Supplementary data

Table S1
Table S2
Table S1. Determinants of health care utilisation (GP visits, specialist visits and hospital admission) in late life among community-dwelling individuals. Results of multilevel random intercept negative binominal regression (IRR) and the random-effects logistic regression (OR). AgeMooDe - German “Late-life depression in primary care: needs, health care utilisation and costs”.

| Independent variables | Number of GP visits | Medical specialists – number of visits | Hospital admission (yes/no) |
|-----------------------|---------------------|---------------------------------------|-----------------------------|
|                       | IRR                 | 95\% CI                               | IRR                         | 95\% CI                     | OR                      | 95\% CI                     |
| Depression (GDS ≥6)   | 1.19***             | (1.08 - 1.31)                         | 1.12*                       | (1.00 - 1.26)               | 1.62**                  | (1.15 - 2.29)               |
| Age                   | 1.01+               | (1.00 - 1.02)                         | 0.97***                     | (0.96 - 0.98)               | 0.98                    | (0.95 - 1.01)               |
| Female (ref: male)    | 1.11*               | (1.01 - 1.21)                         | 1.00                        | (0.90 - 1.12)               | 0.72*                   | (0.52 - 1.00)               |
| Education (ref: low)  |                     |                                       |                             |                             |                         |                         |
| - Middle              | 0.97                | (0.89 - 1.07)                         | 1.08                        | (0.97 - 1.21)               | 0.85                    | (0.61 - 1.18)               |
| - High                | 0.99                | (0.89 - 1.11)                         | 1.05                        | (0.93 - 1.20)               | 0.82                    | (0.55 - 1.21)               |
| Marital status (ref: married, living with spouse) |                     |                                       |                             |                             |                         |                         |
| - Married, living separated | 0.96       | (0.75 - 1.24)                         | 1.26                        | (0.96 - 1.66)               | 1.50                    | (0.63 - 3.57)               |
| - Single              | 0.91                | (0.73 - 1.13)                         | 0.96                        | (0.74 - 1.23)               | 0.99                    | (0.44 - 2.24)               |
| - Divorced            | 1.30**              | (1.07 - 1.58)                         | 1.05                        | (0.82 - 1.35)               | 1.57                    | (0.77 - 3.19)               |
| - Widowed             | 1.05                | (0.91 - 1.22)                         | 1.07                        | (0.90 - 1.27)               | 0.96                    | (0.55 - 1.66)               |
| Living situation (ref: alone) |                     |                                       |                             |                             |                         |                         |
| - Living together with spouse/partner/relative | 1.02          | (0.89 - 1.17)                         | 1.13                        | (0.96 - 1.33)               | 0.72                    | (0.42 - 1.22)               |
| - Retirement home/assisted living/nursing home | 1.10            | (0.94 - 1.30)                         | 0.98                        | (0.80 - 1.21)               | 0.87                    | (0.47 - 1.59)               |
| Health insurance (ref: statutory) |                     |                                       |                             |                             |                         |                         |
| - Private health insurance | 1.37***     | (1.14 - 1.65)                         | 0.83                        | (0.65 - 1.05)               | 1.67                    | (0.90 - 3.11)               |
| High Social support (ESSI) (ref: low) | 1.03          | (0.94 - 1.13)                         | 1.10+                       | (0.99 - 1.22)               | 1.14                    | (0.79 - 1.64)               |
| Cognitive function (MMSE) | 0.98*           | (0.97 - 1.00)                         | 1.00                        | (0.98 - 1.02)               | 1.01                    | (0.95 - 1.08)               |
| Chronic disease score (CDS) | 1.05***        | (1.03 - 1.06)                         | 1.03**                      | (1.01 - 1.04)               | 1.12***                 | (1.06 - 1.17)               |
| Functional impairment (ADL) (ref: no) | 1.17***       | (1.08 - 1.26)                         | 1.09*                       | (1.00 - 1.19)               | 1.79***                 | (1.29 - 2.49)               |
| Visual impairment: (ref: no) | 0.92*          | (0.85 - 1.00)                         | 1.01                        | (0.93 - 1.11)               | 1.07                    | (0.79 - 1.44)               |
| Hearing impairment: (ref: no) | 0.97            | (0.90 - 1.05)                         | 1.14**                      | (1.05 - 1.25)               | 1.27+                   | (0.96 - 1.68)               |
| Random part           | yes                 |                                       | yes                         |                             | yes                     |                             |
| Observations          | 1,843               |                                       | 1,846                       |                             | 1,843                   |                             |
| Individuals           | 1,118               |                                       | 1,119                       |                             | 1,118                   |                             |

Notes: Inclusion-rate ratios (IRR) and odds-ratios (OR) with 95\% confidence intervals (95\% CI) are reported. Depression - short version of the Geriatric Depression Scale, which contains 15 items (GDS-SF) [29]; Educational level (CASMIN) low, middle, high [33]; Social support - German Version of the ENRICHD Social Support
Inventory - ESSI (35), range 5-25, values lower or equal to 18 indicated low social support (36); Cognitive function - Mini-Mental State Examination (MMSE), from 0 (worst) to 30 (best) (39); Chronic disease score (CDS) - burden of multimorbidity, range 0-12, higher scores indicate higher morbidity (38); Functional impairment - 24-item scale (instrumental) activities of daily living (IADL/ADL). Patients who had difficulty on at least one ADL/IADL were classified as functionally impaired (37). *** p<0.001, ** Notes: p<0.01, * p<0.05
Table S2: Sensitivity analysis – results stratified by sex. Determinants of health care utilisation (GP visits, specialist visits and hospital admission) in late life among community-dwelling individuals. Results of multilevel random intercept negative binomial regression (IRR) and the random-effects logistic regression (OR). AgeMooDe - German “Late-life depression in primary care: needs, health care utilisation and costs”.

| Independent variables | Number of GP visits | Medical specialists – number of visits | Hospital admission |
|-----------------------|---------------------|---------------------------------------|-------------------|
|                       | Female (95% CI)     | Male (95% CI)                         | Female (95% CI)   | Male (95% CI) |
| Depressive symptoms (GDS) | 1.03** (1.01 - 1.05) | 1.03* (1.01 - 1.06) | 1.03* (1.00 - 1.05) | 1.07+ (1.00 - 1.14) | 1.09+ (1.00 - 1.19) |
| Age:                  | 1.00 (0.99 - 1.02)   | 1.01 (1.00 - 1.03) | 0.96*** (0.95 - 0.97) | 0.97 (0.96 - 0.99) | 0.98 (0.94 - 1.02) | 0.97 (0.92 - 1.03) |
| Education (CASMIN): (ref: Low) | 0.96 (0.86-1.07) | 1.01 (0.85-1.19) | 0.98 (0.85-1.13) | 1.30** (1.08-1.56) | 0.84 (0.55-1.28) | 0.91 (0.53 - 1.58) |
| - High                | 0.97 (0.83-1.14) | 1.03 (0.88-1.20) | 1.07 (0.88-1.31) | 1.06 (0.89-1.26) | 1.34 (0.75-2.38) | 0.54* (0.31-0.94) |
| Marital status: (ref: Married, living with spouse) | 1.02 (0.73-1.42) | 0.95 (0.65-1.39) | 1.10 (0.74-1.64) | 1.45* (1.00-2.11) | 1.78 (0.51-2.11) | 1.27 (0.35-4.69) |
| - Married, living separated with spouse | 0.94 (0.73-1.22) | 0.87 (0.55-1.36) | 1.11 (0.82-1.52) | 0.61+ (0.36-1.02) | 1.18 (0.44-3.19) | 0.24 (0.03-2.22) |
| - Single              | 1.35* (1.06-1.72) | 1.18 (0.80-1.75) | 1.17 (0.85-1.60) | 0.90 (0.57-1.40) | 1.61 (0.64-4.07) | 2.37 (0.66-8.54) |
| - Divorced            | 1.07 (0.89-1.29) | 1.05 (0.83-1.33) | 1.13 (0.89-1.42) | 1.10 (0.86-1.41) | 1.06 (0.49-2.28) | 0.68 (0.28-1.67) |
| - Widowed             | 1.19 | 1.19 | 1.19 | 1.09 | 0.72 | 0.72 | 0.59 | 0.59 |
| Living situation: (ref: Alone) | 1.01 (0.85-1.21) | 1.19 (0.89-1.42) | 1.19 (0.96-1.47) | 0.99 (0.86-1.39) | 0.93 (0.36-1.39) | 1.44 (0.24 - 1.42) |
| - Living together with spouse/partner/relative | 1.03 (0.86-1.25) | 1.28 (0.92-1.79) | 0.95 (0.74-1.21) | 1.10 (0.76-1.60) | 1.05 (0.53-2.09) | 0.48 (0.12 - 1.92) |
| - Retirement home/assisted living/nursing home | 1.64*** (1.27 - 2.13) | 1.15 (0.89 - 1.50) | 0.71+ (0.48 - 1.04) | 0.93 (0.70 - 1.24) | 1.44 (0.52 - 3.98) | 1.67 (0.72 - 3.91) |
| Private Health Insurance: (ref: Statutory) | 1.10+ (0.99-1.22) | 0.90 (0.76-1.07) | 1.06 (0.93-1.21) | 1.28* (1.05-1.56) | 1.38 (0.87-2.20) | 0.72 (0.38-1.36) |
| Social Support (ESSI): (ref: Low) | 1.20** (0.97-1.01) | 1.01 (0.97 - 1.00) | 1.01 (0.98-1.03) | 0.99 (0.96 - 1.02) | 0.93+ (0.86-1.01) | 1.20** (1.06-1.35) |

Note: ***p < 0.001, **p < 0.01, *p < 0.05, +p < 0.10.
|                              | 1.05**** | 1.04*** | 1.02*   | 1.03*   | 1.09**  | 1.15**  |
|------------------------------|----------|---------|---------|---------|---------|---------|
|                              | (1.03 - 1.06) | (1.02 - 1.07) | (1.00-1.04) | (1.00-1.05) | (1.02 - 1.17) | (1.05 - 1.25) |
| Chronic disease score (CDS): |          |         |         |         |         |         |
| Functional impairment (ADL): | 1.19***  | 1.10    | 1.05    | 1.11    | 1.97**  | 1.54+   |
|                              | (1.08-1.32) | (0.97-1.25) | (0.94-1.18) | (0.97 - 1.26) | (1.22-1.16) | (0.94-2.51) |
|                              | 0.92     | 0.92    | 0.96    | 1.09    | 0.92    | 1.30    |
|                              | (0.84-1.02) | (0.80-1.05) | (0.85-1.08) | (0.84-1.25) | (0.62-1.36) | (0.80-2.13) |
|                              | 1.01     | 0.91    | 1.24*** | 1.01    | 1.36    | 1.10    |
|                              | (0.92-1.11) | (0.81-1.03) | (1.11-1.40) | (0.89-1.16) | (0.94-1.96) | (0.70-1.74) |
|                              | 1,158    | 685     | 1,159   | 687     | 1,155   | 688     |
| Observations                 |          |         |         |         |         |         |
| Individuals                  | 698      | 420     | 698     | 421     | 696     | 422     |

Notes: Incidence-rate ratios (IRR) and odds-ratios (OR) with 95% confidence intervals (95% CI) are reported. Depression - short version of the Geriatric Depression Scale, which contains 15 items (GDS-SF) (29); Educational level (CASMIN) low, middle, high [33]; Social support - German Version of the ENRICHDM Social Support Inventory (ESSI) (35), range 5-25, values lower or equal to 18 indicated low social support (36); Cognitive function - Mini-Mental State Examination (MMSE), from 0 (worst) to 30 (best) (39); Chronic disease score (CDS) - burden of multimorbidity, range 0-12, higher scores indicate higher morbidity (38); Functional impairment - 24-item scale (instrumental) activities of daily living (IADL/ADL). Patients who had difficulty on at least one ADL/IADL were classified as functionally impaired (37). *** p<0.001, ** Notes: p<0.01, * p<0.05