

Supplementary Table SI. Life's Essential 8 scoring rules

CVH metric	Method of measurement	Quantification of CVH metric [1]	
Diet	Dietary intake data were collected from NHANES participants through up to two 24-hour dietary recalls, in person during the first recall and by telephone during the second recall 3–10 days later. To evaluate dietary quality, apply the Healthy Eating Index (HEI-2015), which contains 13 components. Score according to the HEI scoring standard of each component, and then add the scores of each part to calculate the total score.	Scoring: Points 100 80 50 25 0	Quantile ≥ 95 th percentile (top/ideal diet) 75 th –94 th percentiles 50 th –74 th percentiles 25 th –49 th percentiles 1 st –24 th percentiles (bottom/least ideal quartile)
Physical activity	Self-reported minutes of moderate or vigorous physical activity per week.	Scoring: Points 100 90 80 60 40 20 0	Minutes ≥ 420 360–419 300–359 240–299 120–239 1–119 0
Sleep health	Self-reported average hours of sleep per night.	Scoring: Points 100 90 70 40 20 0	Level Age-appropriate optimal range: 8–10 h < 1 h above optimal range < 1 h below optimal range 1–< 2 h below or ≥ 1 h above optimal 2–< 3 h below optimal range ≥ 3 h below optimal range
BMI	Calculate BMI by dividing weight (in kilograms) by the square of the height (in meters squared), and then compare the BMI with the specific values of the same age and sex in the reference table [2].	Scoring: Points 100 70 30 15 0	Level 5 th –< 85 th percentiles 85 th –< 95 th percentiles 95 th percentile–< 120% of the 95 th percentile 120% of the 95 th percentile–< 140% of the 95 th percentile ≥ 140% of the 95 th percentile
Blood lipids	Measure serum total cholesterol and HDL cholesterol, and then calculate the level of non-high-density lipoprotein.	Scoring: Points 100 60 40 20 0	Level < 100 100–119 120–144 145–189 ≥ 190
Blood glucose	Measure fasting blood glucose (FBG), HbA _{1c} , and ask participants about their history of diabetes.	Scoring: Points 100 60 40 30 20 10 0	Level No history of diabetes and FBG < 100 mg/dl (or HbA _{1c} < 5.7%) No diabetes and FBG 100–125 mg/dl (or HbA _{1c} 5.7–6.4%) Diabetes with HbA _{1c} < 7.0% Diabetes with HbA _{1c} 7.0–7.9% Diabetes with HbA _{1c} 8.0–8.9% Diabetes with HbA _{1c} 9.0–9.9% Diabetes with HbA _{1c} ≥ 10.0%
Blood pressure	Use the average of all systolic blood pressure (SBP) and diastolic blood pressure (DBP) measurements provided using the standard NHANES protocol.	Scoring: Points 100 75 50 25 0	Level < 120/< 80 120–129/< 80 130–139 or 80–89 140–159 or 90–99 ≥ 160 or ≥ 100

References

1. Lloyd-Jones DM; Allen NB, Anderson CAM, et al. Life’s Essential 8: updating and enhancing the American Heart Association’s construct of cardiovascular health: a presidential advisory from the American Heart Association. *Circulation* 2022; 146: e18-43.
2. Centers for Disease Control and Prevention. National Center for Health Statistics, Growth Charts, CDC Growth Charts, Extended BMI-for-Age Charts. Available online: <https://www.cdc.gov/growthcharts/extended-bmi-data-files.htm> (accessed on 8 February 2023).

Supplementary Table SII. Summary of variables used in this study from the NHANES questionnaire

Variable name	Questionnaire item
Days moderate recreational activities	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational activities?
Minutes moderate recreational activities	How much time do you spend doing moderate-intensity sports, fitness or recreational activities on a typical day?
Days vigorous recreational activities	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational activities?
Minutes vigorous recreational activities	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?
Sleep hours	How much sleep do you usually get at night on weekdays or workdays?
Now taking prescribed medicine	Are you now following this advice to take prescribed medicine?
Taking prescription for hypertension	Because of your (high blood pressure/hypertension), have you ever been told to take prescribed medicine?
Doctor said you have diabetes	The next questions are about specific medical conditions. Other than during pregnancy, have you ever been told by a doctor or health professional that you have diabetes or sugar diabetes?
Take diabetic pills to lower blood sugar	Are you now taking diabetic pills to lower your blood sugar? These are sometimes called oral agents or oral hypoglycemic agents.

Supplementary Table SIII. Association between serum vitamin D and CVH categories

Variable	Unadjusted model		Adjusted model	
	Moderate versus low CVH	High versus low CVH	Moderate versus low CVH	High versus low CVH
Vitamin D [nmol/l]	1.03 (1.02–1.04)**	1.05 (1.03–1.06)**	1.03 (1.01–1.04)**	1.04 (1.03–1.06)**
Vitamin D status				
Deficiency, < 30 nmol/l	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
Insufficiency, 30–50 nmol/l	1.97 (1.12–3.45)*	3.18 (1.36–7.43)*	1.89 (1.05–3.4)*	2.56 (1.06–6.17)*
Sufficiency, ≥ 50 nmol/l	4.72 (2.64–8.42)**	13.94 (6.03–32.19)**	4.11 (2.09–8.11)**	9.23 (3.64–23.38)**