | Slower gait speed (<0.82m/s): HR=1.23 (1.00-1.50), <i>p</i> <0.05.<br>Slower gait speed predicted cognitive decline.  |
| Sanders et al. 2016 [8]     | Females= 2179<br>Males= 1933                    | 74.5±5.8 (≥65)            | 13 years; 6 years; 21 years. | Gait speed (6m)          | Persistent cognitive decline                 | Slower gait speed (<0.71m/s): HR= 2.1 (0.8-5.8).<br>Slow gait speed did not predict persistent cognitive decline.   |
| Stijntjes et al. 2017 [28]  | Females= 1647<br>Males= 1332                    | (55-90)                   | 5-12 years                   | Gait speed (6m)          | Cognitive decline                            | No association was found for the group of 55–64 years. Group of 65–74 years: slower gait speed (<0.86m/s) was associated with a steeper decline in global cognitive function ( <i>p</i> <0.05). Group of 75–85 years: slower gait speed (<0.69m/s) was associated with a steeper decline on each of the cognitive domains ( <i>p</i> <0.04).<br>Slow gait speed was a marker for cognitive impairment in adults over 65years old. |
| Tian et al. 2019 [29]       | Females= 93<br>Males= 108                       | 79.3±6.3                  | 5.2 years                    | Gait speed (6m, 400m)    | Cognitive impairment/<br>Alzheimer’s disease | Slower gait speed (<1.02m/s): β=-0.22 (-0.47-0.04), <i>p</i> <0.05.<br>Slower gait speed predicted cognitive impairment/Alzheimer’s disease.  |
| Buracchio et al. 2010 [30]  | Females= 118<br>Males= 86                       | 79.0±8.8 (≥65)            | 20 years                     | Gait speed (9.14m)       | Mild cognitive impairment                    | Gait speed rate of change before converters to mild cognitive impairment= -0.005 m/s/year (-0.010-0.000), <i>p</i> =0.07.<br>A decrease of 0.02 m/s/year ( <i>p</i> =0.001) in gait speed may predict mild cognitive impairment.<br>Changes in gait speed may predict cognitive impairment.   |

|                           |                              |                     |           |   |                              |   |
|---------------------------|------------------------------|---------------------|-----------|---|------------------------------|---|
| Sakurai et al. 2017 [31]  | Females= 106<br>Males= 117   | 72.6±4.9<br>(65–85) | 1 year    | Gait speed (10m fast gait speed)                  | Subjective memory complaints | Gait speed (<2.0m/s): OR=0.84 (0.39–1.81).<br>Gait speed did not predict developing subjective memory complaints. |
| Bullain et al. 2016 [32]  | Females= 402<br>Males= 176   | 93.3±2.6<br>(≥90)   | 2.6 years | Postural balance (one-leg stance, eyes open, 10s) | Dementia                     | Unable to complete balance test: HR=3.20 (1.91–5.37).<br>Poor balance may predict dementia.                       |
| Doi et al. 2019 [33]      | Females= 2124<br>Males= 1962 | ±72.0<br>(≥65)      | 3.6 years | Timed Up&Go (TUG)                                 | Dementia                     | Worse TUG performance: HR=1.54 (1.01-2.35), <i>p</i> =0.04.<br>Worse TUG predicted incidence of dementia.         |
| Donoghue et al. 2017 [34] | Females= 1169<br>Males= 1081 | 72.4±6.0<br>(65–98) | 5.9 years | TUG   | Cognitive decline            | TUG (>10.5s): β=1.00 (0.99-1.00).<br>The TUG test was not significant.  |

β, standardized regression coefficient; B, non-standardized regression coefficient; SE, standard Error; HR, Hazard Ratio; OR, Odds Ratio; TUG, Timed Up&Go test.

**Supplementary Table S3.** Longitudinal validity of motor fitness and flexibility tests for depressive symptoms and well-being in adults and older adults.

| Author                                 | Participants                            | Sample age, years (Range) | Follow-up | Fitness test      | Health outcomes     | Main outcomes and conclusions   |
|--|---|---------------------------|-----------|-------------------|---------------------|---|
| Veronese et al. 2017 [35]              | Females= 485<br>Males= 1247<br>3615     | 69.3±6.7 (≥50)            | 2 years   | Gait speed (2.5m) | Depressive symptoms | Slower gait speed: OR=1.82 (1.00–3.32).<br>Slow gait speed may predict depression.  |
| Briggs et al. 2019 [36]                | participants ( <i>unspecified sex</i> ) | ±63.3 (≥50)               | 2-4 years | Gait speed (4m)   | Depressive symptoms | Slower gait speed (<1.3m/s): OR=1.54 (1.08-2.19), <i>p</i> <0.003.<br>Slower gait speed predicted depression.   |
| Veronese et al. 2017 <sup>b</sup> [37] | Females= 533<br>Males= 437              | 72.5±6.0 (65-96)          | 4 years   | Gait speed (4m)   | Depressive symptoms | Slower gait speed (<0.80m/s), women: OR=1.55 (0.90-2.68).<br>Slower gait speed (<0.80m/s), men: OR=2.22 (1.16-4.28).<br>Slow walking speed predicted depression only in men.        |
| Sanders et al. 2012 [38]               | Females= 686<br>Males= 773              | 68.9±8.5 (≥65)            | 16 years  | Gait speed (6m)   | Depressive symptoms | Slower gait speed (<0.55m/s), women: HR=1.22 (0.87–1.72).<br>Slower gait speed (<0.55 m/s), men: HR=1.67 (1.08–2.57).<br>Slow gait speed predicted depressive symptoms only in men. |
| Davis et al. 2015 [39]                 | Females= 196<br>Males= 112              | 82.5±6.5 (≥70)            | 1 year    | Timed Up&Go (TUG) | Well-being          | TUG (>20s): β=-0.30(-0.45, -0.15).<br>The TUG test was a predictor of well-being decrease.  |

HR, Hazard Ratio; OR, Odds Ratio; β, standardized regression coefficient; TUG, Timed Up&Go test.

**Supplementary Table S4.** Longitudinal validity of motor fitness and flexibility tests for mobility limitations and disability risk in adults and older adults.

| Author                     | Participants                 | Sample age, years (Range) | Follow-up  | Fitness test            | Health outcomes  | Main outcomes and conclusions   |
|----------------------------|------------------------------|---------------------------|------------|-------------------------|--|---|
| Makizako et al. 2015 [40]  | Females= 463<br>Males= 485   | 78.5±3.7<br>(≥75)         | 1.25 years | Gait speed (2.4m)       | Disability in instrumental activities of daily living (IADL) | Slower gait speed, women (<0.9m/s): OR=0.97 (0.95–0.99).<br>Slower gait speed, men (<1.1m/s): OR=0.98 (0.96–0.99).<br>Gait speed predicted disability in IADL.                                    |
| Heiland et al. 2018 [41]   | Females= 1154<br>Males= 602  | 70.6±9.6<br>(≥60)         | 9 years    | Gait speed (2.4m or 6m) | Disability in IADL   | Gait speed limitation (<0.8m/s): HR=3.11 (1.92-5.03).<br>Gait speed predicted disability in IADL.   |
| Abe et al. 2019 [42]       | Females= 463<br>Males= 510   | 74.6±5.5<br>(≥65)         | 4.4 years  | Gait speed (5m)         | Disability in IADL   | Slower gait speed (<1.25m/s): HR=0.86 (0.18-0.92), <i>p</i> <0.001.<br>Slower gait speed predicted disability in IADL.  |
| Makizako et al. 2010 [43]  | Females= 146<br>Males= 119   | 78±5.6<br>(68-96)         | 4 years    | Gait speed (5m)         | Disability in IADL   | Slower gait speed (≥5.6s in total), women: OR=5.31 (1.63-17.22).<br>Slower gait speed, men (≥4.6s in total): OR=1.58 (0.94-2.63).<br>Gait speed predicted disability in IADL only in older women. |
| Adachi et al. 2019 [44]    | Females= 417<br>Males= 99    | ±79<br>(76-82)            | 2 years    | Gait speed (10m)        | Disability in IADL   | Slower gait speed (<1.13 m/s): AUC=0.80 (0.74-0.86).<br>Slow gait speed predicted disability in IADL.   |
| Laukkanen et al. 2000 [45] | Females= 261<br>Males= 127   | 75 and 80                 | 5 years    | Gait speed (10m)        | Disability in IADL   | Slower gait speed: <i>t</i> -value=-0.23, SE=0.06.<br>Reduced gait speed predicted disability in IADL.  |
| Nakamoto et al. 2015 [46]  | Females= 466<br>Males= 495   | (40–79)                   | 14 years   | Gait speed (10m)        | Disability in IADL   | Slower gait speed, women (>1 SD increase): OR=0.68 (0.50-0.92).<br>Slower gait speed, men (>1 SD increase): OR= 0.78 (0.59-1.04).<br>Gait speed predicted disability in IADL.                     |
| Doi et al. 2020 [47]       | Females= 1944<br>Males= 1752 | 71.2±4.9<br>(≥65)         | 4.1 years  | Gait speed (2.4 m)      | Mobility disability  | Slower gait speed (<1.1m/s): HR=2.06 (1.65-2.57), <i>p</i> <0.001.<br>Slower gait speed predicted mobility disability.  |
| Brach et al. 2012 [48]     | Females= 336<br>Males= 216   | 79.4±4.1<br>(≥65)         | 1 year     | Gait speed (4m)         | Mobility disability  | Slower gait speed (<1m/s): sensitivity, AUC=0.61 (0.47-0.73), specificity, AUC= 0.60 (0.55-0.65).<br>Slow gait may be a predictor of mobility disability.   |

|                            |  |                     |               |  |                     |   |
|----------------------------|--|---------------------|---------------|--|---------------------|---|
| Deshpande et al. 2013 [49] | 622 participants<br>( <i>unspecified sex</i> ) | (50-85)             | 3 years       | Gait speed (7m)  | Mobility disability | Slower gait speed (<1.2m/s): OR= 24.95 (6.03-103.13).<br>Slower gait speed predicted mobility disability.   |
| Rosso et al. 2019 [50]     | Females= 171<br>Males= 166                     | 78.5±2.9<br>(70-79) | 8 years       | Gait speed (20m)   | Mobility Disability | Slower gait speed (<1.08m/s): HR=0.82 (0.77-0.86).<br>Slower gait speed predicted mobility disability.  |
| Jung et al. 2018 [51]      | Females= 746<br>Males= 602                     | ±76<br>(≥65)        | 5.38<br>years | Gait speed (4m)  | Frailty             | Slower gait speed (<0.8m/s): $\beta$ =-0.534, $p$ =0.001.<br>Gait speed may predict frailty status.<br>Faster gait speed, women (<1.5m/s): $R^2$ =0.37; $p$ <0.001, for greater mobility/autonomy.    |
| Breton et al. 2014 [52]    | Females= 652<br>Males= 613                     | ±73<br>(68-82)      | 5 years       | Gait speed (4m)  | Functional autonomy | Faster gait speed, men (<1.7m/s): $R^2$ =0.28; $p$ <0.001, for with greater mobility/autonomy.<br>Gait speed changes could moderately predict functional autonomy, especially in women.               |
| Makizako et al. 2010 [43]  | Females= 146<br>Males= 119                     | 78±5.6<br>(68-96)   | 4 years       | Postural balance<br>(one-leg stance, eyes open, 60s)                 | Disability in IADL  | Balance, women: OR=0.98 (0.95-1.02).<br>Balance, men: OR=0.98 (0.95-1.00).<br>Balance did not predict disability in IADL.<br>A 1-SD increase in sway area with eyes open, women: OR=1.49 (1.17-1.90). |
| Nakamoto et al. 2015 [46]  | Females= 466<br>Males= 495                     | (40-79)             | 14 years      | Postural balance<br>(bipedal stance, eyes open, 60s. Force platform) | Disability in IADL  | A 1-SD increase in sway area with eyes open, men: OR= 0.92 (0.71-1.20).<br>Sway area increases might predict disability in IADL, only in women.   |
| Breton et al. 2014 [52]    | Females= 652<br>Males= 613                     | ±73<br>(68-82)      | 5 years       | Postural balance<br>(one-leg stance, eyes open, 60s)                 | Functional autonomy | Balance, women: $R^2$ =0.37; $p$ <0.001.<br>Balance, men: $R^2$ =0.28; $p$ <0.001.<br>Balance could moderately predict functional autonomy, especially in women.                                      |
| Savva et al. 2013 [53]     | Females= 925<br>Males= 889                     | ±70<br>(≥65)        | 4 years       | TUG  | Frailty             | TUG (>16s): AUC=0.87 for frailty.<br>TUG (>12s): AUC=0.73 for prefrailty.<br>The TUG test identified prefrailty and frailty.  |

|                             |                            |                                 |           |   |                     |  |
|-----------------------------|----------------------------|---------------------------------|-----------|---|---------------------|--|
| Breton et al.<br>2014 [52]  | Females= 652<br>Males= 613 | $\pm 73$<br>(68-82)             | 5 years   | TUG   | Functional autonomy | TUG (>11s), women: $\beta$ (SE)= 0.56 (0.13); $p < 0.001$ .<br>TUG (>10.5s), men: $\beta$ (SE)= 0.42 (0.12); $p < 0.001$ .<br>The TUG test predicted decline in functional autonomy.   |
| Ward et al.<br>2016 [54]    | Females= 261<br>Males= 130 | $76.5 \pm 7.1$<br>( $\geq 65$ ) | 1-2 years | Range Of Motion<br>(ROM) (knee<br>flexion-<br>extension, ankle)                     | Mobility disability | Restricted knee flexion: OR=2.03 (1.24-3.35).<br>ROM predicted mobility disability.  |
| Ward et al.<br>2016 [54]    | Females= 261<br>Males= 130 | $76.5 \pm 7.1$<br>( $\geq 65$ ) | 1-2 years | Speed of<br>movement (leg<br>velocity, reaction<br>time, rapid leg<br>coordination) | Mobility disability | Slower leg velocity: OR=2.35 (1.21-4.58).<br>Leg velocity predicted mobility disability.   |
| Adachi et al.<br>2019 [44]  | Females= 417<br>Males= 99  | $\pm 79$<br>(76-82)             | 2 years   | Maximum step<br>length  | Disability in IADL  | Maximum step length: AUC=0.81 (0.75-0.87).<br>Maximum step length was a predictor for declined walking speed<br>and predicted disability in IADL.<br>Disability to complete the stair mounting test, women (40 cm):<br>RR=4.14, $p=0.09$ . |
| Schroll et al.<br>1997 [55] | Females= 146<br>Males= 113 | (75-80)                         | 5 years   | Stair mounting<br>(40-50cm step)  | Disability in IADL  | Disability to complete the stair mounting test, men (50 cm): RR=4.07,<br>$p < 0.001$ .<br>Inability to mount a 50cm step was a predictor of disability in IADL<br>in men.  |

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$\beta$ , standardized regression coefficient; IADL, Disability in instrumental activities of daily living; AUC, Area Under the Curve; HR, Hazard Ratio; OR, Odds Ratio; ROM, Range Of Motion; RR, Relative Risk; SD, Standard Deviation; SE, Standard Error; TUG, Timed Up&Go test.

**Supplementary Table S5.** Longitudinal validity of motor fitness and flexibility tests for CVD risk and mortality in adults and older adults.

| Author                     | Participants                 | Sample age, years (Range) | Follow-up  | Fitness test            | Health outcomes   | Main outcomes and conclusions  |
|----------------------------|------------------------------|---------------------------|------------|-------------------------|---|--|
| Heiland et al. 2018 [41]   | Females= 1154<br>Males= 602  | 70.6±9.6<br>(≥60)         | 9 years    | Gait speed (2.4m or 6m) | CVD risk  | Slower gait speed (<0.8m/s): HR=1.09 (1.02–1.17), for group <78 years.<br>Slower gait speed (<0.8m/s): HR= 0.98 (0.92–1.03), for group ≥78 years.  |
| Elbaz et al. 2013 [56]     | Females= 1817<br>Males= 4450 | (35-55)                   | 6.4 years  | Gait speed (2.4m)       | All-cause mortality                                       | Slow gait speed predicted CVD risk only in adults <78 years.<br>Slower gait speed, women (<1.09m/s), men (<1.26m/s): HR= 2.19 (1.54–3.11).<br>Gait speed was a marker of mortality risk.<br>Slower gait speed (<0.8m/s): AUC=0.85 (0.83-0.87), for 3-years mortality; AUC=0.85 (0.83-0.86), for 5-years mortality. |
| Zucchelli et al. 2019 [57] | Females= 2182<br>Males= 1181 | 74.7±11.2<br>(≥60)        | 3-5 years  | Gait speed (2.4m, 6m)   | All-cause mortality and unplanned hospitalization         | Slower gait speed (<0.8m/s): AUC=0.70 (0.68-0.72) for 3-years hospitalization.<br>Slower gait speed predicted mortality and unplanned hospitalization.   |
| Andrasfay et al. 2020 [58] | Females= 430<br>Males= 457   | 70.1±8.7<br>(≥60)         | 4 years    | Gait speed (3m)         | All-cause mortality                                       | A 1-SD increase in gait speed (<0.1m/s): HR=0.70 (0.52-0.94), $p<0.05$ .<br>Slower gait speed predicted mortality risk.  |
| Camargo et al. 2016 [59]   | Females= 1175<br>Males= 1001 | 62±9<br>(35-84)           | 11 years   | Gait speed (4m)         | Stroke  | Slower gait speed (<1.0m/s): HR=1.13 (0.88–1.45).<br>Slow gait speed was not significantly associated with risk of stroke.   |
| Jung et al. 2018 [51]      | Females= 746<br>Males= 602   | ±76<br>(≥65)              | 5.38 years | Gait speed (4m)         | All-cause mortality                                       | Gait speed (<0.8m/s): HR=3.37 (1.25–9.08).<br>Gait speed may predict mortality.  |
| Niiranen et al. 2019 [60]  | Females= 1852<br>Males= 1601 | 54.7±9.2<br>(45-74)       | 8 years    | Gait speed (4m)         | All-cause mortality and Cardiovascular Disease (CVD) risk | Slower gait speed (<1.29m/s): women, HR=3.72 (2.53-5.47), $p<0.001$ ; men, HR=2.57 (1.77-3.74), $p<0.001$ , for mortality.<br>Slower gait speed (<0.99m/s): HR=2.95 (2.26-3.85), $p<0.05$ , for CVD risk.  |

|                                |  |                     |                                   |                          |  |  |   |
|--------------------------------|--|---------------------|-----------------------------------|--------------------------|--|--|---|
|                                |  |                     |                                   |                          |  |  | Slower gait speed predicted incidence of CVD risk and mortality.  |
| Hoogendijk et al. 2020 [27]    | Females= 2221<br>Males= 1999           | ±72.0<br>(≥55)      | 9-25 years                        | Gait speed (4m, 6m, 30m) | All-cause mortality  |  | Slower gait speed (<0.82m/s): HR=1.70 (1.30-6.28), <i>p</i> <0.05.<br>Slower gait speed predicted mortality.  |
| Abe et al. 2019 [42]           | Females= 463<br>Males= 510             | 74.6±5.5<br>(≥65)   | 4.5 years                         | Gait speed (5m)          | All-cause mortality  |  | Slower gait speed (<1.25m/s): HR=0.93 (0.88-1.00), <i>p</i> =0.038.<br>Slower gait speed mortality risk.<br>Slower gait speed, women (<0.94m/s), men (<1.10m/s): HR=1.95 (1.39-2.73), all-cause death.  |
| Nofuji et al. 2016 [61]        | 1085 participants<br>(unspecified sex) | (65-89)             | 10.5 years                        | Gait speed (5m)          | All-cause mortality and cause-specific mortality ((CVD), cancer, other-causes and unknown causes)) |  | Slower gait speed, women (<0.94m/s), men (<1.10m/s): HR=2.80 (1.55-5.05), CVD death.<br>Slower gait speed women (<0.94m/s), men (<1.10m/s): HR=2.08 (1.14-3.77), other-cause death.<br>Slow gait speed predicted all-cause, CVD, and other-cause mortality, but not cancer mortality. |
| Lee et al. 2017 [62]           | Females= 407<br>Males= 504             | 65.3±9.3            | 4.1 years                         | Gait speed (3m)          | All-cause mortality and CVD risk   |  | Slower gait speed (<0.8m/s): HR=1.3 (0.6–2.5), for mortality.<br>Slower gait speed (<0.8m/s): HR=0.8 (0.2–3.3), for CVD risk.<br>Not associations were found between gait speed and any studied variable.   |
| Blain et al. 2010 [63]         | Females= 1548                          | ±79<br>(77-81)      | 8 years                           | Gait speed (6m)          | All-cause mortality  |  | Slower gait speed (<0.8m/s): HR=1.33 (0.94-1.88).<br>Slow gait speed predicted mortality.   |
| Sabia et al. 2014 [64]         | 4016 participants<br>(unspecified sex) | 73.4±4.7<br>(65–85) | 12 years                          | Gait speed (6m)          | All-cause mortality  |  | Slower gait speed decline/year (<-0.08m/s): HR=1.40 (1.02-1.92).<br>Fast gait speed decline predicted mortality.  |
| Sanders et al. 2016 [8]        | Females= 2179<br>Males= 1933           | 74.5±5.8<br>(≥65)   | 13 years;<br>6 years;<br>21 years | Gait speed (6m)          | All-cause mortality  |  | Slower gait speed (<0.71m/s): HR=2.1 (1.6-2.6 45).<br>Slow gait speed predicted mortality.  |
| Georgiopoulou et al. 2016 [65] | Females= 1529<br>Males= 1406           | 73.6±2.9<br>(70-79) | 10 years                          | Gait speed (20m)         | All-cause mortality and CVD risk   |  | Slower gait speed (<1.35m/s): HR=0.34 (0.24-0.48), mortality.<br>Slower gait speed (<1.35m/s): HR=0.36 (0.22-0.60), CVD.<br>Slow gait speed test may predict mortality and CVD risk.  |

|                          |   |                       |            |  |   |  |
|--------------------------|---|-----------------------|------------|--|---|--|
| Idland et al. 2013 [66]  | Females= 113                                    | $\pm 79.5$<br>(75–92) | 9 years    | Gait speed (29m)   | All-cause mortality   | Slower gait speed (<1.1m/s): OR=0.05 (0.02-0.16).<br>Slow gait speed predicted mortality risk.   |
| Looker 2015 [67]         | Females= 1475<br>Males= 1500                    | ( $\geq 50$ )         | 3 years    | Gait speed (6.15m)   | Mortality risk by dysmobility   | Slower gait speed (<1.0m/s): HR=3.63 (2.69-4.90).<br>Dysmobility (by slow gait speed) was associated with increased mortality risk.  |
| Blain et al. 2010 [63]   | Females= 1548                                   | $\pm 79$<br>(77-81)   | 8 years    | Postural balance (side-by-side, tandem stance, to complete 10-foot taps, eyes open, s) | All-cause mortality   | Balance ( $\geq 4.6s$ ): HR= 1.67 (1.21-2.31).<br>Poor balance predicted mortality.  |
| Cooper et al. 2014 [68]  | Females= 1411<br>Males= 1355                    | 53                    | 13 years   | Postural balance (one-leg stance, eyes closed, 30s)                                    | All-cause mortality   | Unable to perform standing balance test: HR=3.40 (2.05-5.63).<br>Inability to perform balance test was a strongly predictor of mortality.  |
| Nofuji et al. 2016 [61]  | 1085 participants<br>( <i>unspecified sex</i> ) | (65-89)               | 10.5 years | Postural balance (one-leg stance, eyes open, 60s)                                      | All-cause mortality and cause-specific mortality (CVD, cancer, other-causes and unknown causes) | One-leg stance (<18 score): HR= 2.67 (1.54-4.62), CVD death.<br>One-leg stance (<18 score): HR= 2.60 (1.45-4.69), other-causes death.<br>Poor balance predicted all-cause, CVD, and other-cause mortality, but not cancer mortality. |
| Idland et al. 2013 [66]  | Females= 113                                    | $\pm 79.5$<br>(75–92) | 9 years    | Dynamic balance (Functional reach test, cm)  | All-cause mortality   | Poorer functional reach: OR=0.92 (0.88-0.95).<br>Poorer functional reach predicted mortality risk.   |
| Bravell et al. 2017 [69] | Females= 343<br>Males= 242                      | $66 \pm 9$<br>(60-91) | 19 years   | Flexibility (Touch-toes test)  | All-cause mortality   | Touch-toes test: HR=0.99 (0.42-2.31).<br>The predictive validity of this flexibility test was not significant.   |

CVD, Cardiovascular Disease; HR, Hazard Ratio; OR, Odds Ratio.

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