**Twin Research and Human Genetics**

**Supplementary material: Genetic and Environmental Influences on Blood Pressure and Serum Lipids Across Age-Groups**

Ke Miao, Yutong Wang, Weihua Cao, Jun Lv, Canqing Yu, Tao Huang, Dianjianyi Sun, Chunxiao Liao, Yuanjie Pang, Runhua Hu, Zengchang Pang, Min Yu, Hua Wang, Xianping Wu, Yu Liu, Wenjing Gao, and Liming Li2

**Univariate Twin Analysis**

**Supplementary Table S1 Twin correlations of blood pressure and serum lipids in univariate twin analysis**

|  |  |
| --- | --- |
| **Phenotypes** | **Twin correlation** |
| **MZ** | **DZ** |
| **SBP** |
| the total population | 0.56(0.51,0.60) | 0.36(0.26,0.45) |
| ≤45years old | 0.62(0.54,0.68) | 0.27(0.12,0.40) |
| 46-55years old | 0.60(0.53,0.67) | 0.43(0.26,0.56) |
| ＞55years old | 0.45(0.34,0.54) | 0.30(0.04,0.50) |
| **DBP** |
| the total population | 0.58(0.51,0.65) | 0.27(0.11,0.40) |
| ≤45years old | 0.59(0.53,0.64) | 0.27(0.14,0.39) |
| 46-55years old | 0.56(0.48,0.63) | 0.50(0.35,0.62) |
| ＞55years old | 0.55(0.45,0.63) | 0.27(0.03,0.46) |
| **TC** |
| the total population | 0.63(0.59,0.67) | 0.41(0.32,0.48) |
| ≤45years old | 0.63(0.56,0.70) | 0.49(0.36,0.60) |
| 46-55years old | 0.63(0.56,0.69) | 0.27(0.10,0.42) |
| ＞55years old | 0.57(0.47,0.65) | 0.45(0.23,0.62) |
| **TG** |
| the total population | 0.59(0.54,0.63) | 0.32(0.22,0.41) |
| ≤45years old | 0.59(0.52,0.66) | 0.35(0.21,0.48) |
| 46-55years old | 0.59(0.51,0.65) | 0.26(0.08,0.41) |
| ＞55years old | 0.47(0.36,0.57) | 0.18(0.00,0.39) |
| **HDL** |
| the total population | 0.70(0.67,0.73) | 0.47(0.38,0.54) |
| ≤45years old | 0.73(0.67,0.77) | 0.49(0.37,0.59) |
| 46-55years old | 0.70(0.64,0.75) | 0.38(0.21,0.52) |
| ＞55years old | 0.70(0.63,0.76) | 0.37(0.14,0.55) |
| **LDL** |
| the total population | 0.63(0.59,0.67) | 0.44(0.35,0.52) |
| ≤45years old | 0.63(0.56,0.69) | 0.45(0.33,0.56) |
| 46-55years old | 0.65(0.58,0.71) | 0.37(0.20,0.50) |
| ＞55years old | 0.58(0.49,0.66) | 0.49(0.28,0.64) |

SBP: systolic blood pressure; DBP: diastolic blood pressure; TC: total cholesterol; TG: triglycerides; HDL: high-density lipoprotein; LDL: low-density lipoprotein.

**Supplementary Table S2 Assumptions Testing of blood pressure and serum lipids**

**in The Whole Population in univariate twin Analysis**

| Base Model | -2LL | Parameters | df | AIC | Comparison Model | ΔX2 | Δdf | p |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SBP**  |
| Sat | 5707.99 | 12 | 2300 | 5731.99 | - | - | - | - |
| Sub1 | 5709.19 | 10 | 2302 | 5729.19 | Sat | 1.20 | 2 | 0.55 |
| Sub2 | 5709.99 | 9 | 2303 | 5727.99 | Sat | 1.99 | 3 | 0.57 |
| Sub3 | 5710.63 | 7 | 2305 | 5724.63 | Sat | 2.64 | 5 | 0.76 |
| Sub4 | 5715.97 | 6 | 2306 | 5727.97 | Sat | 7.97 | 6 | 0.24 |
| **DBP** |
| Sat | 6026.59 | 12 | 2330 | 6050.59 | - | - | - | - |
| Sub1 | 6028.66 | 10 | 2332 | 6048.66 | Sat | 2.06 | 2 | 0.36 |
| Sub2 | 6029.16 | 9 | 2333 | 6047.16 | Sat | 2.57 | 3 | 0.46 |
| Sub3 | 6029.88 | 7 | 2335 | 6043.88 | Sat | 3.29 | 5 | 0.66 |
| Sub4 | 6031.88 | 6 | 2336 | 6043.88 | Sat | 5.28 | 6 | 0.51 |
| **TC** |
| Sat | 5968.40 | 12 | 2258 | 5992.40 | - | - | - | - |
| Sub1 | 5969.09 | 10 | 2260 | 5989.09 | Sat | 0.68 | 2 | 0.71 |
| Sub2 | 5969.15 | 9 | 2261 | 5987.15 | Sat | 0.75 | 3 | 0.86 |
| Sub3 | 5969.39 | 7 | 2263 | 5983.39 | Sat | 0.98 | 5 | 0.96 |
| Sub4 | 5970.50 | 6 | 2264 | 5982.50 | Sat | 2.09 | 6 | 0.91 |
| **TG** |
| Sat | 5960.65 | 12 | 2228 | 5984.65 | - | - | - | - |
| Sub1 | 5960.67 | 10 | 2230 | 5980.67 | Sat | 0.03 | 2 | 0.99 |
| Sub2 | 5962.19 | 9 | 2231 | 5980.19 | Sat | 1.54 | 3 | 0.67 |
| Sub3 | 5962.78 | 7 | 2233 | 5976.78 | Sat | 2.13 | 5 | 0.83 |
| Sub4 | 5962.94 | 6 | 2234 | 5974.94 | Sat | 2.29 | 6 | 0.89 |
| **HDL** |
| Sat | 5731.08 | 12 | 2258.00 | 5755.08 | - | - | - | - |
| Sub1 | 5731.39 | 10 | 2260.00 | 5751.39 | Sat | 0.31 | 2 | 0.86 |
| Sub2 | 5731.85 | 9 | 2261.00 | 5749.85 | Sat | 0.77 | 3 | 0.86 |
| Sub3 | 5732.43 | 7 | 2263.00 | 5746.43 | Sat | 1.35 | 5 | 0.93 |
| Sub4 | 5734.34 | 6 | 2264.00 | 5746.34 | Sat | 3.26 | 6 | 0.78 |
| **LDL** |
| Sat | 5901.17 | 12 | 2236.00 | 5925.17 | - | - | - | - |
| Sub1 | 5901.19 | 10 | 2238.00 | 5921.19 | Sat | 0.02 | 2 | 0.99 |
| Sub2 | 5901.19 | 9 | 2239.00 | 5919.19 | Sat | 0.02 | 3 | 1.00 |
| Sub3 | 5904.47 | 7 | 2241.00 | 5918.47 | Sat | 3.29 | 5 | 0.65 |
| Sub4 | 5904.53 | 6 | 2242.00 | 5916.53 | Sat | 3.36 | 6 | 0.76 |

SBP: systolic blood pressure; DBP: diastolic blood pressure; TC: total cholesterol; TG: triglycerides; HDL: high-density lipoprotein; LDL: low-density lipoprotein.

-2LL: fit statistic, which is -2\*log-likelihood of the data; df: degrees of freedom; AIC: Akaike’s Information Criteria. Lower values denote better model fits.

Δχ2: difference in -2LL between two models, distributed chi-square. Δdf: difference in degrees of

freedom between two models, which is equal to the difference in number of parameters.

Sat: a baseline model of the observed data, which models the variances and means separately

for each twin in a pair and across zygosity. Sub 1 equates means within twin pairs. Sub 2 equates means across zygosity. Sub 3 equates variances within twin pairs. Sub 4 equates variances across zygosity.

**Supplementary Table S3 Assumptions testing of blood pressure and serum lipids of three age groups in univariate twin Analysis**

| Base Model | -2LL | Parameters | df | AIC | Comparison Model | ΔX2 | Δdf | *P* |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SBP ≤45 years old** |
| Sat | 2258.17 | 12 | 906 | 2282.17 | - | - | - | - |
| Sub1 | 2258.61 | 10 | 908 | 2278.61 | Sat | 0.44 | 2 | 0.80 |
| Sub2 | 2261.37 | 9 | 909 | 2279.37 | Sat | 3.20 | 3 | 0.36 |
| Sub3 | 2262.50 | 7 | 911 | 2276.50 | Sat | 4.33 | 5 | 0.50 |
| Sub4 | 2262.55 | 6 | 912 | 2274.55 | Sat | 4.38 | 6 | 0.63 |
| **SBP 46-55 years old** |
| Sat | 2187.63 | 12 | 820 | 2211.63 | - | - | - | - |
| Sub1 | 2190.89 | 10 | 822 | 2210.89 | Sat | 3.25 | 2 | 0.20 |
| Sub2 | 2190.95 | 9 | 823 | 2208.95 | Sat | 3.32 | 3 | 0.35 |
| Sub3 | 2191.51 | 7 | 825 | 2205.51 | Sat | 3.87 | 5 | 0.57 |
| Sub4 | 2192.97 | 6 | 826 | 2204.97 | Sat | 5.34 | 6 | 0.50 |
| **SBP ＞55 years old** |
| Sat | 1510.33 | 12 | 550 | 1534.33 | - | - | - | - |
| Sub1 | 1510.71 | 10 | 552 | 1530.71 | Sat | 0.39 | 2 | 0.82 |
| Sub2 | 1511.35 | 9 | 553 | 1529.35 | Sat | 1.02 | 3 | 0.80 |
| Sub3 | 1512.85 | 7 | 555 | 1526.85 | Sat | 2.52 | 5 | 0.77 |
| Sub4 | 1513.28 | 6 | 556 | 1525.28 | Sat | 2.96 | 6 | 0.81 |
| **DBP ≤45 years old** |
| Sat | 2263.35 | 12 | 904 | 2287.35 | - | - | - | - |
| Sub1 | 2264.03 | 10 | 906 | 2284.03 | Sat | 0.68 | 2 | 0.71 |
| Sub2 | 2265.88 | 9 | 907 | 2283.88 | Sat | 2.53 | 3 | 0.47 |
| Sub3 | 2266.26 | 7 | 909 | 2280.26 | Sat | 2.91 | 5 | 0.71 |
| Sub4 | 2266.35 | 6 | 910 | 2278.35 | Sat | 2.99 | 6 | 0.81 |
| **DBP 46-55 years old** |
| Sat | 2204.02 | 12 | 824 | 2228.02 | - | - | - | - |
| Sub1 | 2207.48 | 10 | 826 | 2227.48 | Sat | 3.46 | 2 | 0.18 |
| Sub2 | 2207.87 | 9 | 827 | 2225.87 | Sat | 3.86 | 3 | 0.28 |
| Sub3 | 2207.91 | 7 | 829 | 2221.91 | Sat | 3.90 | 5 | 0.56 |
| Sub4 | 2209.35 | 6 | 830 | 2221.35 | Sat | 5.34 | 6 | 0.50 |
| **DBP ＞55 years old** |
| Sat | 1578.57 | 12 | 578 | 1602.57 | - | - | - | - |
| Sub1 | 1578.58 | 10 | 580 | 1598.58 | Sat | 0.01 | 2 | 0.99 |
| Sub2 | 1579.68 | 9 | 581 | 1597.68 | Sat | 1.11 | 3 | 0.77 |
| Sub3 | 1580.42 | 7 | 583 | 1594.42 | Sat | 1.85 | 5 | 0.87 |
| Sub4 | 1580.42 | 6 | 584 | 1592.42 | Sat | 1.85 | 6 | 0.93 |
| **TC ≤45 years old** |
| Sat | 2293.31 | 12 | 886 | 2317.31 | - | - | - | - |
| Sub1 | 2294.19 | 10 | 888 | 2314.19 | Sat | 0.88 | 2 | 0.64 |
| Sub2 | 2294.27 | 9 | 889 | 2312.27 | Sat | 0.95 | 3 | 0.81 |
| Sub3 | 2295.41 | 7 | 891 | 2309.41 | Sat | 2.09 | 5 | 0.84 |
| Sub4 | 2307.19 | 6 | 892 | 2319.19 | Sat | 13.88 | 6 | 0.03 |
| **TC 46-55 years old** |
| Sat | 2123.98 | 12 | 794 | 2147.98 | - | - | - | - |
| Sub1 | 2124.00 | 10 | 796 | 2144.00 | Sat | 0.02 | 2 | 0.99 |
| Sub2 | 2126.33 | 9 | 797 | 2144.33 | Sat | 2.35 | 3 | 0.50 |
| Sub3 | 2126.56 | 7 | 799 | 2140.56 | Sat | 2.58 | 5 | 0.76 |
| Sub4 | 2126.85 | 6 | 800 | 2138.85 | Sat | 2.87 | 6 | 0.82 |
| **TC ＞55 years old** |
| Sat | 1486.65 | 12 | 554 | 1510.65 | - | - | - | - |
| Sub1 | 1487.34 | 10 | 556 | 1507.34 | Sat | 0.69 | 2 | 0.71 |
| Sub2 | 1488.43 | 9 | 557 | 1506.43 | Sat | 1.78 | 3 | 0.62 |
| Sub3 | 1489.38 | 7 | 559 | 1503.38 | Sat | 2.73 | 5 | 0.74 |
| Sub4 | 1494.33 | 6 | 560 | 1506.33 | Sat | 7.68 | 6 | 0.26 |
| **TG ≤45 years old** |
| Sat | 2244.38 | 12 | 866 | 2268.38 | - | - | - | - |
| Sub1 | 2244.97 | 10 | 868 | 2264.97 | Sat | 0.59 | 2 | 0.75 |
| Sub2 | 2245.82 | 9 | 869 | 2263.82 | Sat | 1.44 | 3 | 0.70 |
| Sub3 | 2245.85 | 7 | 871 | 2259.85 | Sat | 1.47 | 5 | 0.92 |
| Sub4 | 2245.94 | 6 | 872 | 2257.94 | Sat | 1.56 | 6 | 0.96 |
| **TG 46-55 years old** |
| Sat | 2116.70 | 12 | 784 | 2140.70 | - | - | - | - |
| Sub1 | 2117.63 | 10 | 786 | 2137.63 | Sat | 0.93 | 2 | 0.63 |
| Sub2 | 2119.64 | 9 | 787 | 2137.64 | Sat | 2.94 | 3 | 0.40 |
| Sub3 | 2121.88 | 7 | 789 | 2135.88 | Sat | 5.18 | 5 | 0.39 |
| Sub4 | 2121.97 | 6 | 790 | 2133.97 | Sat | 5.27 | 6 | 0.51 |
| **TG ＞55 years old** |
| Sat | 1535.80 | 12 | 554 | 1559.80 | - | - | - | - |
| Sub1 | 1536.33 | 10 | 556 | 1556.33 | Sat | 0.53 | 2 | 0.77 |
| Sub2 | 1536.69 | 9 | 557 | 1554.69 | Sat | 0.89 | 3 | 0.83 |
| Sub3 | 1536.81 | 7 | 559 | 1550.81 | Sat | 1.01 | 5 | 0.96 |
| Sub4 | 1536.84 | 6 | 560 | 1548.84 | Sat | 1.04 | 6 | 0.98 |
| **HDL ≤45 years old** |
| Sat | 2246.85 | 12 | 884 | 2270.85 | - | - | - | - |
| Sub1 | 2246.86 | 10 | 886 | 2266.86 | Sat | 0.02 | 2 | 0.99 |
| Sub2 | 2246.93 | 9 | 887 | 2264.93 | Sat | 0.08 | 3 | 0.99 |
| Sub3 | 2246.96 | 7 | 889 | 2260.96 | Sat | 0.12 | 5 | 1.00 |
| Sub4 | 2248.15 | 6 | 890 | 2260.15 | Sat | 1.30 | 6 | 0.97 |
| **HDL 46-55 years old** |
| Sat | 2028.19 | 12 | 792 | 2052.19 | - | - | - | - |
| Sub1 | 2029.83 | 10 | 794 | 2049.83 | Sat | 1.63 | 2 | 0.44 |
| Sub2 | 2029.85 | 9 | 795 | 2047.85 | Sat | 1.66 | 3 | 0.65 |
| Sub3 | 2029.89 | 7 | 797 | 2043.89 | Sat | 1.69 | 5 | 0.89 |
| Sub4 | 2042.27 | 6 | 798 | 2054.27 | Sat | 14.08 | 6 | 0.03 |
| **HDL＞55 years old** |
| Sat | 1444.23 | 12 | 558 | 1468.23 | - | - | - | - |
| Sub1 | 1449.34 | 10 | 560 | 1469.34 | Sat | 5.12 | 2 | 0.08 |
| Sub2 | 1452.51 | 9 | 561 | 1470.51 | Sat | 8.28 | 3 | 0.04 |
| Sub3 | 1454.03 | 7 | 563 | 1468.03 | Sat | 9.80 | 5 | 0.08 |
| Sub4 | 1454.11 | 6 | 564 | 1466.11 | Sat | 9.88 | 6 | 0.13 |
| **LDL ≤45 years old** |
| Sat | 2319.42 | 12 | 878 | 2343.42 | - | - | - | - |
| Sub1 | 2320.15 | 10 | 880 | 2340.15 | Sat | 0.73 | 2 | 0.69 |
| Sub2 | 2320.34 | 9 | 881 | 2338.34 | Sat | 0.92 | 3 | 0.82 |
| Sub3 | 2324.94 | 7 | 883 | 2338.94 | Sat | 5.52 | 5 | 0.36 |
| Sub4 | 2325.79 | 6 | 884 | 2337.79 | Sat | 6.37 | 6 | 0.38 |
| **LDL 46-55 years old** |
| Sat | 2080.46 | 12 | 784 | 2104.46 | - | - | - | - |
| Sub1 | 2080.48 | 10 | 786 | 2100.48 | Sat | 0.02 | 2 | 0.99 |
| Sub2 | 2080.55 | 9 | 787 | 2098.55 | Sat | 0.09 | 3 | 0.99 |
| Sub3 | 2080.73 | 7 | 789 | 2094.73 | Sat | 0.27 | 5 | 1.00 |
| Sub4 | 2080.75 | 6 | 790 | 2092.75 | Sat | 0.28 | 6 | 1.00 |
| **LDL＞55 years old** |
| Sat | 1480.67 | 12 | 550 | 1504.67 | - | - | - | - |
| Sub1 | 1481.58 | 10 | 552 | 1501.58 | Sat | 0.91 | 2 | 0.63 |
| Sub2 | 1481.70 | 9 | 553 | 1499.70 | Sat | 1.04 | 3 | 0.79 |
| Sub3 | 1484.12 | 7 | 555 | 1498.12 | Sat | 3.46 | 5 | 0.63 |
| Sub4 | 1484.61 | 6 | 556 | 1496.61 | Sat | 3.94 | 6 | 0.68 |

SBP: systolic blood pressure; DBP: diastolic blood pressure; TC: total cholesterol; TG: triglycerides; HDL: high-density lipoprotein; LDL: low-density lipoprotein.

-2LL: fit statistic, which is -2\*log-likelihood of the data; df: degrees of freedom; AIC: Akaike’s

Information Criteria. Lower values denote better model fits.

Δχ2: difference in -2LL between two models, distributed chi-square. Δdf: difference in degrees of

freedom between two models, which is equal to the difference in number of parameters.

Sat: a baseline model of the observed data, which models the variances and means separately

for each twin in a pair and across zygosity. Sub 1 equates means within twin pairs. Sub 2 equates means across zygosity. Sub 3 equates variances within twin pairs. Sub 4 equates variances across zygosity.

**Supplementary Table S4 Twin Model Fit Statistics of blood pressure and serum lipids of The Whole Population in univariate twin analysis**

| Base Model | -2LL | Parameters | df | AIC | Comparison Model | ΔX2 | Δdf | *P* |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SBP**  |
| Sat | 5707.99  | 12 | 2300 | 5731.99  | - | - | - | - |
| ACE | 5715.26  | 7 | 2305 | 5729.26  | Sat | 7.26  | 5 | 0.202  |
| AE | 5717.79  | 6 | 2306 | 5729.79  | ACE | 2.53  | 1 | 0.111  |
| CE | 5732.50  | 6 | 2306 | 5744.50  | ACE | 17.24  | 1 | <0.001  |
| E | 6075.28  | 5 | 2307 | 6085.28  | ACE | 360.02  | 2 | <0.001 |
| **Hom** | **5769.78** | **4** | **2308** | **5777.78** | **AE** | **51.99** | **2** | **<0.001** |
| **DBP**  |
| Sat | 6026.59  | 12 | 2330 | 6050.59  | - | - | - | - |
| ACE | 6031.41  | 7 | 2335 | 6045.41  | Sat | 4.82  | 5 | 0.438  |
| AE | 6035.01  | 6 | 2336 | 6047.01  | ACE | 3.59  | 1 | 0.058  |
| CE | 6051.13  | 6 | 2336 | 6063.13  | ACE | 19.72  | 1 | <0.001  |
| E | 6428.86  | 5 | 2337 | 6438.86  | ACE | 397.44  | 2 | <0.001  |
| **Hom** | **6046.63** | **4** | **2338** | **6054.63** | **AE** | **11.63** | **2** | **<0.001** |
| **TC**  |
| Sat | 5968.40  | 12 | 2258 | 5992.40  | - | - | - | - |
| ACE | 5970.44  | 10 | 2263 | 5984.44  | Sat | 2.03  | 5 | 0.844  |
| AE | 5974.45 | 9 | 2264 | 5986.45  | Sat | 4.01  | 1 | 0.045  |
| CE | 6002.37  | 7 | 2264 | 6014.37  | Sat | 31.93  | 1 | <0.001 |
| E | 6430.25  | 6 | 2265 | 6440.25  | Sat | 459.81  | 2 | <0.001 |
| **Hom** | **5974.51**  | **4** | **2266** | **5982.51** | **AE** | **0.06** | **2** | **0.97** |
| **TG**  |
| Sat | 5960.65  | 12 | 2228 | 5984.65  | - | - | - | - |
| ACE | 5961.40  | 7 | 2233 | 5975.40  | Sat | 0.76  | 5 | 0.980  |
| AE | 5961.73  | 6 | 2234 | 5973.73  | ACE | 0.33  | 1 | 0.564  |
| CE | 5995.50  | 6 | 2234 | 6007.50  | ACE | 34.10  | 1 | <0.001 |
| E | 6325.40  | 5 | 2235 | 6335.40  | ACE | 363.99  | 2 | <0.001 |
| **Hom** | **5961.96**  | **4** | **2236** | **5969.958**  | **AE** | **0.22**  | **2** | **0.89** |
| **LDL**  |
| Sat | 5901.17  | 12 | 2236 | 5925.17  | - | - | - | - |
| ACE | 5904.53  | 7 | 2241 | 5918.53  | Sat | 3.36  | 5 | 0.645  |
| AE | 5912.26  | 6 | 2242 | 5924.26  | ACE | 7.72  | 1 | 0.005  |
| CE | 5926.04  | 6 | 2242 | 5938.04  | ACE | 21.50  | 1 | <0.001 |
| E | 6375.24  | 5 | 2243 | 6385.24  | ACE | 470.71  | 2 | <0.001 |
| **Hom** | **5912.38**  | **4** | **2244** | **5920.38**  | **AE** | **0.13** | **2** | **0.94** |
| **HDL**  |
| Sat | 5731.08  | 12 | 2258 | 5755.08  | - | - | - | - |
| ACE | 5733.91  | 7 | 2263 | 5747.91  | Sat | 2.83  | 5 | 0.726  |
| AE | 5740.42  | 6 | 2264 | 5752.42  | ACE | 6.50  | 1 | 0.011  |
| CE | 5776.89  | 6 | 2264 | 5788.89  | ACE | 42.97  | 1 | <0.001 |
| E | 6369.21  | 5 | 2265 | 6379.21  | ACE | 635.29  | 2 | <0.001 |
| **Hom** | **5742.98**  | **4** | **2266** | **5750.96**  | **AE** | **2.56**  | **2** | **0.28** |

SBP: systolic blood pressure; DBP: diastolic blood pressure; TC: total cholesterol; TG: triglycerides; HDL: high-density lipoprotein; LDL: low-density lipoprotein. A: additive genetic component; D: non-additive genetic component; C: shared environmental component; E: unique environmental component; Sat: a baseline model of the observed data, which models the variances and means separately for each twin in a pair and across zygosity.

-2LL: fit statistic, which is -2\*log-likelihood of the data. df: degrees of freedom. AIC: Akaike’s Information Criteria, an alternative fit index. Lower values denote better model fits. Δχ2: difference in -2LL between two models, distributed chi-square. Δdf: difference in degrees of freedom between two models, which is equal to the difference in number of parameters. The best fitting models are marked as bold, selected based on the principle of parsimony and lowest AIC and -2ll value. A difference in AIC between two models of 2 or less, provides equivalent support for both models, in which case the most parsimonious model (i.e., with lowest number of parameters) was chosen, a difference of 3 indicates that the lower AIC model has considerably more support, and a difference of more than 10, indicates that the lower AIC model is a substantially better fit compared to the higher AIC model. Hom: homogeneity model, in which the variance components and total variance for serum lipids and blood pressure indicators were equated across three age groups.

**Supplementary Table S5 Twin Model Fit Statistics of blood pressure and serum lipids of Three Age Groups in univariate twin Analysis**

| Base Model | -2LL | Parameters | df | AIC | Comparison Model | ΔX2 | Δdf | *P* |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SBP ≤45 years old** |
| Sat | 2258.17  | 12 | 906 | 2282.17  | - | - | - | - |
| ACE | 2260.21  | 7 | 911 | 2274.21  | Sat | 2.04  | 5 | 0.844  |
| AE | 2260.21  | 6 | 912 | 2272.21  | ACE | 0.00  | 1 | 1.000  |
| CE | 2285.74  | 6 | 912 | 2297.74  | ACE | 25.53  | 1 | <0.001 |
| E | 2413.93  | 5 | 913 | 2423.93  | ACE | 153.72  | 2 | <0.001 |
| **SBP 46-55 years old** |
| Sat | 2187.63 | 12 | 820 | 2211.63  | - | - | - | - |
| ACE | 2192.89  | 7 | 825 | 2206.89  | Sat | 5.25  | 5 | 0.386  |
| AE | 2195.36  | 6 | 826 | 2207.36  | ACE | 2.47  | 1 | 0.116  |
| CE | 2198.51  | 6 | 826 | 2210.51  | ACE | 5.62  | 1 | 0.018  |
| E | 2354.52  | 5 | 827 | 2364.52  | ACE | 161.63  | 2 | <0.001 |
| **SBP ＞55years old** |
| Sat | 1510.33  | 12 | 550 | 1534.33  | - | - | - | - |
| ACE | 1512.60  | 7 | 555 | 1526.60  | Sat | 2.27  | 5 | 0.810  |
| AE | 1512.94  | 6 | 556 | 1524.94  | ACE | 0.34  | 1 | 0.562  |
| CE | 1514.21  | 6 | 556 | 1526.21  | ACE | 1.61  | 1 | 0.205  |
| E | 1567.50  | 5 | 557 | 1577.50  | ACE | 54.90  | 2 | <0.001 |
| **DBP ≤45years old** |
| Sat | 2263.35  | 12 | 904 | 2287.35  | - | - | - | - |
| ACE | 2264.70  | 7 | 909 | 2278.70  | Sat | 1.35  | 5 | 0.930  |
| AE | 2264.70  | 6 | 910 | 2276.70  | ACE | 0.00  | 1 | 1.000  |
| CE | 2285.71  | 6 | 910 | 2297.71  | ACE | 21.01  | 1 | <0.001 |
| E | 2403.24  | 5 | 911 | 2413.24  | ACE | 138.54  | 2 | <0.001 |
| **DBP 46-55years old** |
| Sat | 2204.02  | 12 | 824 | 2228.02  | - | - | - | - |
| ACE | 2209.01  | 7 | 829 | 2223.01  | Sat | 5.00  | 5 | 0.416  |
| AE | 2216.02  | 6 | 830 | 2228.02  | ACE | 7.00  | 1 | 0.008  |
| CE | 2209.80  | 6 | 830 | 2221.80  | ACE | 0.79  | 1 | 0.374  |
| E | 2357.35  | 5 | 831 | 2367.35  | ACE | 148.34  | 2 | <0.001 |
| **DBP ＞55years old** |
| Sat | 1578.57  | 12 | 578 | 1602.57  | - | - | - | - |
| ACE | 1579.33  | 7 | 583 | 1593.33  | Sat | 0.77  | 5 | 0.979  |
| AE | 1579.33  | 6 | 584 | 1591.33  | ACE | 0.00  | 1 | 1.000  |
| CE | 1586.85  | 6 | 584 | 1598.85  | ACE | 7.52  | 1 | 0.006  |
| E | 1665.54  | 5 | 585 | 1675.54  | ACE | 86.21  | 2 | <0.001 |
| **TC ≤45years old** |
| Sat | 2293.31  | 12 | 886 | 2317.31  | - | - | - | - |
| ACE | 2307.13  | 7 | 891 | 2321.13  | Sat | 13.82  | 5 | 0.017  |
| AE | 2309.53  | 6 | 892 | 2321.53  | ACE | 2.40  | 1 | 0.121  |
| CE | 2326.68  | 6 | 892 | 2338.68  | ACE | 19.55  | 1 | <0.001 |
| E | 2501.46  | 5 | 893 | 2511.46  | ACE | 194.32  | 2 | <0.001 |
| **TC 46-55years old** |
| Sat | 2123.98  | 12 | 794 | 2147.98  | - | - | - | - |
| ACE | 2124.84  | 7 | 799 | 2138.84  | Sat | 0.86  | 5 | 0.973  |
| AE | 2124.84  | 6 | 800 | 2136.84  | ACE | 0.00  | 1 | 1.000  |
| CE | 2148.54  | 6 | 800 | 2160.54  | ACE | 23.70  | 1 | <0.001 |
| E | 2274.75  | 5 | 801 | 2284.75  | ACE | 149.91  | 2 | <0.001 |
| **TC >55years old** |
| Sat | 1486.65  | 12 | 554 | 1510.65  | - | - | - | - |
| ACE | 1493.40  | 7 | 559 | 1507.40  | Sat | 6.75  | 5 | 0.240  |
| AE | 1498.70  | 6 | 560 | 1510.70  | ACE | 5.30  | 1 | 0.021  |
| CE | 1493.40  | 6 | 560 | 1505.40  | ACE | 0.00  | 1 | 1.000  |
| E | 1592.69  | 5 | 561 | 1602.69  | ACE | 99.29  | 2 | <0.001 |
| **TG ≤45years old** |
| Sat | 2244.38  | 12 | 866 | 2268.38  | - | - | - | - |
| ACE | 2245.06  | 7 | 871 | 2259.06  | Sat | 0.68  | 5 | 0.984  |
| AE | 2245.65  | 6 | 872 | 2257.65  | ACE | 0.59  | 1 | 0.442  |
| CE | 2257.58  | 6 | 872 | 2269.58  | ACE | 12.52  | 1 | <0.001 |
| E | 2390.13  | 5 | 873 | 2400.13  | ACE | 145.07  | 2 | <0.001 |
| **TG 46-55years old** |
| Sat | 2116.70  | 12 | 784 | 2140.70  | - | - | - | - |
| ACE | 2120.15  | 7 | 789 | 2134.15  | Sat | 3.45  | 5 | 0.631  |
| AE | 2120.15  | 6 | 790 | 2132.15  | ACE | 0.00  | 1 | 1.000  |
| CE | 2137.15  | 6 | 790 | 2149.15  | ACE | 17.00  | 1 | <0.001 |
| E | 2246.76  | 5 | 791 | 2256.76  | ACE | 126.61  | 2 | <0.001 |
| **TG >55years old** |
| Sat | 1535.80  | 12 | 554 | 1559.80  | - | - | - | - |
| ACE | 1536.71  | 7 | 559 | 1550.71  | Sat | 0.91  | 5 | 0.969  |
| AE | 1536.71  | 6 | 560 | 1548.71  | ACE | 0.00  | 1 | 1.000  |
| CE | 1542.92  | 6 | 560 | 1554.92  | ACE | 6.21  | 1 | 0.013  |
| E | 1592.66  | 5 | 561 | 1602.66  | ACE | 55.95  | 2 | <0.001 |
| **HDL≤45years old** |
| Sat | 2246.85  | 12 | 884 | 2270.85  | - | - | - | - |
| ACE | 2248.09  | 7 | 889 | 2262.09  | Sat | 1.24  | 5 | 0.941  |
| AE | 2252.45  | 6 | 890 | 2264.45  | ACE | 4.37  | 1 | 0.037  |
| CE | 2269.88  | 6 | 890 | 2281.88  | ACE | 21.79  | 1 | <0.001 |
| E | 2505.75  | 5 | 891 | 2515.75  | ACE | 257.66  | 2 | <0.001 |
| **HDL 46-55years old** |
| Sat | 2028.19  | 12 | 792 | 2052.19  | - | - | - | - |
| ACE | 2042.26  | 7 | 797 | 2056.26  | Sat | 14.06  | 5 | 0.015  |
| AE | 2045.23  | 6 | 798 | 2057.23  | ACE | 2.97  | 1 | 0.085  |
| CE | 2049.49  | 6 | 798 | 2061.49  | ACE | 7.24  | 1 | 0.007  |
| E | 2255.87  | 5 | 799 | 2265.87  | ACE | 213.61  | 2 | <0.001 |
| **HDL >55years old** |
| Sat | 1444.23  | 12 | 558 | 1468.23  | - | - | - | - |
| ACE | 1451.71  | 7 | 563 | 1465.71  | Sat | 7.48  | 5 | 0.187  |
| AE | 1451.72  | 6 | 564 | 1463.72  | ACE | 0.01  | 1 | 0.905  |
| CE | 1468.55  | 6 | 564 | 1480.55  | ACE | 16.84  | 1 | <0.001 |
| E | 1611.35  | 5 | 565 | 1621.35  | ACE | 159.64  | 2 | <0.001 |
| **LDL≤45years old** |
| Sat | 2319.42  | 12 | 878 | 2343.42  | - | - | - | - |
| ACE | 2325.58  | 7 | 883 | 2339.58  | Sat | 6.16  | 5 | 0.291  |
| AE | 2329.95  | 6 | 884 | 2341.95  | ACE | 4.37  | 1 | 0.037  |
| CE | 2334.40  | 6 | 884 | 2346.40  | ACE | 8.82  | 1 | 0.003  |
| E | 2504.48  | 5 | 885 | 2514.48  | ACE | 178.90  | 2 | <0.001 |
| **LDL 46-55years old** |
| Sat | 2080.46  | 12 | 784 | 2104.46  | - | - | - | - |
| ACE | 2080.68  | 7 | 789 | 2094.68  | Sat | 0.21  | 5 | 0.999  |
| AE | 2080.95  | 6 | 790 | 2092.95  | ACE | 0.27  | 1 | 0.601  |
| CE | 2097.63  | 6 | 790 | 2109.63  | ACE | 16.95  | 1 | <0.001 |
| E | 2251.86  | 5 | 791 | 2261.86  | ACE | 171.19  | 2 | <0.001 |
| **LDL >55years old** |
| Sat | 1480.67  | 12 | 550 | 1504.67  | - | - | - | - |
| ACE | 1484.42  | 7 | 555 | 1498.42  | Sat | 3.76  | 5 | 0.585  |
| AE | 1487.91  | 6 | 556 | 1499.91  | ACE | 3.49  | 1 | 0.062  |
| CE | 1485.33  | 6 | 556 | 1497.33  | ACE | 0.90  | 1 | 0.342  |
| E | 1591.45  | 5 | 557 | 1601.45  | ACE | 107.03  | 2 | <0.001 |

SBP: systolic blood pressure; DBP: diastolic blood pressure; TC: total cholesterol ; TG: triglycerides ;HDL: high-density lipoprotein; LDL: low-density lipoprotein.

A: additive genetic component; D: non-additive genetic component; C: shared environmental component; E: unique environmental component;

-2LL: fit statistic, which is -2\*log-likelihood of the data. df: degrees of freedom. AIC: Akaike’s Information Criteria, an alternative fit index. Lower values denote better model fits. Δχ2: difference in -2LL between two models, distributed chi-square. Δdf: difference in degrees of freedom between two models, which is equal to the difference in number of parameters. The best fitting models are marked as bold, selected based on the principle of parsimony and lowest AIC and -2ll value. A difference in AIC between two models of 2 or less, provides equivalent support for both models, in which case the most parsimonious model (i.e., with lowest number of parameters) was chosen, a difference of 3 indicates that the lower AIC model has considerably more support, and a difference of more than 10, indicates that the lower AIC model is a substantially better fit compared to the higher AIC model. Hom: homogeneity model, in which the variance components and total variance for serum lipids and blood pressure indicators were equated across three age groups.



**Supplementary Figure S1. Twin Model Estimates by Three Age Groups**

A, SBP: systolic blood pressure. B, DBP: diastolic blood pressure. C, TC: total cholesterol. D, TG: triglycerides. E, LDL: low-density lipoprotein. F, HDL: high-density lipoprotein.

**Bivariate Twin Analysis**

**Supplementary Table S6 Assumptions Testing of blood pressure and serum lipids**

**in The Whole Population in Bivariate Twin Analysis**

| Base Model | -2LL  | Paramenters | df | AIC | Comparison Model | ΔX2 | Δdf | p |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **HDL-SBP**  |
| Sat  | 11354.23  | 32 | 4384 | 11418.23  | - | - | - | - |
| Sub1 | 11355.69  | 28 | 4388 | 11411.69  | Sat | 1.45  | 4 | 0.84  |
| Sub2 | 11357.73  | 24 | 4392 | 11405.73  | Sat | 3.50  | 8 | 0.90  |
| Sub3 | 11367.52  | 20 | 4396 | 11407.52  | Sat | 13.29  | 12 | 0.35  |
| **HDL-DBP**  |
| Sat  | 11526.25  | 32 | 4436 | 11590.25  | - | - | - | - |
| Sub1 | 11528.09  | 28 | 4440 | 11584.09  | Sat | 1.84  | 4 | 0.76  |
| Sub2 | 11532.63  | 24 | 4444 | 11580.63  | Sat | 6.38  | 8 | 0.60  |
| Sub3 | 11536.59  | 20 | 4448 | 11576.59  | Sat | 10.34  | 12 | 0.59  |
| **TC-SBP** |
| Sat  | 11492.38  | 32 | 4384 | 11556.38  | - | - | - | - |
| Sub1 | 11494.70  | 28 | 4388 | 11550.70  | Sat | 2.32  | 4 | 0.68  |
| Sub2 | 11496.64  | 24 | 4392 | 11544.64  | Sat | 4.26  | 8 | 0.83  |
| Sub3 | 11509.61  | 20 | 4396 | 11549.61  | Sat | 17.24  | 12 | 0.14  |
| **TC-DBP** |
| Sat  | 11654.25  | 32 | 4436 | 11718.25  | - | - | - | - |
| Sub1 | 11658.03  | 28 | 4440 | 11714.03  | Sat | 3.78  | 4 | 0.44  |
| Sub2 | 11661.70  | 24 | 4444 | 11709.70  | Sat | 7.45  | 8 | 0.49  |
| Sub3 | 11665.92  | 20 | 4448 | 11705.92  | Sat | 11.67  | 12 | 0.47  |
| **TG-SBP** |
| Sat  | 11475.95  | 32 | 4324 | 11539.95  | - | - | - | - |
| Sub1 | 11477.38  | 28 | 4328 | 11533.38  | Sat | 1.44  | 4 | 0.84  |
| Sub2 | 11478.82  | 24 | 4332 | 11526.82  | Sat | 2.87  | 8 | 0.94  |
| Sub3 | 11486.90  | 20 | 4336 | 11526.90  | Sat | 10.96  | 12 | 0.53  |
| **TG-DBP** |
| Sat  | 11597.27  | 32 | 4376 | 11661.27  | - | - | - | - |
| Sub1 | 11599.24  | 28 | 4380 | 11655.24  | Sat | 1.97  | 4 | 0.74  |
| Sub2 | 11602.97  | 24 | 4384 | 11650.97  | Sat | 5.69  | 8 | 0.68  |
| Sub3 | 11605.83  | 20 | 4388 | 11645.83  | Sat | 8.56  | 12 | 0.74  |
| **LDL-SBP** |
| Sat  | 11408.20  | 32 | 4340 | 11472.20  | - | - | - | - |
| Sub1 | 11409.48  | 28 | 4344 | 11465.48  | Sat | 1.28  | 4 | 0.86  |
| Sub2 | 11415.11  | 24 | 4348 | 11463.11  | Sat | 6.91  | 8 | 0.55  |
| Sub3 | 11422.70  | 20 | 4352 | 11462.70  | Sat | 14.49  | 12 | 0.27  |
| **LDL-DBP** |
| Sat  | 11562.02  | 32 | 4392 | 11626.02  | - | - | - | - |
| Sub1 | 11563.99  | 28 | 4396 | 11619.99  | Sat | 1.97  | 4 | 0.74  |
| Sub2 | 11571.16  | 24 | 4400 | 11619.16  | Sat | 9.14  | 8 | 0.33  |
| Sub3 | 11573.53  | 20 | 4404 | 11613.53  | Sat | 11.52  | 12 | 0.49  |

SBP: systolic blood pressure；DBP: diastolic blood pressure; TC: total cholesterol ; TG: triglycerides ;HDL: high-density lipoprotein ; LDL: low-density lipoprotein.

-2LL: fit statistic, which is -2\*log-likelihood of the data; df: degrees of freedom; AIC: Akaike’s

Information Criteria. Lower values denote better model fits. Δχ2: difference in -2LL between two models, distributed chi-square. Δdf: difference in degrees of freedom between two models, which is equal to the difference in number of parameters. Sat is a baseline model of the observed data, which models the variances and means separately for each twin in a pair and across zygosity. Sub1 equates means within twin pairs. Sub2 equates means across zygosity. Sub 3 equates variances within twin pairs. Sub 4 equates variances across zygosity.

**Supplementary Table S7 Assumptions Testing of blood pressure and serum lipids**

**of Three Age Groups in Bivariate Twin Analysis**

| Base Model | -2LL  | Paramenters | df | AIC | Comparison Model | ΔX2 | Δdf | p |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TC-SBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4498.20  | 32 | 1732 | 4562.20  | - | - | - | - |
| Sub1 | 4499.03  | 28 | 1736 | 4555.03  | Sat | 0.83  | 4 | 0.93  |
| Sub2 | 4502.02  | 24 | 1740 | 4550.02  | Sat | 3.82  | 8 | 0.87  |
| Sub3 | 4514.33  | 20 | 1744 | 4554.33  | Sat | 16.14  | 12 | 0.18  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4151.41  | 32 | 1548 | 4215.41  | - | - | - | - |
| Sub1 | 4155.77  | 28 | 1552 | 4211.77  | Sat | 4.37  | 4 | 0.36  |
| Sub2 | 4156.50  | 24 | 1556 | 4204.50  | Sat | 5.09  | 8 | 0.75  |
| Sub3 | 4160.63  | 20 | 1560 | 4200.63  | Sat | 9.23  | 12 | 0.68  |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2859.18  | 32 | 1040 | 2923.18  | - | - | - | - |
| Sub1 | 2860.56  | 28 | 1044 | 2916.56  | Sat | 1.38  | 4 | 0.85  |
| Sub2 | 2863.16  | 24 | 1048 | 2911.16  | Sat | 3.98  | 8 | 0.86  |
| Sub3 | 2869.51  | 20 | 1052 | 2909.51  | Sat | 10.33  | 12 | 0.59  |
| **TC-DBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4477.12  | 32 | 1728 | 4541.12  | - | - | - | - |
| Sub1 | 4478.72  | 28 | 1732 | 4534.72  | Sat | 1.60  | 4 | 0.81  |
| Sub2 | 4481.78  | 24 | 1736 | 4529.78  | Sat | 4.66  | 8 | 0.79  |
| Sub3 | 4493.78  | 20 | 1740 | 4533.78  | Sat | 16.66  | 12 | 0.16  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4202.28  | 32 | 1556 | 4266.28  | - | - | - | - |
| Sub1 | 4207.92  | 28 | 1560 | 4263.92  | Sat | 5.65  | 4 | 0.23  |
| Sub2 | 4208.48  | 24 | 1564 | 4256.48  | Sat | 6.20  | 8 | 0.62  |
| Sub3 | 4212.25  | 20 | 1568 | 4252.25  | Sat | 9.97  | 12 | 0.62  |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2940.97  | 32 | 1088 | 3004.97  | - | - | - | - |
| Sub1 | 2941.72  | 28 | 1092 | 2997.72  | Sat | 0.74  | 4 | 0.95  |
| Sub2 | 2946.47  | 24 | 1096 | 2994.47  | Sat | 5.50  | 8 | 0.70  |
| Sub3 | 2953.20  | 20 | 1100 | 2993.20  | Sat | 12.22  | 12 | 0.43  |
| **TG-SBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4442.32  | 32 | 1692 | 4506.32  | - | - | - | - |
| Sub1 | 4443.18  | 28 | 1696 | 4499.18  | Sat | 0.86  | 4 | 0.93  |
| Sub2 | 4446.01  | 24 | 1700 | 4494.01  | Sat | 3.68  | 8 | 0.88  |
| Sub3 | 4448.55  | 20 | 1704 | 4488.55  | Sat | 6.23  | 12 | 0.90  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4129.76  | 32 | 1532 | 4193.76  | - | - | - | - |
| Sub1 | 4134.50  | 28 | 1536 | 4190.50  | Sat | 4.74  | 4 | 0.32  |
| Sub2 | 4136.89  | 24 | 1540 | 4184.89  | Sat | 7.12  | 8 | 0.52  |
| Sub3 | 4140.62  | 20 | 1544 | 4180.62  | Sat | 10.85  | 12 | 0.54  |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2909.72  | 32 | 1036 | 2973.72  | - | - | - | - |
| Sub1 | 2911.66  | 28 | 1040 | 2967.66  | Sat | 1.94  | 4 | 0.75  |
| Sub2 | 2912.76  | 24 | 1044 | 2960.76  | Sat | 3.04  | 8 | 0.93  |
| Sub3 | 2914.96  | 20 | 1048 | 2954.96  | Sat | 5.24  | 12 | 0.95  |
| **TG-DBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4412.62  | 32 | 1688 | 4476.62  | - | - | - | - |
| Sub1 | 4414.14  | 28 | 1692 | 4470.14  | Sat | 1.52  | 4 | 0.82  |
| Sub2 | 4416.97  | 24 | 1696 | 4464.97  | Sat | 4.35  | 8 | 0.82  |
| Sub3 | 4417.81  | 20 | 1700 | 4457.81  | Sat | 5.19  | 12 | 0.95  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4157.40  | 32 | 1536 | 4221.40  | - | - | - | - |
| Sub1 | 4162.94  | 28 | 1540 | 4218.94  | Sat | 5.53  | 4 | 0.24  |
| Sub2 | 4164.59  | 24 | 1544 | 4212.59  | Sat | 7.19  | 8 | 0.52  |
| Sub3 | 4168.37  | 20 | 1548 | 4208.37  | Sat | 10.97  | 12 | 0.53  |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 3005.47  | 32 | 1088 | 3069.47  | - | - | - | - |
| Sub1 | 3006.68  | 28 | 1092 | 3062.68  | Sat | 1.21  | 4 | 0.88  |
| Sub2 | 3009.56  | 24 | 1096 | 3057.56  | Sat | 4.09  | 8 | 0.85  |
| Sub3 | 3010.61  | 20 | 1100 | 3050.61  | Sat | 5.14  | 12 | 0.95  |
| **LDL-SBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4516.09  | 32 | 1716 | 4580.09  | - | - | - | - |
| Sub1 | 4517.41  | 28 | 1720 | 4573.41  | Sat | 1.32  | 4 | 0.86  |
| Sub2 | 4526.42  | 24 | 1724 | 4574.42  | Sat | 10.33  | 8 | 0.24  |
| Sub3 | 4529.26  | 20 | 1728 | 4569.26  | Sat | 13.17  | 12 | 0.36  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4088.64  | 32 | 1528 | 4152.64  | - | - | - | - |
| Sub1 | 4092.04  | 28 | 1532 | 4148.04  | Sat | 3.40  | 4 | 0.49  |
| Sub2 | 4092.53  | 24 | 1536 | 4140.53  | Sat | 3.89  | 8 | 0.87  |
| Sub3 | 4093.65  | 20 | 1540 | 4133.65  | Sat | 5.01  | 12 | 0.96  |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2846.42  | 32 | 1032 | 2910.42  | - | - | - | - |
| Sub1 | 2847.61  | 28 | 1036 | 2903.61  | Sat | 1.18  | 4 | 0.88  |
| Sub2 | 2850.88  | 24 | 1040 | 2898.88  | Sat | 4.45  | 8 | 0.81  |
| Sub3 | 2852.83  | 20 | 1044 | 2892.83  | Sat | 6.41  | 12 | 0.89  |
| **LDL-DBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4496.14  | 32 | 1712 | 4560.14  | - | - | - | - |
| Sub1 | 4497.86  | 28 | 1716 | 4553.86  | Sat | 1.72  | 4 | 0.79  |
| Sub2 | 4507.13  | 24 | 1720 | 4555.13  | Sat | 10.98  | 8 | 0.20  |
| Sub3 | 4508.74  | 20 | 1724 | 4548.74  | Sat | 12.59  | 12 | 0.40  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4130.08  | 32 | 1536 | 4194.08  | - | - | - | - |
| Sub1 | 4134.21  | 28 | 1540 | 4190.21  | Sat | 4.13  | 4 | 0.39  |
| Sub2 | 4134.56  | 24 | 1544 | 4182.56  | Sat | 4.48  | 8 | 0.81  |
| Sub3 | 4136.44  | 20 | 1548 | 4176.44  | Sat | 6.36  | 12 | 0.90  |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2928.70  | 32 | 1080 | 2992.70  | - | - | - | - |
| Sub1 | 2929.60  | 28 | 1084 | 2985.60  | Sat | 0.91  | 4 | 0.92  |
| Sub2 | 2934.94  | 24 | 1088 | 2982.94  | Sat | 6.24  | 8 | 0.62  |
| Sub3 | 2936.48  | 20 | 1092 | 2976.48  | Sat | 7.78  | 12 | 0.80  |
| **HDL-SBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4530.36  | 32 | 1728 | 4594.36  | - | - | - | - |
| Sub1 | 4532.80  | 28 | 1732 | 4588.80  | Sat | 2.44  | 4 | 0.65  |
| Sub2 | 4534.73  | 24 | 1736 | 4582.73  | Sat | 4.38  | 8 | 0.82  |
| Sub3 | 4538.20  | 20 | 1740 | 4578.20  | Sat | 7.84  | 12 | 0.80  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4047.40  | 32 | 1544 | 4111.40  | - | - | - | - |
| Sub1 | 4053.85  | 28 | 1548 | 4109.85  | Sat | 6.45  | 4 | 0.17  |
| Sub2 | 4054.64  | 24 | 1552 | 4102.64  | Sat | 7.24  | 8 | 0.51  |
| Sub3 | 4068.70  | 20 | 1556 | 4108.70  | Sat | 21.30  | 12 | 0.05  |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2797.98  | 32 | 1048 | 2861.98  | - | - | - | - |
| Sub1 | 2803.27  | 28 | 1052 | 2859.27  | Sat | 5.29  | 4 | 0.26  |
| Sub2 | 2807.85  | 24 | 1056 | 2855.85  | Sat | 9.87  | 8 | 0.27  |
| Sub3 | 2811.33  | 20 | 1060 | 2851.33  | Sat | 13.35  | 12 | 0.34  |
| **HDL-DBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4509.66  | 32 | 1724 | 4573.66  | - | - | - | - |
| Sub1 | 4511.97  | 28 | 1728 | 4567.97  | Sat | 2.31  | 4 | 0.68  |
| Sub2 | 4514.53  | 24 | 1732 | 4562.53  | Sat | 4.88  | 8 | 0.77  |
| Sub3 | 4516.58  | 20 | 1736 | 4556.58  | Sat | 6.93  | 12 | 0.86  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4096.43  | 32 | 1552 | 4160.43  | - | - | - | - |
| Sub1 | 4104.46  | 28 | 1556 | 4160.46  | Sat | 8.03  | 4 | 0.09  |
| Sub2 | 4104.98  | 24 | 1560 | 4152.98  | Sat | 8.55  | 8 | 0.38  |
| Sub3 | 4118.25  | 20 | 1564 | 4158.25  | Sat | 21.83  | 12 | 0.04  |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2885.26  | 32 | 1096 | 2949.26  | - | - | - | - |
| Sub1 | 2889.70  | 28 | 1100 | 2945.70  | Sat | 4.44  | 4 | 0.35  |
| Sub2 | 2896.02  | 24 | 1104 | 2944.02  | Sat | 10.76  | 8 | 0.22  |
| Sub3 | 2898.53  | 20 | 1108 | 2938.53  | Sat | 13.27  | 12 | 0.35  |

SBP: systolic blood pressure; DBP: diastolic blood pressure; TC: total cholesterol; TG: triglycerides; HDL: high-density lipoprotein ; LDL: low-density lipoprotein.

-2LL: fit statistic, which is -2\*log-likelihood of the data; df: degrees of freedom; AIC: Akaike’s

Information Criteria, an alter-tive fit index. Lower values denote better model fits.

Δχ2: difference in -2LL between two models, distributed chi-square. Δdf: difference in degrees of

freedom between two models, which is equal to the difference in number of parameters.

**Supplementary Table S8 Twin Model Fit Statistics of Bivariate Analysis of Blood Pressure and Serum Lipid Indicators in The Whole Population**

| Base Model | -2LL  | Paramenters | df | AIC | Comparison Model | ΔX2 | Δdf | p |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TC-SBP** |
| Sat | 11492.38  | 32 | 4384 | 11556.38  | - | - | - | - |
| ACE | 11512.47  | 15 | 4401 | 11542.47  | Sat | 20.10  | 17 | 0.27  |
| dropC1 | 11517.03  | 14 | 4402 | 11545.03  | ACE | 4.55  | 1 | 0.03  |
| dropC2 | 11525.10  | 14 | 4402 | 11553.10  | ACE | 12.63  | 1 | 0.00  |
| AE | 11527.81  | 12 | 4404 | 11551.81  | ACE | 15.34  | 3 | 0.00  |
| **TC-DBP**  |
| Sat | 11654.25  | 32 | 4436 | 11718.25  | - | - | - | - |
| ACE | 11668.62  | 15 | 4453 | 11698.62  | Sat | 14.37  | 17 | 0.64  |
| dropC1 | 11673.13  | 14 | 4454 | 11701.13  | ACE | 4.51  | 1 | 0.03  |
| dropC2 | 11674.85  | 14 | 4454 | 11702.85  | ACE | 6.23  | 1 | 0.01  |
| AE | 11678.68  | 12 | 4456 | 11702.68  | ACE | 10.05  | 3 | 0.02  |
| **TG-SBP** |
| Sat | 11475.95  | 32 | 4324 | 11539.95  | - | - | - | - |
| ACE | 11490.38  | 15 | 4341 | 11520.38  | Sat | 14.43  | 17 | 0.64  |
| dropC1 | 11491.39  | 14 | 4342 | 11519.39  | ACE | 1.01  | 1 | 0.31  |
| dropC2 | 11504.56  | 14 | 4342 | 11532.56  | ACE | 14.18  | 1 | 0.00  |
| AE | 11505.70  | 12 | 4344 | 11529.70  | ACE | 15.32  | 3 | 0.00  |
| **TG-DBP** |
| Sat | 11597.27  | 32 | 4376 | 11661.27  | - | - | - | - |
| ACE | 11612.57  | 15 | 4393 | 11642.57  | Sat | 15.29  | 17 | 0.57  |
| dropC1 | 11613.91  | 14 | 4394 | 11641.91  | ACE | 1.34  | 1 | 0.25  |
| dropC2 | 11622.42  | 14 | 4394 | 11650.42  | ACE | 9.85  | 1 | 0.00  |
| AE | 11623.98  | 12 | 4396 | 11647.98  | ACE | 11.41  | 3 | 0.01  |
| **LDL-SBP** |
| Sat | 11408.20  | 32 | 4340 | 11472.20  | - | - | - | - |
| ACE | 11424.41  | 15 | 4357 | 11454.41  | Sat | 16.20  | 17 | 0.51  |
| dropC1 | 11432.95  | 14 | 4358 | 11460.95  | ACE | 8.54  | 1 | 0.00  |
| dropC2 | 11437.51  | 14 | 4358 | 11465.51  | ACE | 13.11  | 1 | 0.00  |
| AE | 11443.77  | 12 | 4360 | 11467.77  | ACE | 19.36  | 3 | 0.00  |
| **LDL-DBP** |
| Sat | 11562.02  | 32 | 4392 | 11626.02  | - | - | - | - |
| ACE | 11576.55  | 15 | 4409 | 11606.55  | Sat | 14.54  | 17 | 0.63  |
| dropC1 | 11586.67  | 14 | 4410 | 11614.67  | ACE | 10.12  | 1 | 0.00  |
| dropC2 | 11585.24  | 14 | 4410 | 11613.24  | ACE | 8.68  | 1 | 0.00  |
| AE | 11591.71  | 12 | 4412 | 11615.71  | ACE | 15.16  | 3 | 0.00  |
| **HDL-SBP** |
| Sat | 11354.23  | 32 | 4384 | 11418.23  | - | - | - | - |
| ACE | 11370.22  | 15 | 4401 | 11400.22  | Sat | 15.99  | 17 | 0.52  |
| dropC1 | 11377.98  | 14 | 4402 | 11405.98  | ACE | 7.76  | 1 | 0.01  |
| dropC2 | 11383.05  | 14 | 4402 | 11411.05  | ACE | 12.82  | 1 | 0.00  |
| AE | 11390.72  | 12 | 4404 | 11414.72  | ACE | 20.49  | 3 | 0.00  |
| **HDL-DBP**  |
| Sat | 11526.25  | 32 | 4436 | 11590.25  | - | - | - | - |
| ACE | 11539.26  | 15 | 4453 | 11569.26  | Sat | 13.01  | 17 | 0.74  |
| dropC1 | 11548.16  | 14 | 4454 | 11576.16  | ACE | 8.90  | 1 | 0.00  |
| dropC2 | 11546.50  | 14 | 4454 | 11574.50  | ACE | 7.24  | 1 | 0.01  |
| AE | 11555.38  | 12 | 4456 | 11579.38  | ACE | 16.12  | 3 | 0.00  |

SBP: systolic blood pressure；DBP: diastolic blood pressure; TC: total cholesterol ; TG: triglycerides ;HDL: high-density lipoprotein ; LDL: low-density lipoprotein.

-2LL: fit statistic, which is -2\*log-likelihood of the data. df: degrees of freedom. AIC: Akaike’s Information Criteria, an alternative fit index. Lower values denote better model fits. Δχ2: difference in -2LL between two models, distributed chi-square. Δdf: difference in degrees of freedom between two models, which is equal to the difference in number of parameters. The best fitting models are marked as bold, selected based on the principle of parsimony and lowest AIC and -2ll value. A difference in AIC between two models of 2 or less, provides equivalent support for both models, in which case the most parsimonious model (i.e., with lowest number of parameters) was chosen, a difference of 3 indicates that the lower AIC model has considerably more support, and a difference of more than 10, indicates that the lower AIC model is a substantially better fit compared to the higher AIC model.

**Supplementary Table S9 Twin Model Fit Statistics of Bivariate Analysis of Blood Pressure and Serum Lipid Indicators in Three Age Groups**

| Base Model | -2LL  | Parameters | df | AIC | Comparison Model | ΔX2 | Δdf | p |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TC-SBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4498.20  | 32 | 1732 | 4562.20  | - | - | - | - |
| ACE | 4563.52  | 15 | 1749 | 4593.52  | Sat | - | - | - |
| dropC1 | 4565.25  | 14 | 1750 | 4593.25  | ACE | 1.73  | 1 | 0.19  |
| dropC2 | 4564.45  | 14 | 1750 | 4592.45  | ACE | 0.93  | 1 | 0.33  |
| **AE** | **4566.18**  | **12** | **1752** | **4590.18**  | **ACE** | **2.66**  | **3** | **0.45**  |
| **46-55 years old** |  |  |  |  |  |  |  |  |
| Sat | 4151.41  | 32 | 1548 | 4215.41  | - | - | - | - |
| ACE | 4169.62  | 15 | 1565 | 4199.62  | Sat | 18.21  | 17 | 0.38  |
| dropC1 | 4170.45  | 14 | 1566 | 4198.45  | ACE | 0.83  | 1 | 0.36  |
| dropC2 | 4171.69  | 14 | 1566 | 4199.69  | ACE | 2.07  | 1 | 0.15  |
| **AE** | **4171.69**  | **12** | **1568** | **4195.69**  | **ACE** | **2.07**  | **3** | **0.56**  |
| **Hom1** | **4176.09** | **8** | **1572** | **4192.09** | **AE** | **4.40** | **4** | **0.35** |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2859.18  | 32 | 1040 | 2923.18  | - | - | - | - |
| ACE | 2871.84  | 15 | 1057 | 2901.84  | Sat | 12.66  | 17 | 0.76  |
| dropC1 | 2876.87  | 14 | 1058 | 2904.87  | ACE | 5.03  | 1 | 0.02  |
| dropC2 | 2872.18  | 14 | 1058 | 2900.18  | ACE | 0.34  | 1 | 0.56  |
| **AE** | **2877.20**  | **12** | **1060** | **2901.20**  | **ACE** | **5.36**  | **3** | **0.15**  |
| **Hom2** | **2889.26** | **8** | **1064** | **2095.26** | **AE** | **12.06** | **4** | **0.02** |
| **Hom3** | **2881.64** | **8** | **1064** | **2897.64** | **AE** | **4.44** | **4** | **0.35** |
| **TC-DBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4477.12  | 32 | 1728 | 4541.12  | - | - | - | - |
| ACE | 4497.88  | 15 | 1745 | 4527.88  | Sat | 20.76  | 17 | 0.24  |
| dropC1 | 4500.70  | 14 | 1746 | 4528.70  | ACE | 2.81  | 1 | 0.09  |
| dropC2 | 4498.20  | 14 | 1746 | 4526.20  | ACE | 0.31  | 1 | 0.58  |
| **AE** | **4501.12**  | **12** | **1748** | **4525.12**  | **ACE** | **3.24**  | **3** | **0.36**  |
| **46-55 years old** |  |  |  |  |  |  |  |  |
| Sat | 4202.28  | 32 | 1556 | 4266.28  | - | - | - | - |
| ACE | 4221.83  | 15 | 1573 | 4251.83  | Sat | 19.56  | 17 | 0.30  |
| dropC1 | 4221.92  | 14 | 1574 | 4249.92  | ACE | 0.09  | 1 | 0.76  |
| dropC2 | 4228.59  | 14 | 1574 | 4256.59  | ACE | 6.76  | 1 | 0.01  |
| **AE** | **4228.59**  | **12** | **1576** | **4252.59**  | **ACE** | **6.76**  | **3** | **0.08**  |
| **Hom1** | **4233.85** | **8** | **1580** | **4249.85** | **AE** | **5.26** | **4** | **0.26** |
| **＞55 years old** |  |  |  |  |  |  |  |  |
| Sat | 2940.97  | 32 | 1088 | 3004.97  | - | - | - | - |
| ACE | 2958.94  | 15 | 1105 | 2988.94  | Sat | 17.97  | 17 | 0.39  |
| dropC1 | 2964.85  | 14 | 1106 | 2992.85  | ACE | 5.91  | 1 | 0.02  |
| dropC2 | 2959.73  | 14 | 1106 | 2987.73  | ACE | 0.79  | 1 | 0.37  |
| **AE** | **2964.85**  | **12** | **1108** | **2988.85**  | **ACE** | **5.91**  | **3** | **0.12**  |
| **Hom2** | **2974.51** | **8** | **1112** | **2990.51** | **AE** | **9.66** | **4** | **<0.05** |
| **Hom3** | **2968.17** | **8** | **1112** | **2984.17** | **AE** | **3.32** | **4** | **0.51** |
| **TG-SBP** |
| **≤45 years old** |  |  |  |  |  |  |  |  |
| Sat | 4442.32  | 32 | 1692 | 4506.32  | - | - | - | - |
| ACE | 4457.61  | 15 | 1709 | 4487.61  | Sat | 15.29  | 17 | 0.57  |
| dropC1 | 4461.05  | 14 | 1710 | 4489.05  | ACE | 3.44  | 1 | 0.06  |
| dropC2 | 4458.69  | 14 | 1710 | 4486.69  | ACE | 1.07  | 1 | 0.30  |
| **AE** | **4462.21**  | **12** | **1712** | **4486.21**  | **ACE** | **4.59**  | **3** | **0.20**  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4129.76  | 32 | 1532 | 4193.76  | - | - | - | - |
| ACE | 4144.21  | 15 | 1549 | 4174.21  | Sat | 14.45  | 17 | 0.64  |
| dropC1 | 4144.72  | 14 | 1550 | 4172.72  | ACE | 0.51  | 1 | 0.47  |
| dropC2 | 4146.84  | 14 | 1550 | 4174.84  | ACE | 2.62  | 1 | 0.11  |
| **AE** | **4146.84**  | **12** | **1552** | **4170.84**  | **ACE** | **2.62**  | **3** | **0.45**  |
| **Hom1** | **4151.31** | **8** | **1556** | **4167.31** | **AE** | **4.47** | **4** | **0.35** |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2909.72  | 32 | 1036 | 2973.72  | - | - | - | - |
| ACE | 2920.78  | 15 | 1053 | 2950.78  | Sat | 11.06  | 17 | 0.85  |
| dropC1 | 2920.78  | 14 | 1054 | 2948.78  | ACE | 0.00  | 1 | 1.00  |
| dropC2 | 2921.20  | 14 | 1054 | 2949.20  | ACE | 0.41  | 1 | 0.52  |
| **AE** | **2921.20**  | **12** | **1056** | **2945.20**  | **ACE** | **0.41**  | **3** | **0.94**  |
| **Hom2** | **2933.36** | **8** | **1060** | **2949.36** | **AE** | **12.17** | **4** | **0.02** |
| **Hom3** | **2925.322** | **8** | **1060** | **2941.32** | **AE** | **4.12** | **4** | **0.39** |
| **TG-DBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4412.62  | 32 | 1688 | 4476.62  | - | - | - | - |
| ACE | 4420.81  | 15 | 1705 | 4450.81  | Sat | 8.19  | 17 | 0.96  |
| dropC1 | 4425.58  | 14 | 1706 | 4453.58  | ACE | 4.77  | 1 | 0.03  |
| dropC2 | 4422.27  | 14 | 1706 | 4450.27  | ACE | 1.46  | 1 | 0.23  |
| **AE** | **4427.44**  | **12** | **1708** | **4451.44**  | **ACE** | **6.63**  | **3** | **0.08**  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4477.12  | 32 | 1728 | 4541.12  | - | - | - | - |
| ACE | 4497.88  | 15 | 1745 | 4527.88  | Sat | 20.76  | 17 | 0.24  |
| dropC1 | 4500.70  | 14 | 1746 | 4528.70  | ACE | 2.81  | 1 | 0.09  |
| dropC2 | 4498.20  | 14 | 1746 | 4526.20  | ACE | 0.31  | 1 | 0.58  |
| **AE** | **4501.12**  | **12** | **1748** | **4525.12**  | **ACE** | **3.24**  | **3** | **0.36**  |
| **Hom1** | **4183.17** | **8** | **1560** | **4199.17** | **AE** | **4.60** | **4** | **0.33** |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 3005.47  | 32 | 1088 | 3069.47  | - | - | - | - |
| ACE | 3018.84  | 15 | 1105 | 3048.84  | Sat | 13.37  | 17 | 0.71  |
| dropC1 | 3018.84  | 14 | 1106 | 3046.84  | ACE | 0.00  | 1 | 1.00  |
| dropC2 | 3018.86  | 14 | 1106 | 3046.86  | ACE | 0.03  | 1 | 0.87  |
| **AE** | **3018.86**  | **12** | **1108** | **3042.86**  | **ACE** | **0.03**  | **3** | **1.00**  |
| **Hom2** | **3028.21** | **8** | **1112** | **3044.21** | **AE** | **9.35** | **4** | **<0.05** |
| **Hom3** | **3021.74** | **8** | **1112** | **3037.74** | **AE** | **2.88** | **4** | **0.58** |
| **LDL-SBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4516.09  | 32 | 1716 | 4580.09  | - | - | - | - |
| ACE | 4532.90  | 15 | 1733 | 4562.90  | Sat | 16.82  | 17 | 0.47  |
| dropC1 | 4536.02  | 14 | 1734 | 4564.02  | ACE | 3.12  | 1 | 0.08  |
| dropC2 | 4533.77  | 14 | 1734 | 4561.77  | ACE | 0.87  | 1 | 0.35  |
| **AE** | **4536.41**  | **12** | **1736** | **4560.41**  | **ACE** | **3.51**  | **3** | **0.32**  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4088.64  | 32 | 1528 | 4152.64  | - | - | - | - |
| ACE | 4100.70  | 15 | 1545 | 4130.70  | Sat | 12.06  | 17 | 0.80  |
| dropC1 | 4101.87  | 14 | 1546 | 4129.87  | ACE | 1.17  | 1 | 0.28  |
| dropC2 | 4103.32  | 14 | 1546 | 4131.32  | ACE | 2.62  | 1 | 0.11  |
| **AE** | **4103.76**  | **12** | **1548** | **4127.76**  | **ACE** | **3.05**  | **3** | **0.38**  |
| **Hom1** | **4106.75** | **8** | **1552** | **4122.75** | **AE** | **3.00** | **4** | **0.56** |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2846.42  | 32 | 1032 | 2910.42  | - | - | - | - |
| ACE | 2853.74  | 15 | 1049 | 2883.74  | Sat | 7.31  | 17 | 0.98  |
| dropC1 | 2856.48  | 14 | 1050 | 2884.48  | ACE | 2.75  | 1 | 0.10  |
| dropC2 | 2853.93  | 14 | 1050 | 2881.93  | ACE | 0.20  | 1 | 0.66  |
| **AE** | **2856.68**  | **12** | **1052** | **2880.68**  | **ACE** | **2.94**  | **3** | **0.40**  |
| **Hom2** | **2864.23** | **8** | **1056** | **2880.23** | **AE** | **7.55** | **4** | **0.11** |
| **Hom3** | **2859.82** | **9** | **1056** | **2875.82** | **AE** | **3.14** | **4** | **0.53** |
| **LDL-DBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4496.14  | 32 | 1712 | 4560.14  | - | - | - | - |
| ACE | 4511.95  | 15 | 1729 | 4541.95  | Sat | 15.81  | 17 | 0.54  |
| dropC1 | 4515.83  | 14 | 1730 | 4543.83  | ACE | 3.88  | 1 | 0.05  |
| dropC2 | 4513.13  | 14 | 1730 | 4541.13  | ACE | 1.18  | 1 | 0.28  |
| **AE** | **4516.00**  | **12** | **1732** | **4540.00**  | **ACE** | **4.05**  | **3** | **0.26**  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4130.08  | 32 | 1536 | 4194.08  | - | - | - | - |
| ACE | 4145.04  | 15 | 1553 | 4175.04  | Sat | 14.96  | 17 | 0.60  |
| dropC1 | 4145.82  | 14 | 1554 | 4173.82  | ACE | 0.78  | 1 | 0.38  |
| dropC2 | 4151.95  | 14 | 1554 | 4179.95  | ACE | 6.91  | 1 | 0.01  |
| **AE** | **4152.33**  | **12** | **1556** | **4176.33**  | **ACE** | **7.29**  | **3** | **0.06**  |
| **Hom1** | **4155.40** | **8** | **1560** | **4171.40** | **AE** | **3.07** | **4** | **0.55** |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2928.70  | 32 | 1080 | 2992.70  | - | - | - | - |
| ACE | 2940.14  | 15 | 1097 | 2970.14  | Sat | 11.44  | 17 | 0.83  |
| dropC1 | 2944.23  | 14 | 1098 | 2972.23  | ACE | 4.09  | 1 | 0.04  |
| dropC2 | 2941.05  | 14 | 1098 | 2969.05  | ACE | 0.91  | 1 | 0.34  |
| **AE** | **2944.23**  | **12** | **1100** | **2968.23**  | **ACE** | **4.09**  | **3** | **0.25**  |
| **Hom2** | **2947.76** | **8** | **1104** | **2963.76** | **AE** | **3.54** | **4** | **0.47** |
| **Hom3** | **2946.14** | **8** | **1104** | **2962.14** | **AE** | **1.92** | **4** | **0.75** |
| **HDL-SBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4530.36  | 32 | 1728 | 4594.36  | - | - | - | - |
| ACE | 4545.28  | 15 | 1745 | 4575.28  | Sat | 14.92  | 17 | 0.60  |
| dropC1 | 4550.51  | 14 | 1746 | 4578.51  | ACE | 5.23  | 1 | 0.02  |
| dropC2 | 4546.23  | 14 | 1746 | 4574.23  | ACE | 0.95  | 1 | 0.33  |
| **AE** | **4551.40**  | **12** | **1748** | **4575.40**  | **ACE** | **6.12**  | **3** | **0.11**  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4047.40  | 32 | 1544 | 4111.40  | - | - | - | - |
| ACE | 4074.87  | 15 | 1561 | 4104.87  | Sat | 27.47  | 17 | 0.05  |
| dropC1 | 4077.96  | 14 | 1562 | 4105.96  | ACE | 3.09  | 1 | 0.08  |
| dropC2 | 4077.43  | 14 | 1562 | 4105.43  | ACE | 2.57  | 1 | 0.11  |
| **AE** | **4080.12**  | **12** | **1564** | **4104.12**  | **ACE** | **5.25**  | **3** | **0.15**  |
| **Hom1** | **4085.82** | **8** | **1568** | **4101.82** | **AE** | **5.70** | **4** | **0.22** |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2797.98  | 32 | 1048 | 2861.98  | - | - | - | - |
| ACE | 2814.46  | 15 | 1065 | 2844.46  | Sat | 16.48  | 17 | 0.49  |
| dropC1 | 2814.53  | 14 | 1066 | 2842.53  | ACE | 0.07  | 1 | 0.79  |
| dropC2 | 2814.83  | 14 | 1066 | 2842.83  | ACE | 0.37  | 1 | 0.55  |
| **AE** | **2814.86**  | **12** | **1068** | **2838.86**  | **ACE** | **0.40**  | **3** | **0.94**  |
| **Hom2** | **2822.80** | **8** | **1072** | **2838.80** | **AE** | **7.94** | **4** | **0.09** |
| **Hom3** | **2817.28** | **8** | **1072** | **2833.28** | **AE** | **2.42** | **4** | **0.66** |
| **HDL-DBP** |
| **≤45years old** |  |  |  |  |  |  |  |  |
| Sat | 4509.66  | 32 | 1724 | 4573.66  | - | - | - | - |
| ACE | 4520.93  | 15 | 1741 | 4550.93  | Sat | 11.27  | 17 | 0.84  |
| dropC1 | 4528.03  | 14 | 1742 | 4556.03  | ACE | 7.10  | 1 | 0.01  |
| dropC2 | 4522.05  | 14 | 1742 | 4550.05  | ACE | 1.12  | 1 | 0.29  |
| **AE** | **4529.23**  | **12** | **1744** | **4553.23**  | **ACE** | **8.30**  | **3** | **0.04**  |
| **46-55years old** |  |  |  |  |  |  |  |  |
| Sat | 4096.43  | 32 | 1552 | 4160.43  | - | - | - | - |
| ACE | 4123.16  | 15 | 1569 | 4153.16  | Sat | 26.73  | 17 | 0.06  |
| dropC1 | 4126.80  | 14 | 1570 | 4154.80  | ACE | 3.64  | 1 | 0.06  |
| dropC2 | 4130.55  | 14 | 1570 | 4158.55  | ACE | 7.39  | 1 | 0.01  |
| **AE** | **4133.50**  | **12** | **1572** | **4157.50**  | **ACE** | **10.34**  | **3** | **0.02**  |
| **Hom1** | **4139.68** | **8** | **1576** | **4155.68** | **AE** | **6.18** | **4** | **0.19** |
| **＞55years old** |  |  |  |  |  |  |  |  |
| Sat | 2885.26  | 32 | 1096 | 2949.26  | - | - | - | - |
| ACE | 2905.80  | 15 | 1113 | 2935.80  | Sat | 20.54  | 17 | 0.25  |
| dropC1 | 2905.82  | 14 | 1114 | 2933.82  | ACE | 0.02  | 1 | 0.89  |
| dropC2 | 2905.81  | 14 | 1114 | 2933.81  | ACE | 0.00  | 1 | 0.96  |
| **AE** | **2905.82**  | **12** | **1116** | **2929.82**  | **ACE** | **0.02**  | **3** | **1.00**  |
| **Hom2** | **2909.99** | **8** | **1120** | **2925.99** | **AE** | **4.17** | **4** | **0.38** |
| **Hom3** | **2906.05** | **8** | **1120** | **2922.05** | **AE** | **0.22** | **4** | **0.99** |

SBP: systolic blood pressure；DBP: diastolic blood pressure; TC: total cholesterol ; TG: triglycerides ;HDL: high-density lipoprotein ; LDL: low-density lipoprotein.

-2LL: fit statistic, which is -2\*log-likelihood of the data. df: degrees of freedom. AIC: Akaike’s Information Criteria, an alternative fit index. Lower values denote better model fits. Δχ2: difference in -2LL between two models, distributed chi-square. Δdf: difference in degrees of freedom between two models, which is equal to the difference in number of parameters. The best fitting models are marked as bold, selected based on the principle of parsimony and lowest AIC and -2ll value. A difference in AIC between two models of 2 or less, provides equivalent support for both models, in which case the most parsimonious model (i.e., with lowest number of parameters) was chosen, a difference of 3 indicates that the lower AIC model has considerably more support, and a difference of more than 10, indicates that the lower AIC model is a substantially better fit compared to the higher AIC model. Hom: homogeneity model, in which the variance components and total variance for serum lipids and blood pressure indicators were equated across three age groups.

Hom1: homogeneity model, in which the combined effect of additive genetic component between ≤45years old group and 46-55 years old group; Hom2: homogeneity model, in which the combined effect of additive genetic component were equated between ≤45years old group and >55 years old group; Hom3: homogeneity model, in which the combined effect of additive genetic component were equated between 46-55 years old group and＞55 years old.