

Supplementary material: **An analysis of frailty and multimorbidity in 20,566 UK Biobank participants with Type 2 Diabetes**

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Supplementary Tables

Relationship between frailty/multimorbidity and age

| Supplementary table 1 Frailty index | | | |
|-------------------------------------|----------------|-----------------|-----------------|
| Frailty index value | Age 40-50 | Age 50-60 | Age 60-72 |
| 0-0.05 | 163 (8.8%) | 345 (5.8%) | 665 (5.2%) |
| 0.5-1.0 | 415 (22.3%) | 1264 (21.2%) | 2739 (21.5%) |
| 1.0-1.5 | 422 (22.7%) | 1463 (24.6%) | 3330 (26.1%) |
| 1.5-2.0 | 361 (19.4%) | 1152 (19.4%) | 2683 (21%) |
| >2.0 | 497 (26.7%) | 1729 (29%) | 3338 (26.2%) |

This table shows the number of participants of each level of frailty index, stratified by age. Percentages in brackets show the prevalence within age strata.

| Supplementary table 2 Frailty phenotype | | | |
|---|-----------------|-----------------|-----------------|
| Frailty phenotype | Age 40-50 | Age 50-60 | Age 60-72 |
| Robust | 474 (25.5%) | 1713 (28.8%) | 4074 (31.9%) |
| Pre-frail | 1082 (58.2%) | 3180 (53.4%) | 6764 (53%) |
| Frail | 235 (12.6%) | 797 (13.4%) | 1473 (11.5%) |
| NA | 67 (3.6%) | 263 (4.4%) | 444 (3.5%) |
| Individual components | | | |
| Weight loss | 672 (36.2%) | 1935 (32.5%) | 3455 (27.1%) |
| Low grip strength | 370 (19.9%) | 1531 (25.7%) | 4070 (31.9%) |
| Low physical activity | 379 (20.4%) | 1160 (19.5%) | 1968 (15.4%) |
| Exhaustion | 543 (29.2%) | 1482 (24.9%) | 2051 (16.1%) |
| Slow walking pace | 366 (19.7%) | 1313 (22.1%) | 3055 (24.0%) |

This table shows the number of participants of each level of frailty phenotype, stratified by age. Percentages in brackets show the prevalence within age strata. The number (and percentage) of participants with each of the individual components of the frailty phenotype is also shown, stratified by age.

| Supplementary table 3 Charlson Index | | | |
|--------------------------------------|-----------------|-----------------|-----------------|
| Value | Age 40-50 | Age 50-60 | Age 60-72 |
| 0 | 1335 (71.9%) | 3897 (65.5%) | 6826 (53.5%) |
| 1 | 380 (20.5%) | 1365 (22.9%) | 3297 (25.8%) |
| 2-13 | 143 (7.7%) | 691 (11.6%) | 2632 (20.6%) |

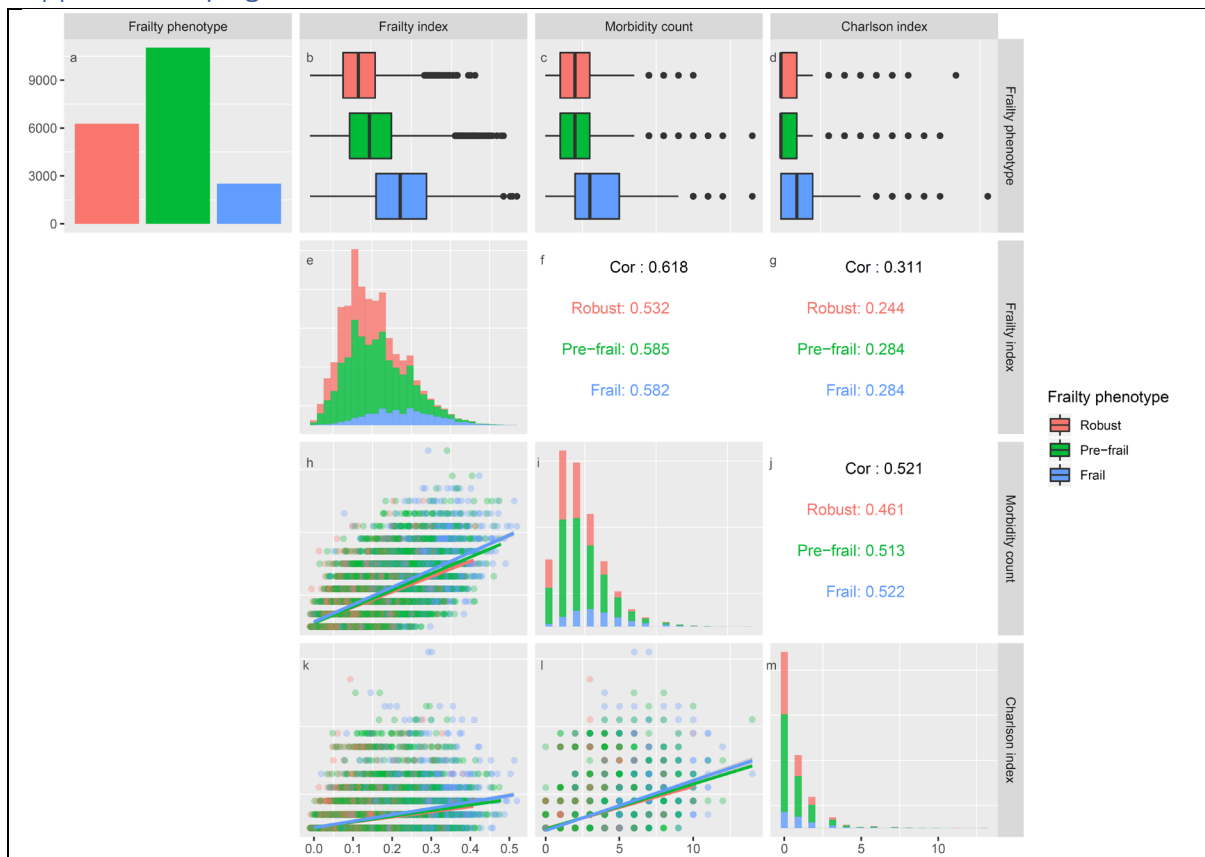
This table shows the number of participants of each level of charlson index, stratified by age. Percentages in brackets show the prevalence within age strata.

| Supplementary table 4 LTC count | | | |
|---------------------------------|----------------|-----------------|-----------------|
| Count | Age 40-50 | Age 50-60 | Age 60-72 |
| 0 | 381 (20.5%) | 761 (12.8%) | 950 (7.4%) |
| 1 | 600 (32.3%) | 1726 (29%) | 3131 (24.5%) |
| 2 | 380 (20.5%) | 1454 (24.4%) | 3281 (25.7%) |
| 3 | 234 (12.6%) | 903 (15.2%) | 2387 (18.7%) |
| 4 or more | 263 (14.2%) | 1109 (18.6%) | 3006 (23.6%) |

This table shows the number of participants of each level of the count of long-term conditions, stratified by age. Percentages in brackets show the prevalence within age strata.

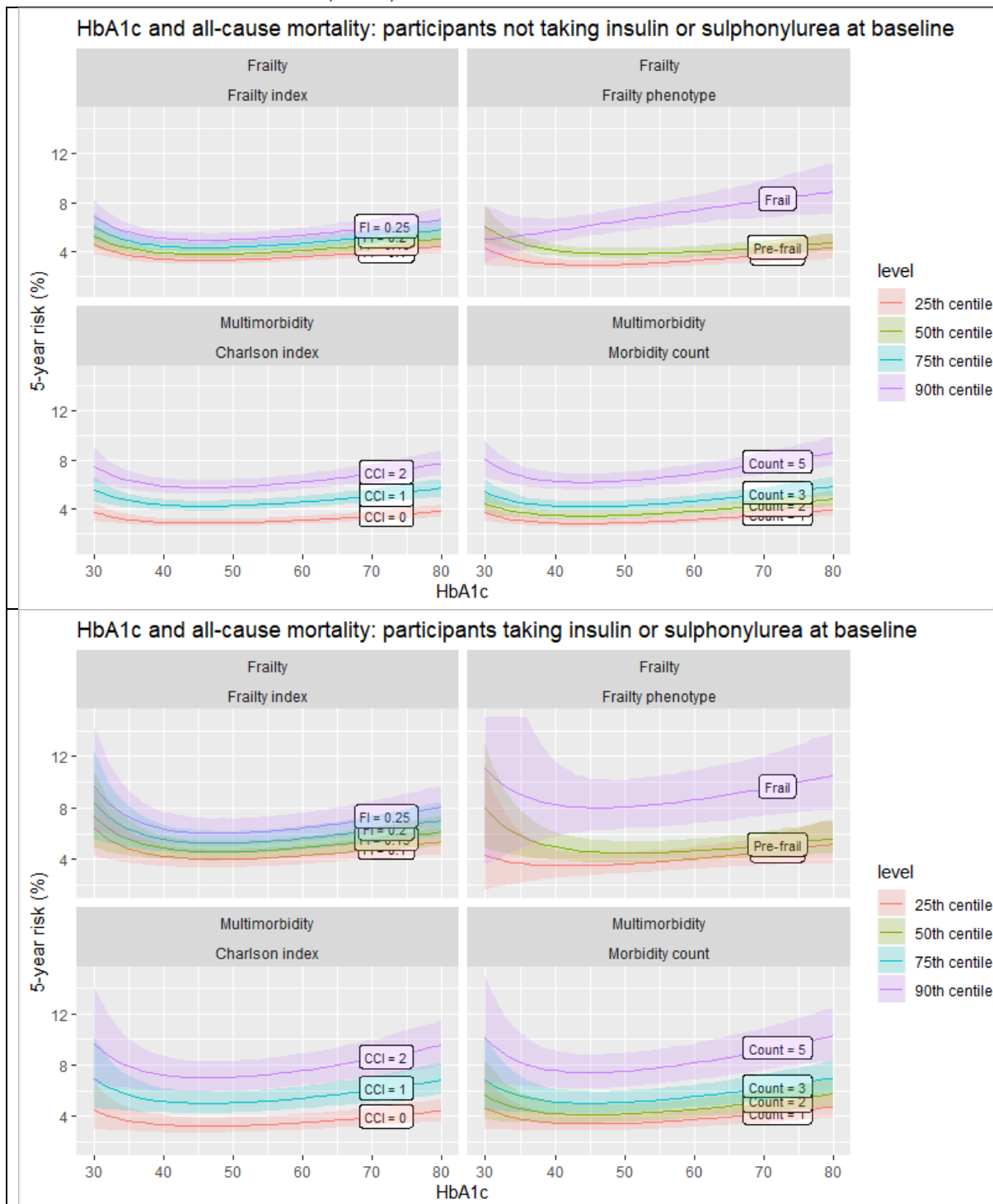
Supplementary figures

Supplementary figure 1: Correlation between measures



This plot shows the distribution of each measure of frailty or multimorbidity, as well as the correlation between each of the measures. Panel a shows the distribution of the frailty phenotype. Panels e, i, and m show the distribution of the frailty index, long-term condition count, and Charlson index, respectively, with the corresponding frailty phenotype levels shown in colour. Box-plots in panels b, c, and d show the median, interquartile range, range, and outliers of the frailty index, long-term condition count, and Charlson index, respectively, stratified by levels of the frailty phenotype. Scatter plots in panels h, k, and l show the correlation between the frailty index and the long-term condition count (panel h, with correlation coefficients shown in panel f), the frailty index and the Charlson index (panel k, with correlation coefficients shown in panel g) and the long-term condition count and the Charlson index (panel l, with correlation coefficients shown in panel j). Correlation coefficients are shown for all participants (black text) and stratified by level of the frailty phenotype (coloured text).

Supplementary figure 2: Relationship between HbA1c and mortality, stratified by baseline use of insulin or sulphonylurea



This figure shows the relationship between HbA1c and predicted 5-year mortality at different levels of frailty or multimorbidity, stratified by baseline use of hypoglycaemic agents (insulin or sulphonylurea). Frailty of multimorbidity measure is indicated by the panel labels. Coloured lines or points indicate point estimates for predicted 5-year mortality. Colours indicate the level of frailty or multimorbidity according to centiles. Shaded areas indicate 95% confidence intervals. Models are adjusted for age, sex, socioeconomic status, body mass index, smoking and alcohol. Predicted 5-year mortality is based on age 60, socioeconomic status and body mass index held at the sample mean, previous smokers, and 1-4 times weekly. There was a significant interaction between the frailty

phenotype and HbA1c. Interactions between frailty index, Charlson index, and LTC count were not significant.