# Additional file 1

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## sMethod 1. Detailed information on KoGES

Korean Genome and Epidemiology Study (KoGES) consists of large-scale six prospective cohort studies employed by the Korean government (National Research Institute of Health (NIH), Centers for Disease Control and Prevention, and the Ministry of Health and Welfare, Korea). The cohort studies are categorized into population-based and gene-environment model studies. The population-based cohorts include the *Health Examinee* (HEXA) study and the *Ansan and Ansung* study. Under the supervision of trained staff, eligible participants were invited to visit the survey sites and provided data through questionnaires assessing health status and lifestyle habits, as well as physical examinations. After enrollment, they underwent periodic follow-up assessments and telephone/email surveys.

***HEXA*** is composed of individuals recruited from the national health examinee registry, which is part of the National Health Insurance Program. The study recruited volunteers aged ≥40 years who visited medical institutions, primarily general hospitals, in metropolitan areas and major cities in Korea (e.g., Seoul, Busan, Changwon, Daegu, and Gwangju). The initial survey was conducted between 2004 and 2013, starting with 173,195 participants. At baseline, the mean chronological age of participants was 53.1 years (SD: 8.4), and the cohort consisted of 59,294 males and 114,063 females. The prevalence of hypertension was 30.9%, type 2 diabetes was 9.3%, and obesity was 34.8%. The first follow-up exam, conducted between 2007 and 2016, included 70,214 participants, with an approximate retention rate of 40.5% (a total of 2 waves so far).

***Ansan and Ansung*** involved residents from two areas in Gyeonggi Province: Ansan (a suburban area) and Ansung (a rural area). To collect representative samples, registered inhabitants were randomly selected and contacted. Among them, a total of 10,030 participants aged 40–69 years were voluntarily enrolled at baseline between 2001 and 2002 (5,012 from Ansan and 5,018 from Ansung). The recruited individuals had a mean chronological age of 52.3 years (SD: 8.9) and consisted of 4,758 males and 5,272 females. This distribution was comparable to that of non-recruited individuals. The prevalence of hypertension was 33.8%, type 2 diabetes was 8.7%, and obesity was 43.0%. The *Ansan and Ansung* study conducted nine biennial follow-up surveys, resulting in a total of 10 waves by 2020. The follow-up rates for the 2nd to 10th follow-ups were 80.7%, 71.3%, 65.0%, 67.2%, 63.4%, 63.3%, 66.5%, 64.2%, and 61.9%, respectively.

**sMethod 2. Assessing healthy diet for CVH score**

To assess dietary quality, we used the Healthy Lifestyle Score. A score of 1 was assigned if the individual complied with the recommended intake levels (servings/day or week) for each of the nine food groups−fruits, nuts, vegetables, refined grains, fish, dairy products, processed meats, unprocessed red meats, and sugar-sweetened beverages; Otherwise, a score of 0 was given (total score ranging from 0 to 9). In the next step, individuals in the top percentile (95%) of the aggregated score were assigned a score of 100, and the remaining were assigned scores corresponding to their percentiles (zero points for the 1–24th percentile, 25 points for the 25–49th percentile, 50 points for the 50–74th percentile, and 80 points for the 75–94th percentile).

**Table S1. Assessment of CVH components**

| Domain | CVH components | Metric | Points | Criteria |
|---|---|---|---|---|
| Health behaviours | Healthy diet | HLS diet scores | 100 | ≥ 95$^{th}$ percentile (ideal quantile) |
| | | | 80 | 75–94$^{th}$ percentile |
| | | | 50 | 50–74$^{th}$ percentile |
| | | | 25 | 25–49$^{th}$ percentile |
| | | | 0 | 1–24$^{th}$ percentile (least ideal quantile) |
| | Healthy sleep | Average hours of sleep per night | 100 | 7-8 hours |
| | | | 90 | 9 hours |
| | | | 70 | 6 hours |
| | | | 40 | 5 or ≥10 hours |
| | | | 20 | 4 hours |
| | | | 0 | < 4 hours |
| | Nicotine avoidance | Current smoking, smoking cessation period, and secondhand smoke exposure at home | 100 | Never smoker |
| | | | 75 | Former smoker, quit ≥ 5 years |
| | | | 50 | Former smoker, quit 1-4 years |
| | | | 25 | Former smoker, quit <1 year |
| | | | 0 | Current smoker |
| | | | *Subtract 20 points (unless score is 0) for living with indoor smoker in home † | |
| | Physical activity | Minutes of exercise of intensity to induce sweating (per week) | 100 | ≥ 150 minutes |
| | | | 90 | 120-149 minutes |
| | | | 80 | 90-119 minutes |
| | | | 60 | 60-89 minutes |
| | | | 40 | 30-59 minutes |
| | | | 20 | 1-29 minutes |
| | | | 0 | 0 |
| Clinical indicators | BMI (kg/m$^2$) | Body weight (kilograms) divided by height squared (meters squared) | 100 | < 25 kg/m$^2$ |
| | | | 70 | 25-29.9 kg/m$^2$ |
| | | | 30 | 30-34.9 kg/m$^2$ |
| | | | 15 | 35-39.9 kg/m$^2$ |
| | | | 0 | ≥ 40 kg/m$^2$ |
| | Blood lipids (mg/dL) | Non-HDL cholesterol | 100 | < 130 mg/dL |
| | | | 60 | 130-159 mg/dL |
| | | | 40 | 160-189 mg/dL |
| | | | 20 | 190-219 mg/dL |
| | | | 0 | ≥ 220 mg/dL |
| | | | *Subtract 20 points (unless score is 0), if drug-treated level | |
| | Blood glucose (mg/dL or %) | Diabetes diagnosis, HbA1c (%) or Fasting blood glucose (FBG, mg/dL) | 100 | No history of diabetes diagnosis and HbA1c < 5.7 (or FBG <100) |
| | | | 60 | No history of diabetes diagnosis and HbA1c 5.7-6.4 (or FBG 100-125) |
| | | | 40 | Diabetes diagnosis with HbA1c <7.0 or no history of diabetes diagnosis with HbA1c 6.5-6.9 |
| | | | 30 | Diabetes diagnosis with HbA1c 7.0-7.9 or no history of diabetes diagnosis with HbA1c 7.0-7.9 |
| | | | 20 | Diabetes diagnosis with HbA1c 8.0-8.9 or no history of diabetes diagnosis with HbA1c 8.0-8.9 |

| | | | | |
|---|---|---|---|---|
| | | | 10 | Diabetes diagnosis with HbA1c 9.0-9.9 or no history of diabetes diagnosis with HbA1c 9.0-9.9 |
| | | | 0 | Diabetes diagnosis with HbA1c ≥10.0 or no history of diabetes diagnosis with HbA1c ≥10.0 |
| | Blood pressure (mmHg) | Systolic and diastolic blood pressure (BP, mmHg) | 100 | SBP < 120 and DBP <80 |
| | | | 75 | SBP 120-129 and DBP <80 |
| | | | 50 | SBP 130-139 or DBP 80-89 |
| | | | 25 | SBP 140-159 or DBP 90-99 |
| | | | 0 | SBP ≥ 160 or DBP ≥ 100 |
| | | | *Subtract 20 points (unless score is 0), if drug-treated level | |

† We used secondhand smoke exposure at home as a proxy for living with an indoor smoker when the latter variable was missing.

**Table S2. Distribution of CVH score and level**

| Variables | | | Total (N= 1,940) | Males (n= 1,125) | Females (n= 815) | P-value [a] |
|---|---|---|---|---|---|---|
| CVH score [b], mean (SD) | Health behaviours | Healthy diet | 49.0 (36.9) | 42.4 (35.9) | 58.2 (36.3) | <.001 |
| | | Healthy sleep | 74.8 (27.6) | 76.6 (26.4) | 71.7 (29.3) | 0.005 |
| | | Nicotine avoidance | 64.8 (39.5) | 45.7 (40.1) | 91.2 (17.3) | <.001 |
| | | Physical activity | 35.5 (45.8) | 34.9 (45.7) | 36.3 (46.0) | 0.506 |
| | Health indicators | BMI | 85.0 (21.7) | 83.8 (23.1) | 86.6 (19.3) | 0.004 |
| | | Blood lipids | 61.9 (28.9) | 63.2 (28.6) | 60.1 (29.1) | 0.024 |
| | | Blood glucose | 74.9 (32.4) | 75.4 (31.2) | 74.3 (33.9) | 0.471 |
| | | Blood pressure | 69.9 (30.7) | 67.6 (30.6) | 73.2 (30.6) | <.001 |
| | Total score (average) | | 63.9 (14.2) | 60.4 (14.1) | 68.8 (13.0) | <.001 |
| CVH level [c], n (%) | | Ideal | 267 (13.76) | 100 (8.89) | 167 (20.49) | <.001 |
| | | Intermediate | 1377 (70.98) | 786 (69.87) | 591 (72.52) | |
| | | Poor | 296 (15.26) | 239 (21.24) | 57 (6.99) | |

[a] Global P values were obtained from $x^2$ tests for categorical variables and Student *t* tests for continuous variables to compare between the sexes.

[b] Ranged from 0 to 100; A higher score means better health behaviours and health status.

[c] Ideal (80-100 points), intermediate (50-79 points), and poor (0-49 points)

*SD* standard deviation

**Table S3. The associations between CVH and EAA in total participants (sensitivity analyses)**

| | | EAA | Total participants β (95% CI) [a] |
|---|---|---|---|
| CVH score [b] | | IEAA | -0.25 (-0.44, -0.06) * |
| | | EEAA | -0.05 (-0.24, 0.13) |
| | | PhenoAA | -0.53 (-0.77, -0.28) ** |
| | | Grim2AA | -0.91 (-1.07, -0.76) ** |
| | | DunedinPACE | -2.62 (-3.06, -2.18) ** |
| CVH level [c] | Ideal | IEAA | -0.29 (-0.83, 0.25) |
| | Poor | | 0.47 (-0.04, 0.99) |
| | Ideal | EEAA | -0.17 (-0.69, 0.35) |
| | Poor | | -0.07 (-0.57, 0.43) |
| | Ideal | PhenoAA | -0.73 (-1.42, -0.04) * |
| | Poor | | 1.02 (0.35, 1.68) * |
| | Ideal | Grim2AA | -1.12 (-1.56, -0.68) ** |
| | Poor | | 1.73 (1.31, 2.16) ** |
| | Ideal | DunedinPACE | -3.54 (-4.79, -2.29) ** |
| | Poor | | 5.80 (4.60, 7.00) ** |

[a] Adjusted for sex, chronological age, marital status, education level, household income, and employment.
[b] β represents the change in EAA for each 1-SD (standard deviation; 14.2) increase in CVH score
[c] Reference = Intermediate
Stratum-specific P-values: * P< 0.05; ** P< .001

**Table S4. Associations between overall CVH and EAA from regression analysis (adjusted for cell type composition)**

| | | EAA | Total (N= 1,940) β (95% CI) | Males (n= 1,125) β (95% CI) | Females (n= 815) β (95% CI) | Interaction P-value |
|---|---|---|---|---|---|---|
| CVH score † | | IEAA | -0.26 (-0.45, -0.07)* | -0.28 (-0.53, -0.03)* | -0.35 (-0.63, -0.07)* | 0.679 |
| | | EEAA | -0.17 (-0.35, 0.01) | -0.20 (-0.43, 0.03) | -0.19 (-0.45, 0.07) | 0.984 |
| | | PhenoAA | -0.65 (-0.88, -0.42)** | -0.59 (-0.89, -0.29)** | -0.69 (-1.03, -0.35)** | 0.713 |
| | | Grim2AA | -0.92 (-1.06, -0.78)** | -1.03 (-1.22, -0.83)** | -0.70 (-0.89, -0.51)** | 0.010* |
| | | DunedinPACE | -2.49 (-2.91, -2.06)** | -2.86 (-3.41, -2.31)** | -1.71 (-2.36, -1.06)** | 0.010* |
| CVH level ‡ | Ideal | IEAA | -0.27 (-0.82, 0.27) | -0.04 (-0.91, 0.83) | -0.66 (-1.35, 0.02) | 0.541 |
| | Poor | | 0.50 (-0.02, 1.02) | 0.59 (-0.02, 1.20) | 0.42 (-0.65, 1.49) | |
| | Ideal | IEAA | -0.38 (-0.88, 0.12) | -0.37 (-1.18, 0.44) | -0.51 (-1.15, 0.12) | 0.252 |
| | Poor | | 0.12 (-0.36, 0.60) | 0.36 (-0.21, 0.92) | -0.59 (-1.58, 0.40) | |
| | Ideal | PhenoAA | -0.98 (-1.63, -0.33)* | -0.75 (-1.79, 0.30) | -1.26 (-2.08, -0.44)* | 0.847 |
| | Poor | | 1.16 (0.54, 1.78)** | 1.20 (0.47, 1.94)* | 0.89 (-0.39, 2.17) | |
| | Ideal | Grim2AA | -0.95 (-1.35, -0.55)** | -1.25 (-1.92, -0.57)** | -0.86 (-1.33, -0.39)** | 0.100 |
| | Poor | | 1.81 (1.43, 2.20)** | 1.90 (1.43, 2.37)** | 1.40 (0.68, 2.13)** | |
| | Ideal | DunedinPACE | -3.15 (-4.36, -1.95)** | -3.37 (-5.28, -1.45)** | -3.21 (-4.78, -1.64)** | 0.309 |
| | Poor | | 5.62 (4.46, 6.78)** | 6.00 (4.66, 7.35)** | 4.27 (1.83, 6.70)** | |

Adjusted for chronological age, marital status, education level, household income, employment, current drinking, no. of comorbidities, and cell type composition (sex was additionally adjusted in total participants; menopause status was additionally adjusted in females).

† β represents the change in EAA for each 1-SD (standard deviation) increase in CVH score; Participants (SD): total (14.2); males (14.1); females (13.0)

‡ Reference = Intermediate

Interaction P-values derived from interaction analysis between CVH and sex.

Stratum-specific P-values: * P< .05; ** P< .001

**Table S5. The sex-stratified associations between CVH and EAA from regression analysis (The first-generation clocks)**

| | | EAA | Total (N= 1,940) β (95% CI) | Males (n= 1,125) β (95% CI) | Females (n= 815) β (95% CI) | Interaction P-value |
|---|---|---|---|---|---|---|
| CVH score [a] | | IEAA | -0.27 (-0.46, -0.08)* | -0.29 (-0.54, -0.04)* | -0.34 (-0.62, -0.06)* | 0.765 |
| | | EEAA | -0.06 (-0.24, 0.13) | -0.07 (-0.31, 0.18) | -0.16 (-0.44, 0.11) | 0.769 |
| CVH level [b] | Ideal | IEAA | -0.30 (-0.84, 0.23) | -0.05 (-0.91, 0.82) | -0.68 (-1.36, -0.01)* | 0.511 |
| | Poor | | 0.53 (0.01, 1.05)* | 0.63 (0.03, 1.24)* | 0.38 (-0.68, 1.45) | |
| | Ideal | EEAA | -0.18 (-0.70, 0.34) | -0.04 (-0.88, 0.80) | -0.44 (-1.11, 0.23) | 0.538 |
| | Poor | | -0.06 (-0.56, 0.45) | 0.12 (-0.47, 0.71) | -0.39 (-1.43, 0.66) | |

Adjusted for chronological age, marital status, education level, household income, job, current drinking, and the no. of comorbidities
(sex was additionally adjusted in total participants; menopause status was additionally adjusted in females).
[a] β represents the change in EAA for each 1-SD (standard deviation) increase in CVH score; Participants (SD): total (14.2); male (14.1); female (13.0)
Interaction P-values derived from interaction analysis between CVH and sex.
[b] Reference= Intermediate
Stratum-specific P-values: * P< 0.05

**Table S6. Associations between individual CVH components and EAA from regression analysis by sex**

| CVH components | | EAA | Males (n= 1,125) β (95% CI) | Females (n= 815) β (95% CI) | Interaction P-value |
|---|---|---|---|---|---|
| Health behaviors | Healthy diet | PhenoAA | 0.30 (-0.11, 0.72) | 0.04 (-0.48, 0.56) | 0.217 |
| | | Grim2AA | 0.05 (-0.21, 0.30) | -0.20 (-0.50, 0.11) | 0.077 |
| | | DunedinPACE | -0.03 (-0.75, 0.70) | -0.16 (-1.16, 0.83) | 0.576 |
| | Healthy sleep | PhenoAA | 0.06 (-0.34, 0.47) | 0.23 (-0.28, 0.74) | 0.834 |
| | | Grim2AA | -0.03 (-0.28, 0.22) | 0.16 (-0.14, 0.46) | 0.464 |
| | | DunedinPACE | 0.10 (-0.61, 0.81) | 0.53 (-0.46, 1.51) | 0.570 |
| | Nicotine avoidance | PhenoAA | -0.50 (-0.95, -0.06)* | -0.34 (-0.86, 0.17) | 0.347 |
| | | Grim2AA | -1.74 (-2.01, -1.47)** | -0.61 (-0.91, -0.31)** | 0.737 |
| | | DunedinPACE | -3.56 (-4.34, -2.78)** | -1.03 (-2.02, -0.04)* | 0.543 |
| | Physical activity | PhenoAA | -0.25 (-0.67, 0.17) | -0.32 (-0.81, 0.17) | 0.858 |
| | | Grim2AA | -0.04 (-0.30, 0.23) | -0.40 (-0.69, -0.12)* | 0.055 |
| | | DunedinPACE | -0.49 (-1.23, 0.25) | -1.06 (-1.99, -0.12)* | 0.352 |
| Health indicators | Better BMI | PhenoAA | 0.15 (-0.18, 0.48) | -0.43 (-0.79, -0.06)* | 0.036* |
| | | Grim2AA | 0.13 (-0.09, 0.35) | -0.32 (-0.53, -0.11)* | 0.031* |
| | | DunedinPACE | -0.74 (-1.34, -0.15)* | -1.30 (-1.94, -0.65)** | 0.183 |
| | Better blood lipids | PhenoAA | 0.21 (-0.10, 0.52) | 0.06 (-0.30, 0.42) | 0.627 |
| | | Grim2AA | 0.10 (-0.11, 0.31) | 0.04 (-0.17, 0.25) | 0.992 |
| | | DunedinPACE | 0.14 (-0.43, 0.70) | 0.57 (-0.07, 1.20) | 0.351 |
| | Better blood glucose | PhenoAA | -0.67 (-0.99, -0.36)** | -0.41 (-0.81, -0.02)* | 0.230 |
| | | Grim2AA | -0.98 (-1.19, -0.76)** | -0.69 (-0.92, -0.46)** | 0.008* |
| | | DunedinPACE | -2.44 (-3.02, -1.87)** | -2.63 (-3.33, -1.94)** | 0.572 |
| | Better blood pressure | PhenoAA | -0.39 (-0.70, -0.07)* | -0.39 (-0.76, -0.01)* | 0.833 |
| | | Grim2AA | -0.08 (-0.29, 0.13) | 0.08 (-0.14, 0.30) | 0.114 |
| | | DunedinPACE | -0.30 (-0.87, 0.28) | 0.02 (-0.64, 0.68) | 0.312 |

Adjusted for chronological age, marital status, education level, household income, employment, current drinking, no. of comorbidities, and four components of health behaviors or health indicators (menopause status was additionally adjusted in females).

β represents the change in EAA for each 1-SD (standard deviation) increase in CVH score.

Components (SD): healthy diet (35.9); healthy sleep (26.4); nicotine avoidance (40.1); physical activity (45.7); better BMI (23.1); better blood lipids (28.6); better blood glucose (31.2); better blood pressure (30.6) in males; healthy diet (36.3); healthy sleep (29.3); nicotine avoidance (17.3); physical activity (46.0); better BMI (19.3); better blood lipids (29.1); better blood glucose (33.9); better blood pressure (30.6) in females.

Interaction P-values derived from interaction analysis between CVH and sex.

Stratum-specific P-values: * P< .05; ** P< .001

**Table S7. Associations between individual CVH components and EAA from regression analysis (adjusted for cell type composition)**

| CVH components | | EAA | Total (N= 1,940) β (95% CI) | Males (n= 1,125) β (95% CI) | Females (n= 815) β (95% CI) | Interaction P-value |
|---|---|---|---|---|---|---|
| Health behaviors | Healthy diet | PhenoAA | 0.21 (-0.10, 0.51) | 0.29 (-0.10, 0.67) | -0.15 (-0.63, 0.33) | 0.143 |
| | | Grim2AA | -0.01 (-0.19, 0.18) | 0.07 (-0.16, 0.31) | -0.17 (-0.45, 0.12) | 0.134 |
| | | DunedinPACE | -0.29 (-0.86, 0.28) | -0.01 (-0.71, 0.69) | -0.20 (-1.17, 0.77) | 0.587 |
| | Healthy sleep | PhenoAA | 0.04 (-0.25, 0.33) | 0.16 (-0.22, 0.54) | 0.01 (-0.47, 0.48) | 0.454 |
| | | Grim2AA | 0.09 (-0.09, 0.26) | 0.09 (-0.14, 0.32) | 0.12 (-0.16, 0.40) | 0.900 |
| | | DunedinPACE | 0.36 (-0.19, 0.92) | 0.40 (-0.28, 1.09) | 0.26 (-0.69, 1.22) | 0.673 |
| | Nicotine avoidance | PhenoAA | -0.57 (-0.92, -0.23)* | -0.82 (-1.27, -0.38)** | -0.67 (-1.16, -0.19)* | 0.149 |
| | | Grim2AA | -1.46 (-1.66, -1.25)** | -1.54 (-1.81, -1.27)** | -0.62 (-0.91, -0.34)** | 0.877 |
| | | DunedinPACE | -3.81 (-4.46, -3.17)** | -3.18 (-3.98, -2.38)** | -1.16 (-2.14, -0.19)* | 0.961 |
| | Physical activity | PhenoAA | -0.20 (-0.49, 0.09) | -0.25 (-0.65, 0.14) | -0.16 (-0.61, 0.29) | 0.772 |
| | | Grim2AA | -0.13 (-0.30, 0.04) | -0.06 (-0.30, 0.18) | -0.27 (-0.54, -0.01)* | 0.249 |
| | | DunedinPACE | -0.66 (-1.21, -0.12)* | -0.69 (-1.41, 0.02)* | -0.78 (-1.68, 0.13) | 0.846 |
| Health indicators | Better BMI | PhenoAA | -0.11 (-0.33, 0.12) | 0.14 (-0.17, 0.45) | -0.53 (-0.87, -0.20)* | 0.010* |
| | | Grim2AA | -0.11 (-0.25, 0.04) | 0.12 (-0.09, 0.32) | -0.38 (-0.57, -0.20)** | 0.006* |
| | | DunedinPACE | -1.04 (-1.47, -0.60)** | -0.59 (-1.17, -0.01) | -1.39 (-2.00, -0.77)** | 0.080 |
| | Better blood lipids | PhenoAA | 0.02 (-0.21, 0.24) | 0.08 (-0.21, 0.38) | -0.15 (-0.48, 0.18) | 0.448 |
| | | Grim2AA | 0.00 (-0.13, 0.14) | 0.02 (-0.17, 0.21) | -0.12 (-0.30, 0.06) | 0.450 |
| | | DunedinPACE | 0.32 (-0.10, 0.74) | 0.09 (-0.46, 0.64) | 0.38 (-0.23, 0.99) | 0.551 |
| | Better blood glucose | PhenoAA | -0.54 (-0.77, -0.31)** | -0.70 (-1.00, -0.40)** | -0.27 (-0.64, 0.09) | 0.150 |
| | | Grim2AA | -0.85 (-1.00, -0.71)** | -0.95 (-1.14, -0.75)** | -0.68 (-0.88, -0.48)** | 0.023* |
| | | DunedinPACE | -2.44 (-2.88, -2.00)** | -2.35 (-2.90, -1.80)** | -2.50 (-3.16, -1.83)** | 0.651 |
| | Better blood pressure | PhenoAA | -0.20 (-0.43, 0.02) | -0.30 (-0.60, 0.00) | -0.20 (-0.54, 0.14) | 0.759 |
| | | Grim2AA | -0.09 (-0.23, 0.05) | -0.16 (-0.35, 0.03) | 0.07 (-0.12, 0.26) | 0.125 |
| | | DunedinPACE | -0.39 (-0.82, 0.04) | -0.48 (-1.03, 0.08) | 0.03 (-0.60, 0.66) | 0.228 |

Adjusted for chronological age, marital status, education level, household income, employment, current drinking, no. of comorbidities, four components of health behaviors or health indicators, and cell type composition (sex was additionally adjusted in total participants; menopause status was additionally adjusted in females).
β represents the change in EAA for each 1-SD (standard deviation) increase in CVH score.

Components (SD): healthy diet (36.9); healthy sleep (27.6); nicotine avoidance (39.5); physical activity (45.8); better BMI (21.7); better blood lipids (28.9); better blood glucose (32.4); better blood pressure (30.7) in total participants; healthy diet (35.9); healthy sleep (26.4); nicotine avoidance (40.1); physical activity (45.7); better BMI (23.1); better blood lipids (28.6); better blood glucose (31.2); better blood pressure (30.6) in males; healthy diet (36.3); healthy sleep (29.3); nicotine avoidance (17.3); physical activity (46.0); better BMI (19.3); better blood lipids (29.1); better blood glucose (33.9); better blood pressure (30.6) in females.

Interaction P-values derived from interaction analysis between CVH and sex.

Stratum-specific P-values: * P< .05; ** P< .001

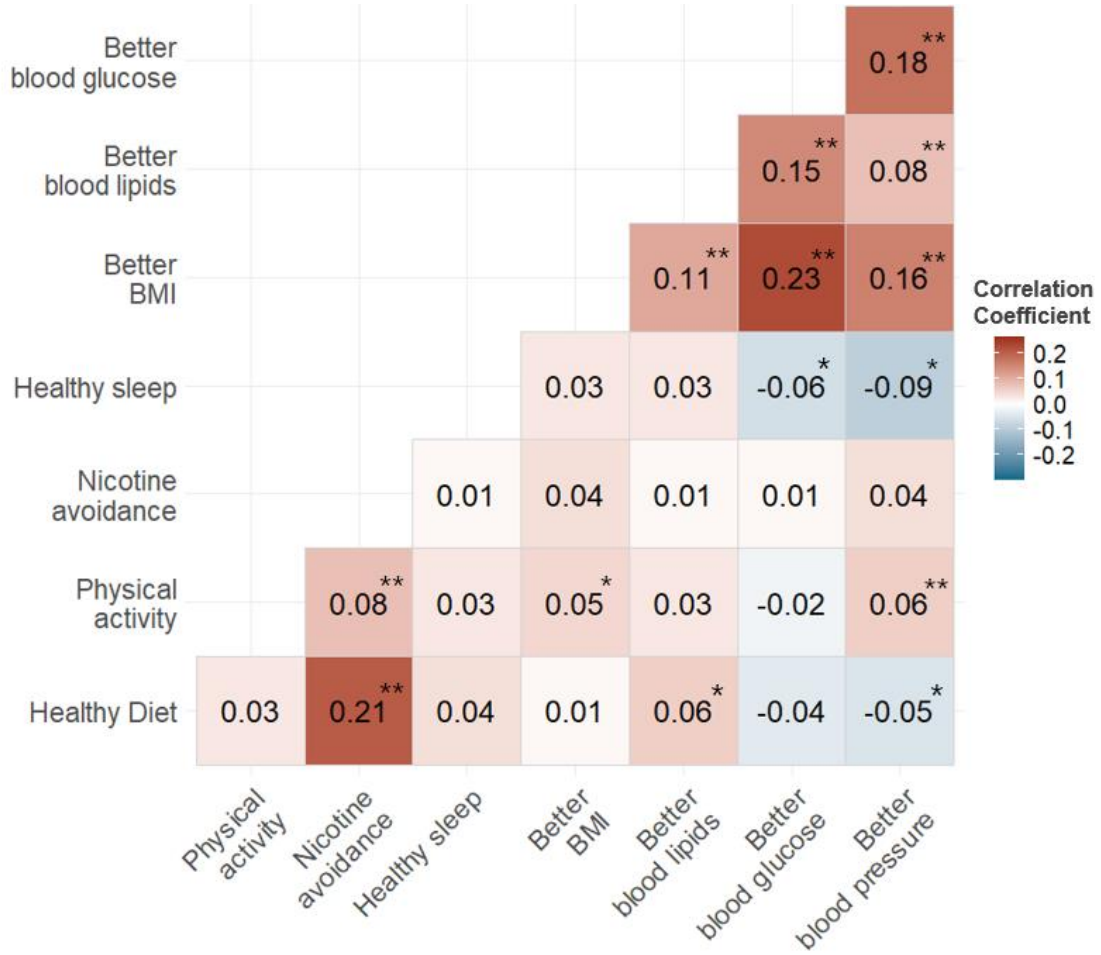


**Figure S1. Spearman's correlations among CVH components**

* P<.05; ** P< .001

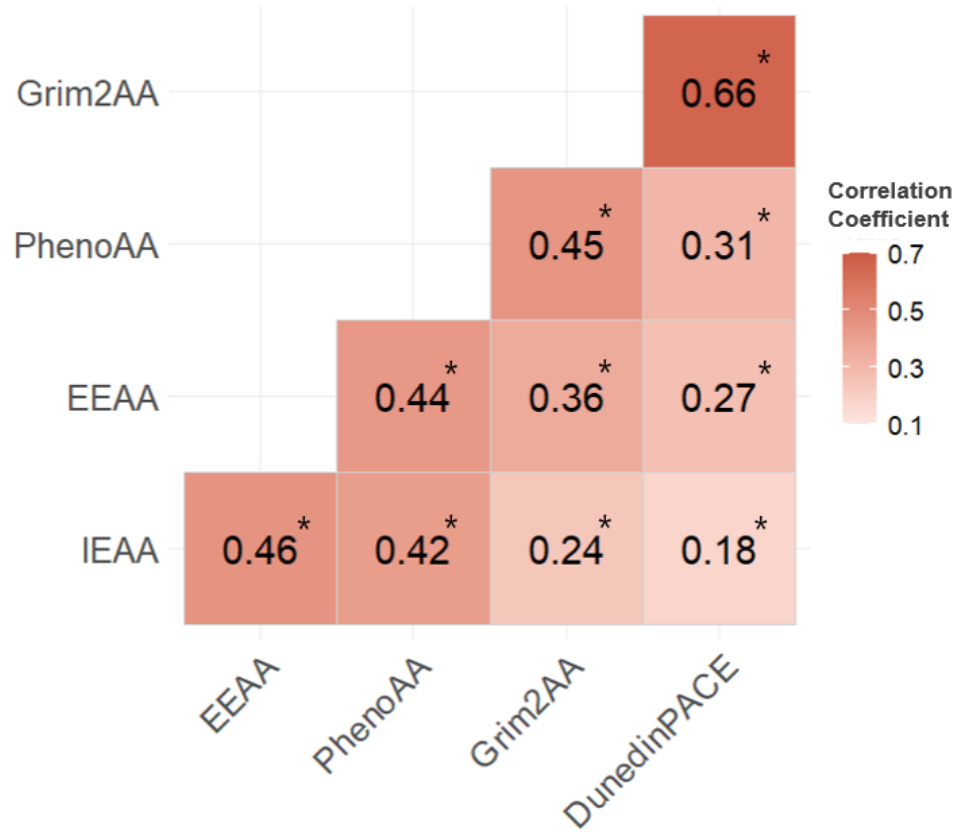


**Figure S2. Correlation coefficients among EAA measures**

Pearson correlation was used for the IEAA–EEAA pair; Spearman correlation was applied for all other pairs.

* P< .001

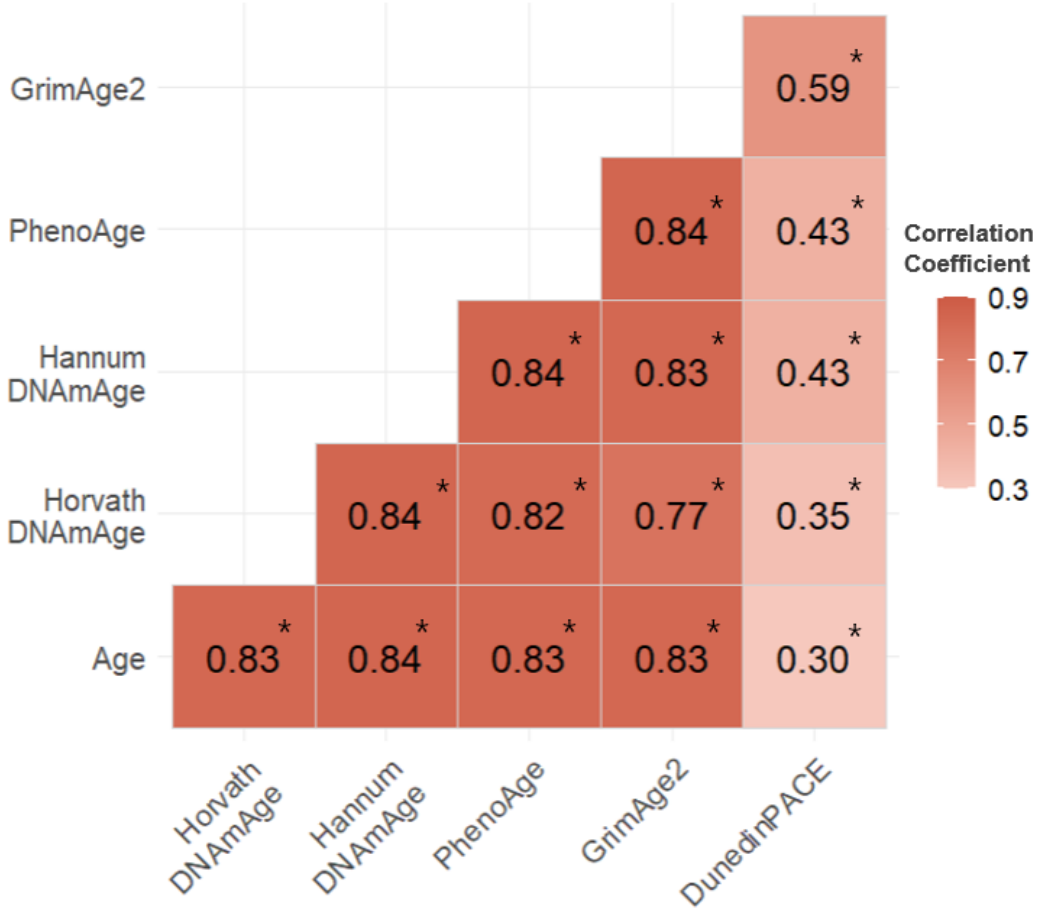


**Figure S3. Spearman's correlations among epigenetic age measures and chronological age**

* P< .001

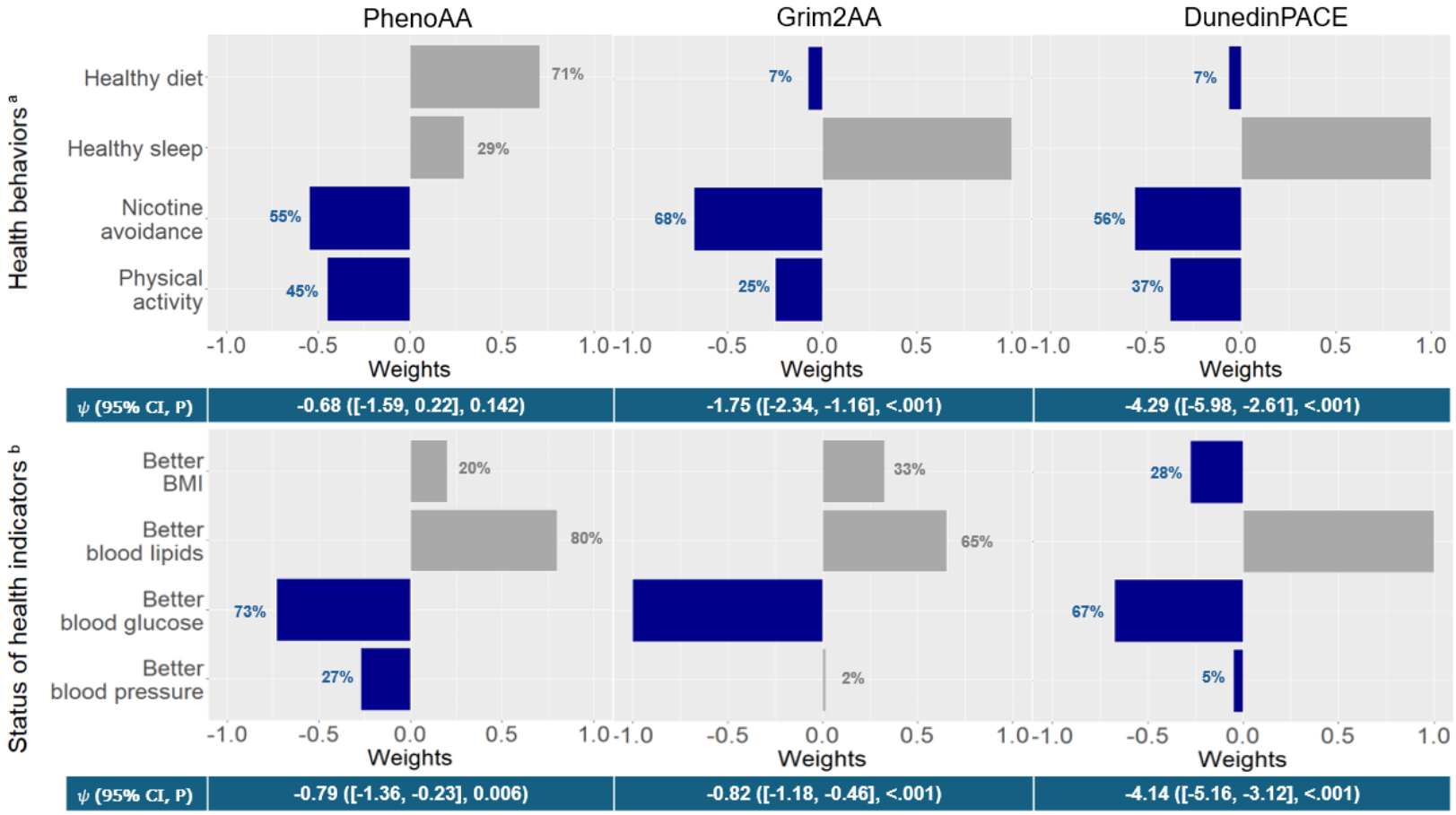


**Figure S4. Collective association and relative contribution of CVH components to EAA in total participants**

† *Blue:* negative contribution of health components to association; *Grey*: positive contribution of health components to association

$\psi$ represents the mixture association.

[a] Adjusted for chronological age, sex, marital status, education level, household income, job, current drinking, no. of comorbidities, and four health behaviours.

[b] Adjusted for chronological age, sex, marital status, education level, household income, job, current drinking, no. of comorbidities, and four health indicators.