

Supporting Information

Cognitive sarcopenia: Prevalence and the risk for mortality and healthy aging in the KORA-Age study

Marie-Theres Huemer^{1, 2}, Barbara Thorand^{1, 3}, Eva Grill^{3, 4}, Lars Schwettmann^{5, 6}, Annette Peters^{1, 3}

¹ Institute of Epidemiology, Helmholtz Zentrum München, German Research Center for Environmental Health (GmbH), Ingolstädter Landstraße 1, 85764, Neuherberg, Germany

² Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, USA

³ Institute for Medical Information Processing, Biometry and Epidemiology, Medical Faculty, Ludwig-Maximilians-Universität München, Marchioninstr. 15, 81377, Munich, Germany

⁴ German Center for Vertigo and Balance Disorders, DSGZ, Faculty of Medicine, Ludwig-Maximilians-Universität Munich (LMU), Germany

⁵ Institute of Health Economics and Health Care Management, Helmholtz Zentrum München, German Research Center for Environmental Health (GmbH), Ingolstädter Landstraße 1, 85764, Neuherberg, Germany

⁶ Department of Health Services Research, School of Medicine and Health Sciences, Carl von Ossietzky University of Oldenburg, Ammerländer Heerstr. 114-118, 26129 Oldenburg, Germany

Corresponding author:

Marie-Theres Huemer
Ingolstädter Landstr. 1, 85764 Neuherberg, Germany
marietheres.huemer@helmholtz-munich.de

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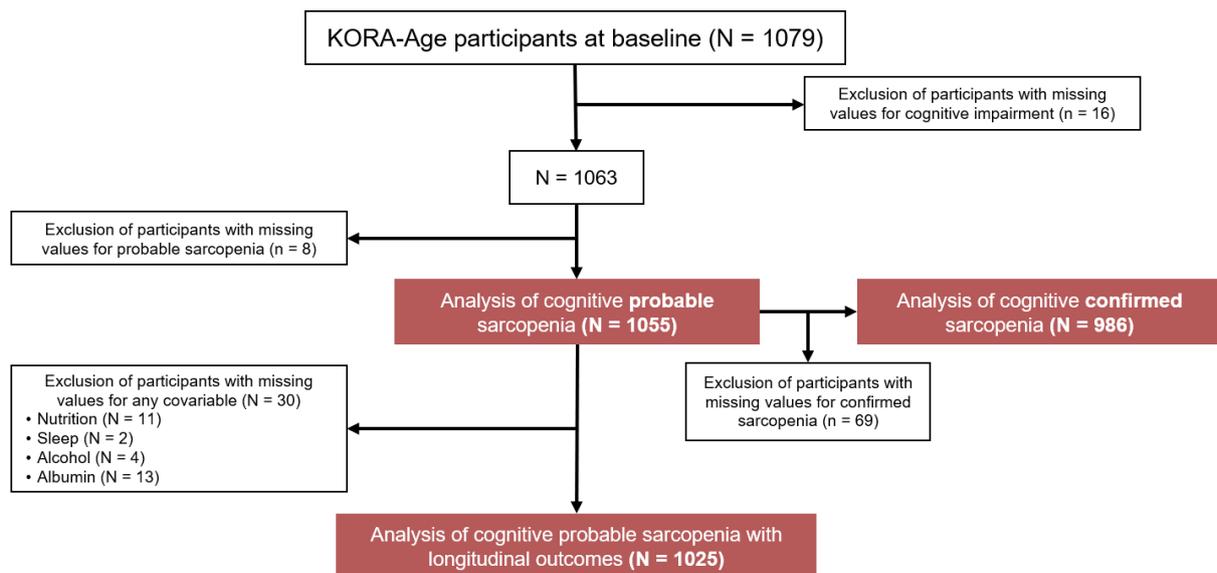


Fig. S1 Flow chart illustrating the exclusion of participants

Out of the 1079 baseline participants, 16 participants with missing values for cognitive impairment and 8 participants with missing values for probable sarcopenia were excluded. The remaining 1055 participants were included in the analysis of cognitive probable sarcopenia. For all analyses that included adjustment for covariables, we further excluded 30 participants with missing values for any covariable (N=1025). For the analysis of cognitive confirmed sarcopenia, we additionally excluded 69 participants out of the 1055 with missing values for appendicular skeletal muscle mass (ASMM), as ASMM is required to confirm sarcopenia (N=986).

Table S1 Available sample size and number of events for mortality and adverse outcomes (N = 1025)

| Outcome | Available sample size (N) | Events [N (%)] |
|--------------------------------|----------------------------------|-----------------------|
| All-cause mortality (12 years) | 1025 | 526 (51.3) |
| CVD mortality (12 years) | 1015 | 247 (24.3) |
| CHD mortality (12 years) | 1015 | 103 (10.1) |
| Falls (3 years) | 800 | 142 (17.8) |
| Falls (7 years) | 600 | 125 (20.8) |
| ADL disability (3 years) | 791 | 70 (8.8) |
| ADL disability (7 years) | 599 | 89 (14.9) |
| Hospital stay (3 years) | 789 | 205 (26.0) |
| Hospital stay (7 years) | 600 | 145 (24.2) |
| Nursing care (3 years) | 790 | 42 (5.3) |
| Nursing care (7 years) | 599 | 65 (10.9) |
| Disability (3 years) | 791 | 495 (62.6) |
| Disability (7 years) | 599 | 385 (64.3) |
| Multimorbidity (3 years) | 790 | 575 (72.8) |
| Multimorbidity (7 years) | 593 | 448 (75.5) |

ADL: activities of daily living; CHD: coronary heart disease; CVD: cardiovascular disease

Software tools

All statistical analyses were performed using R, V 4.3.1 [1]. The R package “eulerr” was used to create the Venn diagrams [2], the R package “survival” [3] to calculate the Cox regression models.

Table S2 Association of probable sarcopenia and cognitive impairment with mortality during twelve years of follow-up (Cox regression models)

| | Probable sarcopenia vs all remaining participants | | Cognitive impairment vs all remaining participants | |
|----------------------------|--|--------------|---|------------------|
| | HR (95% CI) | p-value | HR (95% CI) | p-value |
| All-cause mortality | | | | |
| Model 1 | 1.46 (1.17, 1.81) | 0.001 | 1.60 (1.32, 1.93) | <0.001 |
| Model 2 | 1.31 (1.04, 1.64) | 0.019 | 1.54 (1.27, 1.86) | <0.001 |
| Model 3 | 1.30 (1.03, 1.63) | 0.024 | 1.46 (1.20, 1.77) | <0.001 |
| CVD mortality | | | | |
| Model 1 | 1.27 (0.92, 1.75) | 0.145 | 1.46 (1.11, 1.93) | 0.007 |
| Model 2 | 1.13 (0.81, 1.58) | 0.456 | 1.41 (1.06, 1.88) | 0.019 |
| Model 3 | 1.16 (0.83, 1.62) | 0.380 | 1.33 (1.00, 1.78) | 0.049 |
| CHD mortality | | | | |
| Model 1 | 1.68 (1.04, 2.70) | 0.034 | 1.56 (1.02, 2.38) | 0.040 |
| Model 2 | 1.60 (0.98, 2.61) | 0.060 | 1.55 (1.00, 2.39) | 0.050 |
| Model 3 | 1.72 (1.05, 2.81) | 0.030 | 1.46 (0.94, 2.27) | 0.090 |

CHD: coronary heart disease; CI: confidence interval; CVD: cardiovascular disease; HR: hazard ratio.

Model adjustment:

Model 1: Age, sex.

Model 2: Model 1 + education, physical activity, nutrition, sleep duration, alcohol consumption.

Model 3: Model 2 + albumin, arthritis, neurological disease, lung disease, polypharmacy.

Bold font for p-values indicates significance ($p \leq 0.05$).

Table S3 Association of probable sarcopenia and cognitive impairment with adverse outcomes at three and seven years of follow-up (logistic regression models)

| | Probable sarcopenia vs all remaining participants | | Cognitive impairment vs all remaining participants | |
|---------------------------------|--|--------------|---|------------------|
| | OR (95% CI) | p-value | OR (95% CI) | p-value |
| Falls (3 years) | | | | |
| Model 1 | 1.19 (0.69, 1.99) | 0.528 | 1.13 (0.70, 1.79) | 0.604 |
| Model 2 | 1.21 (0.69, 2.05) | 0.495 | 1.12 (0.69, 1.78) | 0.652 |
| Model 3 | 1.18 (0.67, 2.02) | 0.564 | 1.06 (0.65, 1.70) | 0.818 |
| Falls (7 years) | | | | |
| Model 1 | 1.63 (0.85, 3.04) | 0.128 | 1.69 (1.00, 2.79) | 0.045 |
| Model 2 | 1.57 (0.81, 2.96) | 0.167 | 1.69 (1.00, 2.82) | 0.046 |
| Model 3 | 1.42 (0.72, 2.71) | 0.297 | 1.65 (0.97, 2.78) | 0.060 |
| ADL disability (3 years) | | | | |
| Model 1 | 2.78 (1.50, 5.04) | 0.001 | 2.92 (1.65, 5.18) | <0.001 |
| Model 2 | 2.53 (1.34, 4.68) | 0.004 | 2.59 (1.43, 4.67) | 0.002 |
| Model 3 | 2.84 (1.48, 5.37) | 0.001 | 2.41 (1.32, 4.38) | 0.004 |
| ADL disability (7 years) | | | | |
| Model 1 | 2.02 (0.97, 4.09) | 0.054 | 1.85 (1.00, 3.37) | 0.046 |
| Model 2 | 2.13 (1.00, 4.42) | 0.046 | 1.83 (0.96, 3.42) | 0.061 |
| Model 3 | 1.97 (0.92, 4.11) | 0.074 | 1.75 (0.92, 3.29) | 0.082 |
| Hospital stay (3 years) | | | | |
| Model 1 | 0.88 (0.52, 1.46) | 0.640 | 0.78 (0.51, 1.19) | 0.259 |
| Model 2 | 0.86 (0.50, 1.43) | 0.563 | 0.74 (0.47, 1.13) | 0.167 |
| Model 3 | 0.85 (0.49, 1.44) | 0.551 | 0.64 (0.41, 1.00) | 0.056 |
| Hospital stay (7 years) | | | | |
| Model 1 | 1.14 (0.59, 2.12) | 0.693 | 0.75 (0.43, 1.26) | 0.288 |
| Model 2 | 1.06 (0.54, 2.00) | 0.863 | 0.73 (0.42, 1.24) | 0.262 |
| Model 3 | 1.04 (0.52, 1.99) | 0.907 | 0.72 (0.41, 1.23) | 0.240 |
| Nursing care (3 years) | | | | |
| Model 1 | 2.44 (1.14, 5.01) | 0.018 | 3.94 (2.00, 7.76) | <0.001 |
| Model 2 | 2.05 (0.93, 4.32) | 0.065 | 3.41 (1.69, 6.83) | 0.001 |
| Model 3 | 2.43 (1.08, 5.27) | 0.028 | 2.95 (1.44, 5.99) | 0.003 |
| Nursing care (7 years) | | | | |
| Model 1 | 2.68 (1.26, 5.53) | 0.009 | 1.84 (0.95, 3.49) | 0.066 |
| Model 2 | 2.74 (1.26, 5.80) | 0.009 | 1.80 (0.91, 3.49) | 0.085 |
| Model 3 | 2.65 (1.20, 5.67) | 0.013 | 1.72 (0.86, 3.34) | 0.115 |
| Disability (3 years) | | | | |
| Model 1 | 3.07 (1.64, 6.22) | 0.001 | 1.50 (0.99, 2.32) | 0.062 |
| Model 2 | 2.70 (1.42, 5.53) | 0.004 | 1.48 (0.95, 2.33) | 0.084 |
| Model 3 | 2.46 (1.27, 5.12) | 0.011 | 1.32 (0.84, 2.11) | 0.234 |
| Disability (7 years) | | | | |
| Model 1 | 2.03 (0.91, 5.07) | 0.102 | 2.21 (1.25, 4.05) | 0.008 |
| Model 2 | 1.73 (0.75, 4.37) | 0.218 | 2.30 (1.27, 4.28) | 0.007 |
| Model 3 | 1.37 (0.57, 3.63) | 0.500 | 2.22 (1.21, 4.22) | 0.012 |
| Multimorbidity (3 years) | | | | |
| Model 1 | 2.08 (1.13, 4.14) | 0.026 | 1.38 (0.88, 2.19) | 0.166 |
| Model 2 | 1.91 (1.03, 3.82) | 0.052 | 1.39 (0.88, 2.22) | 0.164 |
| Model 3 | 1.88 (0.99, 3.84) | 0.066 | 1.25 (0.78, 2.03) | 0.367 |
| Multimorbidity (7 years) | | | | |
| Model 1 | 1.19 (0.57, 2.71) | 0.658 | 1.43 (0.81, 2.63) | 0.234 |
| Model 2 | 1.08 (0.52, 2.50) | 0.838 | 1.41 (0.79, 2.61) | 0.258 |
| Model 3 | 0.86 (0.39, 2.06) | 0.724 | 1.42 (0.78, 2.68) | 0.264 |

ADL: activities of daily living; CI: confidence interval; OR: odds ratio.

Model adjustment:

Model 1: Age, sex.

Model 2: Model 1 + education, physical activity, nutrition, sleep duration, alcohol consumption.

Model 3: Model 2 + albumin, arthritis, neurological disease, lung disease, polypharmacy.

Bold font for p-values indicates significance ($p \leq 0.05$).

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