Data S1. Additional information about assessment of alcohol consumption, physical activity index and socioeconomic disadvantage

Alcohol consumption

In 2001 and 2007, participants reported their consumption of 1/3 litre cans or bottles of beer, 1/3 litre glasses of wine, and 4 centiliter shots of liquor or strong alcohol during the past week. These amounts are comparable to approximately 14 g of alcohol (=1 unit). The total consumption of different beverages in the last week divided by seven was the daily alcohol consumption\(^{23}\). The average value for repeated data measured over all observed time-points was lifetime-averaged daily alcohol consumption and used in this study.

Physical activity index

Data on physical activity was self-reported by participants beginning of age 9 years or older at each study time-point. In 1980-1989, the questionnaire consisted of the variables regarding the frequency and intensity of leisure-time physical activity, participation in sports club training, participation in sport competitions, and habitual way of spending leisure time\(^{24}\). In the follow-ups from 1992 ahead, the physical activity questionnaire included five variables regarding the frequency and intensity of physical activity, frequency of vigorous physical activity, hours spent on vigorous physical activity, average duration of a physical activity session, and participation in organized physical activity\(^{24}\). The items were coded from 1 to 3 and summed to form a physical activity index with scores at each study time-point\(^{24}\). We then averaged the repeated data measured over all study surveys to generate lifetime-averaged value.

Socioeconomic disadvantage

For participants aged 6 to 21 years, socioeconomic disadvantage was determined by their parental education attainment (completed years of schooling for the parent with the highest education), the previous year’s family gross income and parental unemployment. For
participants aged 24 to 45 years, socioeconomic disadvantage was determined by the number of years of participant’s education (highest level of educational attendance or completed education), participant’s annual gross income and participant’s unemployment. Both parental and participant’s unemployment is a binary variable (yes/no), and those who had ever been unemployed were categorized as unemployment (yes). Indicators regarding education and income were transformed into Z scores (mean=0, standard deviation [SD]=1). Unemployment variables were coded as -1 for ever unemployment and 0 otherwise. For each of the two age periods (i.e., between age 6 and 21 years and between age 24 and 45 years), the sum value of the corresponding three indicators was used to derive the socioeconomic disadvantage score, with a higher score indicating a higher socioeconomic disadvantage period. The lifetime-averaged socioeconomic disadvantage score was the mean of socioeconomic disadvantage scores in these two age periods.
The Bayesian relevant life course exposure model (BRLM) considers a model of weighted exposure variable for each observed life stage. BRLM assumes a weight for the exposure experienced during each life stage and the weight reflects the relative importance of exposure at each life stage at predicting the development of an outcome later in life. The relevant life course exposure is conceptualized as the product of the exposure metric and its corresponding weight over each life period, summed over all life periods. This technique: (i) does not require model/variable selection; (ii) incorporates the hierarchical nature of life course hypotheses; (iii) can be used for both continuous and categorical outcome variables. The life-stage specific weight parameters are estimated using a Bayesian approach. Because in the BRLM the values of the weights inform the life course hypothesis, they are estimated from the data itself, and this allows the estimation of the lifetime effect of the exposure (i.e., the overall effect of relevant exposures accumulated over a person’s lifetime). Once the posterior distribution of weights conditioned on a non-informative prior has been estimated using Bayesian inference, these weight distributions can be used to identify the life course hypothesis supported by the data by calculating a measure of the difference between the estimated and expected weight vectors (e.g., Euclidean distance) under a set number of life course hypotheses. The shortest Euclidean distance (Figure S2) identifies the life course hypothesis most supported by the data, without the need for model selection. There was little or no evidence to include prior beliefs on what life course model would best support these data. Therefore, BRLMs were fitted using a non-informative Dirichlet (1, 1, 1) prior for weights and a weekly informative Cauchy prior (0, 2.5) for the lifetime effect. In the present three life-stage (childhood, young-adulthood and mid-adulthood) study, the model assumptions included one accumulation life-course model (all weights =1/3), three critical life -course models (one of the three weights=100% and the other two=0), and one sensitive
model (weight in childhood = 5%, weight in young-adulthood = 20%, weight in mid-adulthood = 75%).

Model diagnostics

Convergence and mixing were assessed using trace plots and Rhat values, autocorrelation was assessed using autocorrelation function plots, identifiability of the parameters were examined using pairs plot, effectiveness of the sampler was assessed using effective sample size Neff metrics. Pair plots display univariate histograms and bivariate scatter plots for selected parameter’s estimates and allow to identify collinearity between variables (i.e., narrow bivariate plots) and the presence of multiplicative non-identifiability (i.e., banana-like shaped scatterplots). The effective Sample size Neff represents the amount by which autocorrelation within the chains increases uncertainty in posterior estimates. Diagnostics of the final fitted BRLM model (i.e., model 2) suggested adequate convergence, mixing, and effective sample size and no autocorrelation or identifiability issue (Figure S2 and Figure S3). Results were similar when SBP was replaced with other BP components (data not shown).
Data S3. Individual growth curve model

The individual growth curve (IGC)\textsuperscript{30} model is an advanced multilevel regression model that quantifies changes in a variable over time at both the group (population average) and individual level. IGC incorporates fixed effects, the mean slopes and mean intercepts of all individuals in the sample, and random effects, the individual variability around the mean growth parameters (i.e., intercept and slope), allowing to estimate inter- and intra-individual changes in the response variable simultaneously. The IGC model also allows the user to specify a linear or non-linear growth trajectory of the response variable that is best supported by the data.

In this study, an IGC model was performed to determine blood pressure (BP) change over the observed life course (from age 6 to 49 years), herein referred to as BP trajectories. Moreover, we added sex and height to the model to determine how they modified the BP trajectory. Parameters (i.e., random intercept, random slope) were estimated using the maximum likelihood method, with models selected according to Akaike’s information criterion (AIC) and the likelihood ratio test. After constructing the best fitted model, the individual level BP was extracted from the model and then used to interpolate over ages with missing data.\textsuperscript{27} In this regard, the IGC model is a statistical technique that interpolates missing values in a set of observed data measured repeatedly based on the parameters of multilevel linear or non-linear curves. These parameters are determined by both the existing set of data points made within-individual and the mean growth trajectory of the whole sample.

First, an unconditional model was constructed to fit BP as a function of age, with each participant regarded as the random effect. Linear and higher power items of age were added into the analyses sequentially to explore linear and polynomial random intercept and random
slope. To avoid collinearity of age with its higher-order terms, we centred age to the mean (24.3 years). Then, we used the AIC or likelihood ratio test to compare increasingly complex models throughout the unconditional model analyses. After the best fitted unconditional model was determined, we introduced interaction terms of sex and all power terms of age, as well as height and all power terms of age into this model to test if sex and height modified the average BP level of participants’ BP trajectories over time. The systolic BP trajectory in our study was best described by an IGC model with quartic age polynomial (age⁴) random intercept, cubic age random slope and inclusion of sex and height as modifiers (which significantly improved model fit). The same conclusion was drawn on the optimal IGC model for diastolic BP, mean arterial pressure and pulse pressure. The “Lme4” package of R studio (Version 3.5.3, R Foundation for Statistical Computing, Vienna, Austria) was used to perform the IGC modelling.
Table S1 Design of the Cardiovascular Risk in the Young Finns Study

| Year | Age cohorts         |
|------|---------------------|
| 1980 | 3 6 9 12 15 18     |
| 1983 | 6 9 12 15 18 21    |
| 1986 | 9 12 15 18 21 24   |
| 1989 | 12 15 18 21 24 27  |
| 1992 | 15 18 21 24 27 30  |
| 2001 | 24 27 30 33 36 39  |
| 2007 | 30 33 36 39 42 45  |
| 2011 | 34 37 40 43 46 49  |

Data from the age points highlighted in grey not included in this study.
Table S2. Proportion of participants with optimal, normal, and (or) elevated systolic blood pressure who had used antihypertensive medications

| Systolic blood pressure (SBP) | Used antihypertensive medications year |
|------------------------------|----------------------------------------|
|                              | 2001 | 2007 | 2001 or/ and 2007* |
| **2001 (6 years prior to the observed outcomes measured)** |       |       |                     |
| Optimal (SBP<120 mmHg)       | 1.2% (12/1027) |                     |
| Normal or lower (SBP<130 mmHg) | 1.9% (27/1418) |                     |
| Elevated or lower (SBP<140 mmHg) | 2.1% (34/1603) |                     |
| **2007 (time-point when the observed outcomes measured)** |       |       |                     |
| Optimal (SBP<120 mmHg)       | 3.6% (34/933) | 4.3% (36/848)      |
| Normal or lower (SBP<130 mmHg) | 5.1% (69/1359) | 5.8% (71/1228)     |
| Elevated or lower (SBP<140 mmHg) | 6.8% (112/1650) | 7.8% (117/1493)    |

Abbreviation: SBP, systolic blood pressure.
*Used antihypertensive medications at any survey in 2001 or 2007; did not use antihypertensive medications indicate the participants who did not use antihypertensive medications in both 2001 and 2007.
Table S3. Relative weights of the association of systolic blood pressure in between 0 and 27 years in three-year increments before the outcomes were measured and arterial stiffness in mid-adulthood

| Years before the outcome measured | Pulse wave velocity | Carotid distensibility |
|----------------------------------|---------------------|------------------------|
| 27                               | 2.1% (0.1% to 7.3%) | 3.5% (0.1% to 11.9%)   |
| 24                               | 2.3% (0.1% to 7.9%) | 3.7% (0.1% to 12.8%)   |
| 21                               | 2.9% (0.1% to 10.1%)| 5.8% (0.2% to 18.7%)   |
| 18                               | 3.5% (0.1% to 12.2%)| 6.0% (0.2% to 20.8%)   |
| 15                               | 3.3% (0.1% to 11.9%)| 5.1% (0.1% to 17.8%)   |
| 12                               | 4.2% (0.1% to 12.4%)| 7.4% (0.2% to 25.7%)   |
| 9                                | 4.4% (0.1% to 15.8%)| 9.1% (0.2% to 31.1%)   |
| 6                                | 6.0% (0.1% to 20.6%)| 7.8% (0.2% to 24.4%)   |
| 3                                | 28.4% (11.0% to 47.7%)| 19.4% (0.7% to 53.5%) |
| 0                                | 43.0% (13.0% to 68.9%)| 32.1% (6.6% to 57.9%)  |

Values are relative weights and their 95% credible interval. Values are from the model adjusted for adjusted for sex, year of birth, pack-years of smoking, alcohol consumption, body mass index, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, triglycerides, socioeconomic disadvantage, physical activity index, and heart rate.
Table S4. Association between systolic blood pressure and markers of arterial stiffness in mid-adulthood, stratified by sex

| Life stages       | Pulse wave velocity (m/s) | Carotid distensibility (%/10mmHg) |
|-------------------|---------------------------|-----------------------------------|
|                   | Male (N=681)   | Female (N=851)      | Male (N=790)   | Female (N=1001) |
| Accumulated effect| β (95% CrI)     | β (95% CrI)          | β (95% CrI)     | β (95% CrI)     |
|                   | 0.58 (0.45 to 0.72) | 0.56 (0.48 to 0.65) | -0.13 (-0.18 to -0.10) | -0.14 (-0.18 to -0.10) |
| Childhood         | 0.03 (0.001 to 0.10) | 0.02 (0.001 to 0.07) | -0.01 (-0.04 to -0.003) | -0.01 (-0.05 to -0.001) |
| Young adulthood   | 0.08 (0.002 to 0.26) | 0.03 (0.001 to 0.10) | -0.03 (-0.09 to -0.001) | -0.02 (-0.08 to -0.001) |
| Mid-adulthood     | 0.47 (0.31 to 0.61) | 0.51 (0.42 to 0.59) | -0.09 (-0.14 to -0.04) | -0.10 (-0.15 to -0.05) |

Abbreviations: CrI, credible interval.

β values are per 10 mmHg increase in systolic blood pressure. Values are from the model adjusted for adjusted for year of birth, pack years of smoking, alcohol consumption, body mass index, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, triglycerides, socioeconomic disadvantage, physical activity index, and heart rate.
Table S5. Association between blood pressure (diastolic blood pressure, mean arterial pressure and pulse pressure) and markers of arterial stiffness in mid-adulthood

|                            | Pulse wave velocity (m/s) | Carotid distensibility (%/10mmHg) |
|-----------------------------|---------------------------|----------------------------------|
|                             | β (95% CrI) | Relative weight (95% CrI) | β (95% CrI) | Relative weight (95% CrI) |
| **Diastolic blood pressure**| N=1532     |                        | N=1791     |                          |
| Accumulated effect          | 0.76        | (0.64 to 0.89)         | -0.20      | (-0.25 to -0.15)         |
| Life stages                 |             |                      |            |                          |
| Childhood                   | 0.10        | 12.7%                | -0.02      | 11.3%                    |
|                            | (0.006 to 0.23) | (0.9% to 27.5%) | (-0.07 to -0.001) | (0.5% to 30.3%) |
| Young adulthood             | 0.11        | 15.0%                | -0.04      | 22.0%                    |
|                            | (0.005 to 0.30) | (0.6% to 39.5%) | (-0.11 to -0.002) | (1.0% to 57.9%) |
| Mid-adulthood               | 0.55        | 72.4%                | -0.13      | 66.7%                    |
|                            | (0.39 to 0.68) | (52.6% to 89.9%) | (-0.19 to -0.07) | (34.3% to 91.8%) |
| **Mean arterial pressure**  | N=1532     |                        | N=1791     |                          |
| Lifetime effect             | 0.73        | (0.62 to 0.84)         | -0.20      | (-0.24 to -0.15)         |
| Life stages                 |             |                      |            |                          |
| Childhood                   | 0.09        | 11.8%                | -0.02      | 12.3%                    |
|                            | (0.005 to 0.21) | (0.7% to 26.8%) | (-0.07 to -0.001) | (0.5% to 30.0%) |
| Young adulthood             | 0.07        | 10.1%                | -0.03      | 14.6%                    |
|                            | (0.002 to 0.23) | (0.3% to 30.3%) | (-0.09 to -0.001) | (0.5% to 43.9%) |
| Mid-adulthood               | 0.56        | 78.1%                | -0.14      | 73.1%                    |
|                            | (0.45 to 0.66) | (59.7% to 94.3%) | (-0.19 to -0.10) | (45.7% to 94.5%) |
| **Pulse pressure**          | N=1532     |                        | N=1791     |                          |
| Lifetime effect             | 0.41        | (0.28 to 0.55)         | 0.01       | (-0.06 to 0.07)          |
| Life stages                 |             |                      |            |                          |
| Childhood                   | 0.01        | 2.2%                 | 0.01       | 39.2%                    |
|                            | (0.0002 to 0.03) | (0.1% to 8.2%) | (-0.01 to 0.05) | (1.2% to 89.9%) |
| Young adulthood             | 0.02        | 5.8%                 | 0.003      | 29.4%                    |
|                            | (0.001 to 0.08) | (0.2% to 20.8%) | (-0.02 to 0.03) | (0.9% to 81.2%) |
| Mid-adulthood               | 0.38        | 92.0%                | -0.001     | 31.3%                    |
|                            | (0.24 to 0.52) | (76.3% to 99.1%) | (-0.04 to 0.02) | (0.8% to 88.0%) |

Abbreviations: CrI, credible interval.

β values are per 10 mmHg increase in blood pressure. Values are from the model adjusted for adjusted for sex, year of birth, pack-years of smoking, alcohol consumption, body mass index, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, triglyceride, socioeconomic disadvantage, physical activity index, and heart rate.
Table S6. Association between elevated and/or hypertensive blood pressure and markers of arterial stiffness in mid-adulthood

|                           | Pulse wave velocity (m/s) | Carotid distensibility (%/10mmHg) |
|---------------------------|---------------------------|-----------------------------------|
|                           | β (95% CrI)               | Relative weight (95% CrI)         | β (95% CrI)               | Relative weight (95% CrI) |
| Elevated or hypertensive BP* |                           |                                   |                           |                           |
| Accumulated effect        | 1.23                      |                                   | -0.26                     | ( -0.36 to -0.17)         |
|                           | (0.99 to 1.47)            |                                   |                           |                           |
| Life stages               |                           |                                   |                           |                           |
| Childhood                 | 0.06                      | 4.8%                              | -0.01                     | 4.3%                       |
|                           | (0.002 to 0.19)           | (0.2% to 14.7%)                   | (-0.04 to -0.0003)        | (0.1% to 14.8%)           |
| Young adulthood           | 0.28                      | 23.0%                             | -0.04                     | 14.6%                      |
|                           | (0.05 to 0.56)            | (4.0% to 42.1%)                   | (-0.12 to -0.001)         | (0.5% to 41.1%)           |
| Mid-adulthood             | 0.88                      | 72.2%                             | -0.21                     | 81.2%                      |
|                           | (0.65 to 1.11)            | (53.6% to 91.2%)                  | (-0.30 to -0.12)          | (54.5% to 97.4%)          |
| Hypertensive BP†          |                           |                                   |                           |                           |
| Accumulated effect        | 1.40                      |                                   | -0.37                     | (-0.62 to -0.15)          |
|                           | (0.96 to 1.86)            |                                   |                           |                           |
| Life stages               |                           |                                   |                           |                           |
| Childhood                 | 0.14                      | 9.6%                              | -0.06                     | 17.5%                      |
|                           | (0.004 to 0.43)           | (0.3% to 27.4%)                   | (-0.18 to -0.002)         | (0.6% to 58.8%)           |
| Young adulthood           | 0.14                      | 9.8%                              | -0.10                     | 27.4%                      |
|                           | (0.004 to 0.47)           | (0.3% to 29.7%)                   | (-0.32 to -0.003)         | (1.1% to 72.4%)           |
| Mid-adulthood             | 1.10                      | 80.6%                             | -0.21                     | 55.1%                      |
|                           | (0.77 to 1.43)            | (59.7% to 96.6%)                  | (-0.36 to -0.06)          | (79.2% to 91.3%)          |

Abbreviations: BP, blood pressure; CrI, credible interval.

Values are from the model adjusted for adjusted for sex, year of birth, pack-years of smoking, alcohol consumption, body mass index, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, triglyceride, socioeconomic disadvantage, physical activity index, heart rate.

* The categories of elevated and hypertensive BP were combined and then applied to the models. That is, systolic BP/diastolic BP ≥120/80 mmHg for childhood, systolic BP/diastolic BP ≥130/85 mmHg for young adulthood and mid-adulthood.

† Hypertensive BP was defined as systolic BP/diastolic BP ≥130/80 mm Hg for childhood, systolic BP/diastolic BP ≥140/90 mmHg for young adulthood and mid-adulthood.
Table S7. Relative weights of the association of systolic blood pressure in between 0 and 27 years in three-year increments before the outcomes were measured and arterial stiffness among the participants with normal/elevated current systolic blood pressure (systolic blood pressure <140 mmHg in 2007), stratified by taking antihypertensive medications and without antihypertensive medications

| Years before the outcome measured | Pulse wave velocity | Carotid distensibility |
|-----------------------------------|---------------------|------------------------|
|                                   | With antihypertensive medications (n=99) | Without antihypertensive medications (n=1154) | With antihypertensive medications (n=111) | Without antihypertensive medications (n=1348) |
| 27                                | 6.5% (0.1% to 28.6%) | 4.1% (0.1% to 13.9%) | 5.9% (0.3% to 17.3%) | 4.7% (0.1% to 16.5%) |
| 24                                | 6.7% (0.2% to 27.2%) | 5.8% (0.2% to 18.3%) | 6.9% (0.3% to 31.3%) | 7.3% (0.2% to 23.4%) |
| 21                                | 7.7% (0.2% to 26.8%) | 4.7% (0.1% to 15.6%) | 8.9% (0.3% to 33.1%) | 8.7% (0.2% to 27.3%) |
| 18                                | 9.3% (0.3% to 31.5%) | 7.4% (0.2% to 24.8%) | 11.0% (0.3% to 33.7%) | 8.5% (0.2% to 28.6%) |
| 15                                | 9.1% (0.3% to 31.3%) | 6.0% (0.2% to 20.9%) | 10.0% (0.3% to 33.5%) | 6.7% (0.2% to 23.6%) |
| 12                                | 10.1% (0.3% to 33.8%) | 8.2% (0.2% to 28.9%) | 11.1% (0.1% to 33.8%) | 9.3% (0.3% to 31.8%) |
| 9                                 | 10.7% (0.3% to 36.7%) | 6.6% (0.2% to 22.1%) | 8.0% (0.3% to 15.8%) | 10.8% (0.3% to 35.2%) |
| 6                                 | 9.7% (0.4% to 36.4%) | 10.5% (0.3% to 35.9%) | 10.0% (0.1% to 33.6%) | 9.5% (0.3% to 30.6%) |
| 3                                 | 10.7% (1.0% to 38.6%) | 13.8% (2.5% to 65.9%) | 12.4% (11.0% to 34.3%) | 15.4% (0.6% to 49.4%) |
| 0                                 | 19.3% (1.0% to 40.9%) | 32.7% (2.5% to 65.9%) | 15.3% (11.0% to 34.1%) | 19.4% (0.8% to 44.4%) |

Values are relative weights and their 95% credible interval. Values are from the model adjusted for adjusted for sex, year of birth, pack-years of smoking, alcohol consumption, body mass index, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, triglycerides, socioeconomic disadvantage, physical activity index, and heart rate.
Table S8. Association of systolic blood pressure in between 3 and 27 years in three-year increments before the outcomes and arterial stiffness, stratified by systolic blood pressure status at the same time-point when arterial stiffness was measured

| Years before the outcome measured | Pulse wave velocity (m/s) | Carotid distensibility (%/10mmHg) |
|-----------------------------------|---------------------------|-----------------------------------|
|                                   | Normal SBP* (n=1134)      | Elevated /high SBP* (n=398)       |
|                                   | Lifetime effect β(95% CrI) | Relative weight (95% CrI), %       | Lifetime effect β(95% CrI) | Relative weight (95% CrI), %       |
|                                   | Normal SBP* (n=1321)      | Elevated /high SBP* (n=470)       |
|                                   | Lifetime effect β(95% CrI) | Relative weight (95% CrI), %       | Lifetime effect β(95% CrI) | Relative weight (95% CrI), %       |
| 27                                | 0.44                      | 0.58                              | -0.07                     | -0.09                               |
|                                   | (0.31, 0.56)              | (0.36, 0.79)                      | (-0.10, -0.02)            | (-0.2, -0.02)                       |
| 24                                | 3.3%                      | 5.7%                              | 7.6%                      | 8.1%                                |
|                                   | (0.1% to 11.3%)           | (0.2% to 19.0%)                   | (0.2% to 26.5%)           | (0.2% to 27.2%)                     |
|                                   | 5.1%                      | 8.2%                              | 8.2%                      | 7.8%                                |
|                                   | (0.1% to 16.0%)           | (0.3% to 25.8%)                   | (0.2% to 27.6%)           | (0.2% to 27.1%)                     |
| 21                                | 4.3%                      | 4.7%                              | 11.9%                     | 9.5%                                |
|                                   | (0.1% to 14.3%)           | (0.1% to 17.2%)                   | (0.3% to 37.1%)           | (0.3% to 32.0%)                     |
| 18                                | 6.3%                      | 8.1%                              | 10.5%                     | 10.4%                               |
|                                   | (0.1% to 21.8%)           | (0.2% to 28.6%)                   | (0.3% to 35.1%)           | (0.2% to 34.6%)                     |
| 15                                | 5.1%                      | 9.6%                              | 9.1%                      | 9.6%                                |
|                                   | (0.3% to 18.5%)           | (0.3% to 32.9%)                   | (0.3% to 31.5%)           | (0.3% to 33.1%)                     |
| 12                                | 7.5%                      | 10.7%                             | 11.3%                     | 11.5%                               |
|                                   | (0.2% to 26.9%)           | (0.3% to 36.5%)                   | (0.3% to 37.4%)           | (0.3% to 37.7%)                     |
| 9                                 | 9.9%                      | 13.1%                             | 12.5%                     | 12.6%                               |
|                                   | (0.3% to 35.4%)           | (0.1% to 22.1%)                   | (0.4% to 40.5%)           | (0.4% to 40.8%)                     |
| 6                                 | 17.9%                     | 6.7%                              | 11.5%                     | 12.9%                               |
|                                   | (1.0% to 20.1%)           | (0.4% to 42.5 %)                  | (0.4% to 36.4%)           | (0.4% to 40.0%)                     |
| 3                                 | 40.5%                     | 33.0%                             | 17.4%                     | 17.6%                               |
|                                   | (1.7% to 78.2%)           | (2.4% to 67.8%)                   | (0.6% to 50.6%)           | (0.6% to 51.5%)                     |

Abbreviations: CrI, credible interval; SBP, systolic blood pressure

β values are per 10 mmHg increase in SBP. Values are from the model adjusted for adjusted for sex, year of birth, pack-years of smoking, alcohol consumption, body mass index, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, triglyceride, socioeconomic disadvantage, physical activity index, heart rate.

* The categories of elevated and high SBP were SBP≥130 mmHg; The categories of normal SBP were SBP<130 mmHg.
Table S9. Association between systolic blood pressure and markers of arterial stiffness in mid-adulthood

| Life stages | Pulse wave velocity (m/s) | Carotid distensibility (%/10mmHg) |
|-------------|---------------------------|----------------------------------|
|             | β (95% CrI)                | Relative weight (95% CrI)        |
| Standard model † |                           |                                  |
| Accumulated effect | 0.63                      | -0.18                           |
| (0.50, 0.70) | (-0.23 to -0.14)           |
| Childhood   | 0.01                      | -0.02                           |
| (0.001 to 0.07) | (95% CrI)                  |
| (0.1% to 10.1%) | (-0.06, -0.0007)           |
| Young adulthood | 0.04                      | -0.03                           |
| (0.001 to 0.14) | (95% CrI)                  |
| (0.2% to 21.0%) | (-0.11 to -0.001)          |
| Mid-adulthood | 0.58                      | -0.12                           |
| (0.50 to 0.67) | (95% CrI)                  |
| (75.7% to 98.8%) | (-0.18 to -0.01)           |
| (90.7%) | (36.7% to 94.0%)           |
| Residual model † |                           |                                  |
| Accumulated effect | 0.64                      | -0.20                           |
| (0.50 to 0.70) | (-0.24 to -0.15)           |
| Childhood   | 0.01                      | -0.01                           |
| (0.001 to 0.05) | (95% CrI)                  |
| (0.1% to 8.0%) | (-0.04 to -0.0002)         |
| Young adulthood | 0.09                      | -0.03                           |
| (0.01 to 0.33) | (95% CrI)                  |
| (0.2% to 49.4%) | (-0.09 to -0.002)          |
| Mid-adulthood | 0.54                      | -0.15                           |
| (0.50, 0.70) | (95% CrI)                  |
| (50.0% to 95.6%) | (-0.21 to -0.07)           |
| (84.3%) | (42.7% to 96.9%)           |

Abbreviations: CrI, credible interval.

β represents per 10 mmHg increase in systolic blood pressure.

* Standard model is adjusted for sex, year of birth, and lifetime-averaged values for body mass index, in which the mean of systolic blood pressure at each life stage is the primary exposure variable.

† Residual model is adjusted for sex, year of birth. Residual model uses the residuals from a regression analysis at each life stage as the primary exposure, in which systolic blood pressure regressed on body mass index.
Figure S1. Pattern of missing systolic blood pressure in the Cardiovascular Risk in Young Finns Study from 1980 to 2007.

Vertical axis represents the number of participants at each pattern of missing SBP from 1980 to 2007. For example, 174 participants had complete data across all surveys. Horizontal axis at the bottom represents the number (%) of participants who did not provide SBP measurements at specific survey. For example, 53 participants did not have SBP measurements in 1980.
Figure S2. Median and 80% credible intervals of posterior distributions of Euclidean distance under three life-course scenarios.

The vertical solid line represents the median, the blue area represents the 80% credible interval.

The Y axis shows the following reference vectors to estimated weights: critical period in childhood (weight in childhood=100%, weight in young adulthood=0, weight in mid-adulthood=0); critical period in young adulthood (weight in childhood=0, weight in young adulthood=100%, weight in mid-adulthood=0); critical period in mid-adulthood (weight in childhood=0, weight in young adulthood=0, weight in mid-adulthood=100%); accumulation model (weight in childhood=weight in young adulthood=weight in mid-adulthood=1/3); sensitive period (weight in childhood=5%, weight in young adulthood=20%, weight in mid-adulthood=75%).
Figure S3. Diagnostics of the Bayesian relevant life course exposure model for systolic blood pressure and pulse wave velocity.

A. Trace plot

- Weight in childhood
- Weight in young adulthood
- Weight in mid-adulthood
- Lifetime effect

B. Rhat values of parameters

- Weight in childhood
- Weight in young adulthood
- Weight in mid-adulthood
- Lifetime effect

Rhat value range: 1.00 to 1.05
C. Autocorrelation function plots

| Weight in childhood | Weight in young adulthood | Weight in mid-adulthood | Lifetime effect |
|---------------------|---------------------------|-------------------------|-----------------|
| ![Graph for Chain 1](image1) | ![Graph for Chain 2](image2) | ![Graph for Chain 3](image3) | ![Graph for Chain 4](image4) |

D. Identifiability

- **Weight in childhood**
  - ![Scatter plot for Chain 1](image5)
  - ![Scatter plot for Chain 2](image6)
  - ![Scatter plot for Chain 3](image7)
  - ![Scatter plot for Chain 4](image8)

- **Weight in young adulthood**
  - ![Scatter plot for Chain 1](image9)
  - ![Scatter plot for Chain 2](image10)
  - ![Scatter plot for Chain 3](image11)
  - ![Scatter plot for Chain 4](image12)

- **Weight in mid-adulthood**
  - ![Scatter plot for Chain 1](image13)
  - ![Scatter plot for Chain 2](image14)
  - ![Scatter plot for Chain 3](image15)
  - ![Scatter plot for Chain 4](image16)

- **Lifetime effect**
  - ![Scatter plot for Chain 1](image17)
  - ![Scatter plot for Chain 2](image18)
  - ![Scatter plot for Chain 3](image19)
  - ![Scatter plot for Chain 4](image20)
E. Effective sample size

Weight in childhood

Weight in young adulthood

Weight in mid-adulthood

Lifetime effect

Ratio of the effective sample size to the total sample size
Figure S4. Diagnostics of the Bayesian relevant life course exposure model for systolic blood pressure and carotid distensibility.

A. Trace plot

- **Weight in childhood**
- **Weight in young adulthood**
- **Weight in mid-adulthood**
- **Lifetime effect**

B. Rhat values of parameters

- **Weight in childhood**
- **Weight in young adulthood**
- **Weight in mid-adulthood**
- **Lifetime effect**

Rhat value: 1.00 - 1.05
E. Effective sample size

- Weight in childhood
- Weight in young adulthood
- Weight in mid-adulthood
- Lifetime effect

Ratio of the effective sample size to the total sample size
Figure S5. Posterior densities of relative weights for exposure to systolic blood pressure in childhood, young adulthood and mid-adulthood for pulse wave velocity (A) and carotid distensibility (B) in mid-adulthood.

A. Pulse wave velocity

B. Carotid distensibility

The vertical solid line represents the median, the grey area represents the 80% credible interval. Model 1 is adjusted for sex and year of birth. Model 2 is adjusted for sex, year of birth, pack-years of smoking, alcohol consumption, body mass index, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, triglycerides, socioeconomic disadvantage, physical activity index, and heart rate.
Figure S6. Relative weights and their 95% credible intervals of the association of systolic blood pressure in childhood, young adulthood and mid-adulthood on pulse wave velocity (A) and carotid distensibility (B) in mid-adulthood, stratified by sex.

Abbreviation: CrI, credible intervals.

The triangles represent the relative weight point estimates for males and the dots represent the relative weight point estimates for females; error bars and brackets indicate the 95% credible interval. Values are from the model adjusted for year of birth, pack-years of smoking, alcohol consumption, body mass index, low density lipoprotein-cholesterol, high density lipoprotein-cholesterol, triglycerides, socioeconomic disadvantage, physical activity index, and heart rate.
Figure S7. Comparisons of arterial stiffness between the participants with antihypertensive medications (either in 2001 or 2007) and those who without antihypertensive (neither 2001 nor 2007) medications, among the participants without hypertensive systolic blood pressure (<140 mmHg) in 2007 (concurrent with the arterial stiffness measurements).

A. Pulse wave velocity

| Systolic blood pressure in 2007, mmHg | Mean Pulse wave velocity, m/s |
|--------------------------------------|------------------------------|
| <120                                 | 8.3                          |
| <130                                 | 7.7                          |
| <140                                 | 8.3                          |

P=0.04  
P=0.055  
P=0.001

B. Carotid distensibility

| Systolic blood pressure in 2007, mmHg | Mean Carotid distensibility, %/10mmHg |
|--------------------------------------|---------------------------------------|
| <120                                 | 1.7                                   |
| <130                                 | 1.8                                   |
| <140                                 | 1.6                                   |

P=0.04  
P=0.06  
P<0.001

Grey bars and the values inside represent the mean of pulse wave velocity (A) and carotid distensibility (B) among the participants taking antihypertensive medications. Blank bars and the values inside represent the mean of pulse wave velocity and carotid distensibility among the participants without antihypertensive medications. Error bars represent standard
deviations. P values were derived from the logistic regressions adjusted for sex and year of birth.