Dietary inflammatory index (DII)

DII, a literature-derived and population-based dietary score used to compare the inflammatory potential of individual diets, was designed and developed by Shivappa and others using 45 pro-inflammatory and anti-inflammatory food parameters[1]. DII represented diet inflammatory ability by combining the associations with the six inflammatory biomarkers: IL-1β, IL-4, IL-6, IL-10, TNF-α, and CRP. DII estimated the inflammation effects of dietary consumption of 45 nutrients. These parameters were then used to derive the participant's exposure relative to the standard global mean as a z-score, derived by subtracting the mean of the regionally representative database from the amount reported and dividing this value by the parameter's standard deviation. These z-scores were converted to proportions (i.e., with values ranging from 0 to 1) and then centered by doubling and subtracting 1. All these food parameter-specific DII scores were then summed to create the overall DII score for every subject in the study. In this study, 26 nutrients were used for the calculation of the DII score, which included alcohol, vitamin B12/B6, β-carotene, caffeine, carbohydrate, cholesterol, total fat, fiber, folic acid, Fe, Mg, Zn, Se, MUFA, niacin, n-3 fatty acids, n-6 fatty acids, protein, PUFA, riboflavin, saturated fat, thiamin, and vitamins A/C/E. Importantly, even if the nutrients applied for the number of calculations of DII were less than 30, the DII was still available[1]. Positive values of DII were associated with greater pro-inflammatory capacity, whereas negative values reflected greater anti-inflammatory capacity.

Healthy eating index-2020 (HEI-2020)

The HEI-2020 was a diet quality index developed by the USDA’s Center for Nutrition Policy and Promotion to assess adherence to the 2020-2025 Dietary Guidelines of Americans (DGA)[2] and consisted of 13 components (food groups or nutrients), including 9 adequacy components (total fruits, whole fruits, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, and fatty acids) and 4 moderation components (refined grains, sodium, added sugars, and saturated fats). The index was widely used to characterize the quality of Americans' diets and to test prospective and cross-sectional correlations between diet quality and health outcomes. Higher intakes resulted in higher scores for the adequacy components, while lower intakes caused higher scores for moderation components[2]. The maximum points of whole grain, dairy, fatty acids and 4 moderation components were 10, and the rest components’ maximum points were 5. The component scores were scored separately and summed to compute an overall score with the range from 0 to 100 (the higher the scores could present the higher compliance with 2020-2025 DGA).

Alternative healthy eating index-2010 (AHEI-2010)

The AHEI-2010 was developed by adding dietary factors related to cardiovascular disease and cancer to the HEI-2010 in order to better predict the risk of major chronic diseases[3]. This score was based on the intakes of 11 foods and nutrients. Higher scores were assigned for higher intakes of vegetables, fruits, whole grains, nuts and legumes, PUFAs, and omega-3 fatty acids, whereas lower scores were assigned for higher intakes of sugar-sweetened beverages, red and processed meats, trans fatty acids, and sodium; moderate intake was rewarded for alcohol. Each component received a score from 0 (least favorable) to 10 (most favorable), with partial scores that were proportional to intake. Component scores were summed for a total AHEI-2010 score with a potential range between 0 to 110[4]. However, a modified AHEI-2010 score was constructed in this study by excluding the trans fatty acids because the trans fatty acids were unavailable in the NHANES dietary files[5]. Therefore, the maximum total AHEI-2010 score was rescaled from 110 points to 100 points and higher scores were indicative of higher diet quality.

Composite dietary antioxidant index (CDAI)

To assess the combined exposure of dietary antioxidant intake, we used a modified version of the CDAI, developed by Wright et al[6, 7]. CDAI was a summary score of multiple dietary antioxidants including vitamin A, vitamin C, vitamin E, zinc, selenium, and total carotenoids[8] that represented an individual's antioxidant profile. The CDAI was developed according to their aggregate effect on anti-inflammation based on markers such as IL-1β and TNF-α[9], both of which were pro-inflammatory and associated with many health outcomes. Dietary antioxidant estimates did not include antioxidants obtained from dietary supplements, medications, or ordinary drinking water. Intake of each antioxidant nutrient was standardized by subtracting the mean and dividing by the standard deviation. The CDAI was calculated by summing the standardized dietary antioxidant intakes.

Table S1 Linear regression analyses between dietary indices and BMI

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Dietary indices	Model 1[a]		Model 2[b]	
	β(95%CI)	*P*	*β*(95%CI)	*P*
zDII	0.56 (0.35, 0.78)	<0.001	0.81 (0.51, 1.10)	<0.001
zHEI-2020	-0.71 (-0.96, -0.46)	<0.001	-0.89 (-1.15, -0.63)	<0.001
zAHEI-2010	-0.11 (-0.36, 0.15)	0.409	-0.43 (-0.70, -0.16)	0.002
zCDAI	-0.32 (-0.57, -0.08)	0.010	-0.45 (-0.75, -0.14)	0.006

Note: [a] Model 1 without adjustments; [b] Model 2 additionally adjusted for sociodemographic variables (gender, race, education level), health behaviors (physical activity, smoking status and drinking status), energy intake, diabetes, hypertension and cardiovascular diseases.

Table S2 Linear regression analyses between BMI and PhenoAgeAccel

Table S2 Linear regression analyses between BMI and PhenoAgeAccel

	Model 1[a]		Model 2[b]	
	β(95%CI)	*P*	*β*(95%CI)	*P*
BMI	0.37 (0.34, 0.40)	<0.001	0.29 (0.25, 0.32)	<0.001

Note: [a] Model 1 without adjustments; [b] Model 2 additionally adjusted for sociodemographic variables (gender, race, education level), health behaviors (physical activity, smoking status and drinking status), energy intake, diabetes, hypertension and cardiovascular diseases.

Figure S1 Mediation effects of BMI on the association between dietary indices and PhenoAgeAccel unadjusted for diabetes, hypertension, and cardiovascular diseases

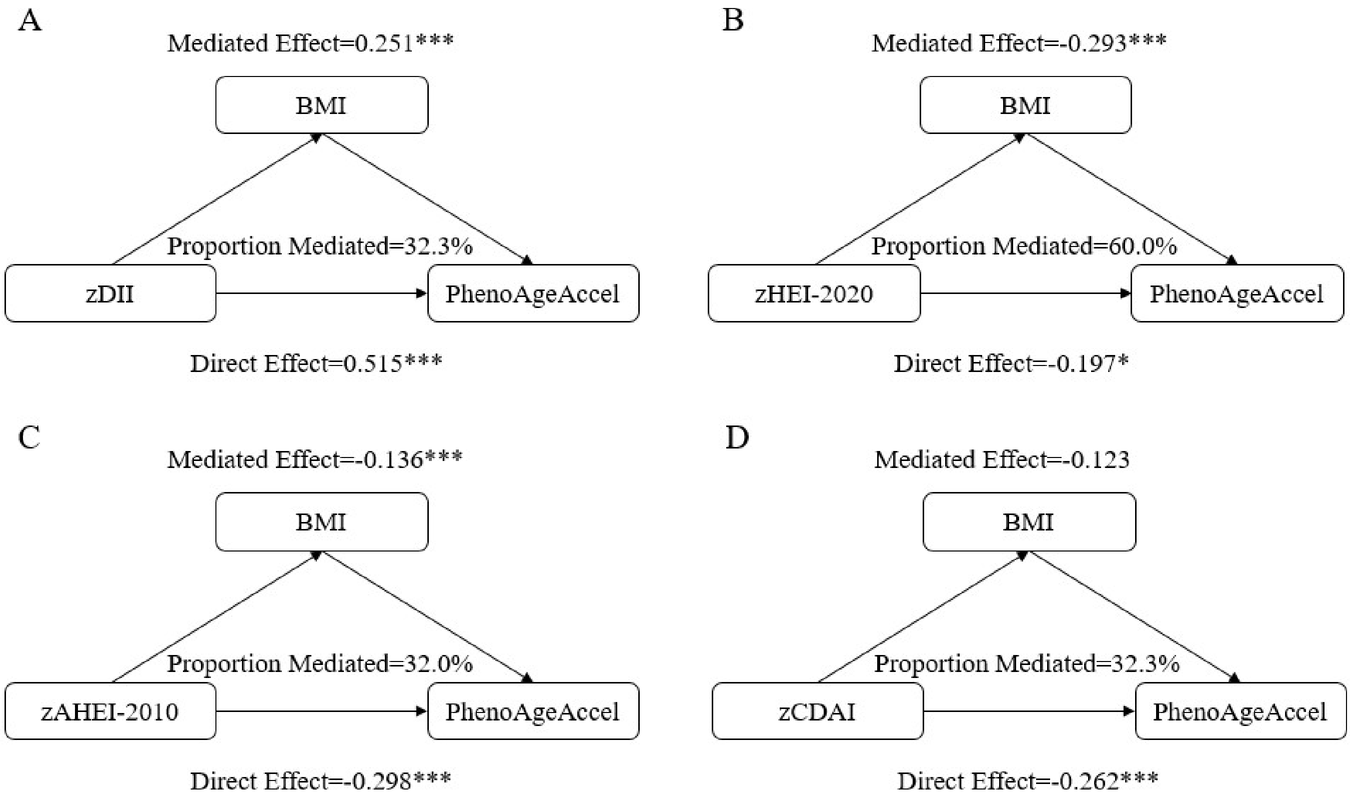

Figure S1 Mediation effects of BMI on the association between dietary indices and PhenoAgeAccel unadjusted for diabetes, hypertension, and cardiovascular diseases. Note: Exposure: zDII(A) zHEI-2020(B) zAHEI-2010(C) zCDAI(D); Outcome: PhenoAgeAccel; Mediator: BMI. Adjusted for sociodemographic variables (sex, race, education level), health behaviors (physical activity, smoking status and drinking status), and energy intake. **P*<0.05, ***P*<0.01, ****P*<0.001.

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