Technical Appendix

FRAILTY CALCULATOR ALGORITHM

Note: The scoring of variables Fatigue, Low appetite, Weakness, and Frequency of Activities were described in the main paper body. For coding the Slowness variable, there were four different sub-variables needed for the equations in this appendix below: ‘Observed gait₁’, ‘Observed gait₂’, ‘Observed gait₃’, and ‘Observed gait₄’. These four sub-variables appear in the algorithm/calculator but only one receives a value equal to 1, depending on the ‘responder status’ recorded. All others receive a value of 0. For example, selecting the 1ˢᵗ option (‘without help’) saw ‘Observed gait₁’ coded as 1 and all others, i.e. ‘Observed gait₂’, ‘Observed gait₃’, and ‘Observed gait₄’, coded as 0. Similarly, selecting the 2ⁿᵈ option (‘with help’) saw ‘Observed gait₂’ coded as 1 and all others coded as 0. Selecting either the 3ʳᵈ or 4ᵗʰ option (‘not observed – wheelchair or bedbound’) saw ‘Observed gait₃’ coded as 1, and all others coded as 0. Finally, selecting the 5ᵗʰ option (‘not observed – uncertain if impediment’) saw ‘Observed gait₄’ coded as 1, with all others coded as 0.
The predicted DFactor score for males was determined as follows:

\[
ClusterM1 = (10.6623) + (-1.47917) \times \text{Fatigue} + (-1.41729) \times \text{Low appetite} + (-2.49931) \times \text{Weakness} + (2.14484) \times \text{Observed gait}_1 \\
+ (-0.380793) \times \text{Observed gait}_2 + (-2.50745) \times \text{Observed gait}_3 \\
+ (0.743403) \times \text{Observed gait}_4 + (-0.900943) \\
\times \text{Frequency of activities} + (-0.0992256) \times \text{Age}
\]

\[
ClusterM2 = (1.77965) + (6.92999e^{-12}) \times \text{Fatigue} + (1.53326e^{-10}) \times \text{Low appetite} + (1.17227e^{-10}) \times \text{Weakness} + (-5.6775e^{-11}) \times \text{Observed gait}_1 \\
+ (1.87149e^{-11}) \times \text{Observed gait}_2 + (3.50539e^{-11}) \times \text{Observed gait}_3 \\
+ (3.00685e^{-12}) \times \text{Observed gait}_4 + (-5.57989e^{-11}) \\
\times \text{Frequency of activities} + (-5.40195e^{-12}) \times \text{Age}
\]

\[
ClusterM3 = (-12.442) + (14.7917) \times \text{Fatigue} + (14.1729) \times \text{Low appetite} + (2.49931) \times \text{Weakness} + (-2.14484) \times \text{Observed gait}_1 \\
+ (0.380793) \times \text{Observed gait}_2 + (2.50745) \times \text{Observed gait}_3 \\
+ (-0.743403) \times \text{Observed gait}_4 + (0.900943) \\
\times \text{Frequency of activities} + (0.0992256) \times \text{Age}
\]

\[
\text{DFS(males)} = 0.5 \times \left( \frac{\text{ClusterM2} - \text{maxClusterM}}{\text{ClusterM1} - \text{maxClusterN} + \text{ClusterM2} - \text{maxClusterN} + \text{ClusterM3} - \text{maxClusterN}} \right) + \frac{\text{ClusterM1} - \text{maxClusterN} + \text{ClusterM2} - \text{maxClusterN} + \text{ClusterM3} - \text{maxClusterN}}{\text{ClusterM1} - \text{maxClusterN} + \text{ClusterM2} - \text{maxClusterN} + \text{ClusterM3} - \text{maxClusterN}}
\]

Where,

\(\text{maxClusterN} = \text{maximum value between ClusterM1, ClusterM2, and ClusterM3}\)
The predicted DFactor score for females was determined as follows:

\[
ClusterF1 = (11.4557) + (-1.19002) \times \text{Fatigue} + (-1.0991) \times \text{Low appetite} \\
+ (-2.223) \times \text{Weakness} + (2.17022) \times \text{Observed gait}_1 + (-0.470775) \\
\times \text{Observed gait}_2 + (-2.24213) \times \text{Observed gait}_3 + (0.542693) \\
\times \text{Observed gait}_4 + (-0.6816) \times \text{Frequency of activities} \\
+ (-0.103516) \times \text{Age}
\]

And,

\[
ClusterF2 = (1.77106) + (-2.22865e^{-12}) \times \text{Fatigue} + (-2.51367e^{-12}) \\
\times \text{Low appetite} + (-6.57505e^{-12}) \times \text{Weakness} + (1.53203e^{-11}) \\
\times \text{Observed gait}_1 + (-1.02629e^{-11}) \times \text{Observed gait}_2 \\
+ (-7.57729e^{-12}) \times \text{Observed gait}_3 + (2.51986e^{-12}) \\
\times \text{Observed gait}_4 + (-7.54609e^{-11}) \times \text{Frequency of activities} \\
+ (-4.54363e^{-12}) \times \text{Age}
\]

And,

\[
ClusterF3 = (-13.2267) + (1.19002) \times \text{Fatigue} + (1.0991) \times \text{Low appetite} \\
+ (2.223) \times \text{Weakness} + (-2.17022) \times \text{Observed gait}_1 + (0.470775) \\
\times \text{Observed gait}_2 + (2.24213) \times \text{Observed gait}_3 + (-0.542693) \\
\times \text{Observed gait}_4 + (1.06816) \times \text{Frequency of activities} \\
+ (0.103516) \times \text{Age}
\]

And,

\[
\text{DFS(females)} \\
= 0.5 \\
\times \left( \frac{\text{ClusterF2} \times \text{maxClusterF} \\
+ \text{ClusterF2} \times \text{maxClusterF}}{\text{ClusterF1} \times \text{maxClusterF} + \text{ClusterF2} \times \text{maxClusterF} + \text{ClusterF3} \times \text{maxClusterF}} \right)
\]

Where,

\[
\text{maxClusterF} = \text{maximum value between ClusterF1, ClusterF2, and ClusterF3}
\]
The cut-offs for the SHARE-FI75+ frailty calculator from the model for both gender (male and female) were approximated to:

For either gender,

If DFS between 0 – 0.24999, NON-FRAIL
If DFS between 0.25 – 0.74999, PRE-FRAIL
If DFS between 0.75 – 1, FRAIL