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Figure S1. Flow chart of the study population

Figure S2. Restricted cubic splines for the association of dietary intake of iron, copper, zinc, and manganese with cognitive impairment

Figure S3. Restricted cubic splines for the association of dietary intake of iron, copper, zinc, and manganese with global cognitive score by BMI, education, marital status, iron supplement intake, and zinc supplement intake

Table S1. Spearman's rank correlation coefficient of dietary iron, copper, zinc, and manganese intake

	Iron		Copper		Zinc	
	r	<i>P</i> -value	r	<i>P</i> -value	r	<i>P</i> -value
Copper	0.271	<0.001				
Zinc	0.569	<0.001	0.153	<0.001		
Manganese	0.535	<0.001	0.387	<0.001	0.299	<0.001

Table S2. Nutrient intake of participants calculated to total energy of 2500 kcal per day overall and by sex

Nutrients	Overall (n = 6863)	Gender	
		Male (n = 2794)	Female (n = 4069)
Animal protein, g, mean (SD)	63.52 (20.61)	62.17 (20.18)	64.45 (20.85)
Vegetable protein, g, mean (SD)	35.62 (11.87)	35.06 (10.45)	36.00 (12.75)
Total sugar, g, mean (SD)	144.90 (46.98)	140.29 (46.50)	148.07 (47.04)
Dietary Fiber, g, mean (SD)	27.21 (8.64)	25.79 (8.12)	28.18 (8.84)
Other carbohydrates, g, mean (SD)	143.15 (32.76)	145.12 (32.64)	141.79 (32.78)
Saturated fat, g, mean (SD)	31.05 (7.14)	30.88 (7.03)	31.17 (7.22)
Monounsaturated fat, g, mean (SD)	32.99 (7.63)	33.03 (7.22)	32.97 (7.90)
Polyunsaturated fat, g, mean (SD)	18.54 (5.65)	18.34 (5.37)	18.68 (5.82)
Cholesterol, mg, mean (SD)	338.13 (155.33)	348.47 (161.91)	331.03 (150.25)
Iron, mg, mean (SD)	19.20 (5.88)	19.15 (5.99)	19.23 (5.80)
Magnesium, mg, mean (SD)	415.15 (100.95)	402.77 (93.91)	423.65 (104.69)
Phosphorus, mg, mean (SD)	1,664.97 (337.65)	1,620.63 (309.86)	1,695.41 (352.30)
Kalium, mg, mean (SD)	3,983.19 (883.33)	3,816.70 (840.88)	4,097.52 (893.65)
Sodium, mg, mean (SD)	3,007.70 (714.59)	3,027.00 (734.18)	2,994.45 (700.60)
Zinc, mg, mean (SD)	15.45 (3.75)	15.38 (3.79)	15.50 (3.73)
Copper, mg, mean (SD)	1.97 (0.75)	1.91 (0.73)	2.01 (0.76)
Manganese, mg, mean (SD)	4.68 (1.52)	4.51 (1.51)	4.79 (1.52)
Calcium, mg, mean (SD)	1,043.72 (506.24)	974.60 (432.13)	1,091.18 (546.40)
Alcohol, g, mean (SD)	8.22 (16.63)	11.72 (20.08)	5.83 (13.24)
Caffeine, mg, mean (SD)	228.18 (227.21)	228.31 (213.67)	228.08 (236.08)
Flavonoids, mg, mean (SD)	414.95 (382.90)	374.22 (350.69)	442.93 (401.19)
Vitamin C, mg, mean (SD)	151.13 (88.25)	142.65 (86.52)	156.95 (88.95)
Vitamin B1, mg, mean (SD)	1.91 (1.31)	1.86 (1.01)	1.95 (1.48)

Vitamin B2, mg, mean (SD)	2.95 (1.49)	2.86 (1.22)	3.01 (1.65)
Niacin, mg, mean (SD)	29.03 (8.74)	28.96 (7.60)	29.08 (9.45)
Pantothenic acid, mg, mean (SD)	7.74 (2.54)	7.52 (2.36)	7.89 (2.64)
Vitamin B6, mg, mean (SD)	2.58 (0.72)	2.55 (0.69)	2.60 (0.74)
Food folate, µg, mean (SD)	379.73 (126.84)	360.36 (113.76)	393.02 (133.49)
Vitamin B12, µg, mean (SD)	9.13 (5.04)	9.08 (4.90)	9.17 (5.14)
Retinol, µg, mean (SD)	1,123.63 (548.47)	1,035.36 (503.65)	1,184.24 (569.43)
Alpha carotene, µg, mean (SD)	884.60 (899.18)	763.67 (751.28)	967.64 (979.48)
Beta carotene, µg, mean (SD)	4,945.97 (3,819.59)	4,107.73 (3,081.08)	5,521.54 (4,156.66)
Beta cryptoxanthin, µg, mean (SD)	183.75 (167.64)	180.85 (169.48)	185.75 (166.35)
Lycopene, µg, mean (SD)	7,052.27 (6,261.14)	7,173.85 (6,803.11)	6,968.79 (5,859.45)

Table S3. Subgroup associations of mineral intake with cognitive function

		Quintiles of mineral intake, mg								P-interaction	
		Quintile 1	Quintile 2		Quintile 3		Quintile 4		Quintile 5		
			β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)		P-value
Iron											
Gender										0.049	
Male	Reference		0.43 [-0.05, 0.90]	0.078	0.19 [-0.31, 0.68]	0.458	0.31 [-0.23, 0.86]	0.261	-0.25 [-0.92, 0.42]	0.462	
Female	Reference		0.29 [-0.07, 0.66]	0.115	-0.02 [-0.43, 0.40]	0.931	-0.06 [-0.53, 0.42]	0.813	-0.54 [-1.14, 0.06]	0.078	
Age, years										0.051	
<65	Reference		0.29 [-0.11, 0.69]	0.149	0.19 [-0.26, 0.65]	0.399	0.31 [-0.21, 0.82]	0.242	-0.14 [-0.78, 0.50]	0.676	
>=65	Reference		0.37 [-0.05, 0.79]	0.080	-0.15 [-0.59, 0.29]	0.513	-0.19 [-0.68, 0.30]	0.452	-0.81 [-1.42, -0.19]	0.010	
Body mass index, kg/m²										0.900	
< 25	Reference		0.43 [-0.23, 1.09]	0.202	0.15 [-0.54, 0.85]	0.670	0.15 [-0.62, 0.92]	0.702	-0.52 [-1.44, 0.41]	0.272	
>= 25	Reference		0.28 [-0.04, 0.60]	0.086	-0.01 [-0.37, 0.34]	0.938	0.06 [-0.34, 0.47]	0.753	-0.43 [-0.93, 0.07]	0.094	
Education, years										0.369	
< 10	Reference		-0.39 [-1.48, 0.71]	0.490	-0.35 [-1.54, 0.83]	0.559	-1.39 [-2.66, -0.11]	0.033	-1.61 [-3.15, -0.07]	0.040	
10-15	Reference		0.46 [0.10, 0.82]	0.012	0.06 [-0.34, 0.46]	0.771	0.30 [-0.15, 0.75]	0.189	-0.21 [-0.78, 0.36]	0.470	
>= 15	Reference		0.15 [-0.37, 0.68]	0.573	0.03 [-0.54, 0.60]	0.925	0.03 [-0.61, 0.66]	0.937	-0.70 [-1.48, 0.09]	0.081	
Marital status										0.235	
Married	Reference		0.31 [-0.05, 0.66]	0.090	-0.11 [-0.49, 0.28]	0.593	0.16 [-0.28, 0.59]	0.477	-0.27 [-0.81, 0.27]	0.329	
Unmarried	Reference		0.33 [-0.16, 0.82]	0.183	0.23 [-0.31, 0.77]	0.402	-0.14 [-0.76, 0.48]	0.662	-0.88 [-1.64, -0.12]	0.024	
Cardiometabolic										0.581	
Yes	Reference		0.29 [-0.05, 0.64]	0.094	-0.05 [-0.43, 0.33]	0.784	0.02 [-0.41, 0.45]	0.930	-0.54 [-1.08, -0.01]	0.045	
No	Reference		0.35 [-0.17, 0.87]	0.187	0.17 [-0.40, 0.74]	0.557	0.14 [-0.48, 0.76]	0.654	-0.32 [-1.10, 0.46]	0.428	

Iron supplement intake										0.016
Yes	Reference	0.26 [-0.08, 0.59]	0.134	-0.06 [-0.43, 0.31]	0.761	-0.01 [-0.43, 0.41]	0.958	-0.52 [-1.03, -0.00]	0.049	
No	Reference	0.39 [-0.17, 0.95]	0.174	0.14 [-0.47, 0.75]	0.654	0.19 [-0.49, 0.87]	0.585	-0.38 [-1.25, 0.49]	0.395	
Zinc supplement intake										0.027
Yes	Reference	0.32 [0.02, 0.62]	0.036	0.01 [-0.32, 0.34]	0.962	0.03 [-0.35, 0.40]	0.892	-0.44 [-0.91, 0.02]	0.060	
No	Reference	0.06 [-0.92, 1.03]	0.912	-0.03 [-1.07, 1.02]	0.958	0.10 [-1.06, 1.27]	0.864	-0.89 [-2.36, 0.57]	0.232	
Copper										
Gender										< 0.001
Male	Reference	0.09 [-0.36, 0.54]	0.707	-0.00 [-0.48, 0.48]	0.999	0.48 [-0.05, 1.00]	0.076	0.26 [-0.37, 0.90]	0.416	
Female	Reference	-0.21 [-0.58, 0.16]	0.265	-0.25 [-0.64, 0.15]	0.223	-0.80 [-1.27, -0.33]	0.001	-1.00 [-1.56, -0.45]	<0.001	
Age, years										0.334
<65	Reference	-0.03 [-0.43, 0.37]	0.886	-0.21 [-0.64, 0.23]	0.349	-0.19 [-0.69, 0.31]	0.454	-0.68 [-1.26, -0.09]	0.023	
>=65	Reference	-0.15 [-0.55, 0.26]	0.474	-0.11 [-0.54, 0.32]	0.607	-0.30 [-0.80, 0.19]	0.229	-0.34 [-0.93, 0.26]	0.270	
Body mass index, kg/m²										0.040
< 25	Reference	-0.04 [-0.70, 0.61]	0.898	0.28 [-0.41, 0.96]	0.431	-0.17 [-0.97, 0.62]	0.668	-0.57 [-1.47, 0.33]	0.214	
>= 25	Reference	-0.12 [-0.43, 0.20]	0.465	-0.28 [-0.62, 0.06]	0.105	-0.30 [-0.69, 0.10]	0.139	-0.47 [-0.95, -0.00]	0.049	
Education, years										0.169
< 10	Reference	0.09 [-1.00, 1.18]	0.871	-0.49 [-1.70, 0.72]	0.424	-0.74 [-2.12, 0.64]	0.292	-0.59 [-2.40, 1.21]	0.518	
10-15	Reference	0.04 [-0.31, 0.40]	0.805	-0.06 [-0.46, 0.34]	0.774	0.20 [-0.26, 0.65]	0.394	-0.13 [-0.73, 0.48]	0.685	
>= 15	Reference	0.20 [-0.36, 0.76]	0.486	0.43 [-0.16, 1.01]	0.155	0.69 [0.04, 1.35]	0.038	0.50 [-0.32, 1.32]	0.231	
Marital status										0.240
Married	Reference	-0.01 [-0.36, 0.34]	0.953	-0.22 [-0.59, 0.16]	0.253	0.04 [-0.40, 0.47]	0.871	-0.19 [-0.71, 0.34]	0.488	
Unmarried	Reference	-0.22 [-0.71, 0.27]	0.384	0.04 [-0.49, 0.57]	0.883	-0.75 [-1.35, -0.15]	0.014	-0.97 [-1.66, -0.29]	0.006	
Cardiometabolic										0.338
Yes	Reference	-0.17 [-0.51, 0.17]	0.323	-0.23 [-0.60, 0.13]	0.214	-0.40 [-0.82, 0.02]	0.060	-0.58 [-1.08, -0.09]	0.021	

No	Reference	0.05 [-0.47, 0.57]	0.857	0.05 [-0.50, 0.61]	0.851	0.08 [-0.57, 0.73]	0.814	-0.22 [-1.00, 0.56]	0.578	0.095
Iron supplement intake										
Yes	Reference	-0.21 [-0.54, 0.13]	0.224	-0.25 [-0.61, 0.10]	0.164	-0.41 [-0.83, 0.00]	0.052	-0.62 [-1.11, -0.14]	0.011	
No	Reference	0.11 [-0.45, 0.68]	0.693	0.03 [-0.55, 0.62]	0.910	0.05 [-0.62, 0.71]	0.894	-0.19 [-1.02, 0.65]	0.659	0.141
Zinc supplement intake										
Yes	Reference	-0.10 [-0.40, 0.20]	0.514	-0.18 [-0.49, 0.14]	0.280	-0.27 [-0.64, 0.10]	0.155	-0.49 [-0.93, -0.05]	0.028	
No	Reference	-0.20 [-1.22, 0.83]	0.707	-0.07 [-1.13, 0.99]	0.898	-0.42 [-1.58, 0.73]	0.474	-0.70 [-2.05, 0.65]	0.306	0.285
Zinc										
Gender										
Male	Reference	0.02 [-0.45, 0.50]	0.930	0.24 [-0.27, 0.74]	0.356	0.27 [-0.28, 0.82]	0.335	-0.06 [-0.75, 0.62]	0.855	
Female	Reference	0.20 [-0.17, 0.57]	0.288	0.25 [-0.17, 0.66]	0.244	0.19 [-0.29, 0.67]	0.445	0.30 [-0.30, 0.91]	0.328	
Age, years										
<65	Reference	0.26 [-0.15, 0.68]	0.212	0.36 [-0.09, 0.82]	0.118	0.44 [-0.07, 0.95]	0.092	0.56 [-0.08, 1.20]	0.085	
>=65	Reference	-0.04 [-0.44, 0.37]	0.855	0.04 [-0.41, 0.48]	0.868	-0.07 [-0.58, 0.43]	0.780	-0.47 [-1.10, 0.16]	0.145	
Body mass index, kg/m²										
< 25	Reference	0.38 [-0.26, 1.02]	0.244	0.48 [-0.21, 1.17]	0.172	0.67 [-0.11, 1.45]	0.093	0.49 [-0.49, 1.47]	0.329	
>= 25	Reference	0.03 [-0.29, 0.36]	0.849	0.10 [-0.26, 0.45]	0.596	0.04 [-0.36, 0.44]	0.847	-0.04 [-0.55, 0.47]	0.873	
Education, years										
< 10	Reference	0.15 [-0.37, 0.68]	0.573	0.03 [-0.54, 0.60]	0.925	0.03 [-0.61, 0.66]	0.937	-0.70 [-1.48, 0.09]	0.081	
10-15	Reference	-0.17 [-1.22, 0.88]	0.750	-0.16 [-1.35, 1.03]	0.791	-0.68 [-2.01, 0.65]	0.317	-0.89 [-2.47, 0.70]	0.273	
>= 15	Reference	0.11 [-0.25, 0.48]	0.539	0.15 [-0.25, 0.56]	0.467	0.32 [-0.14, 0.78]	0.174	0.36 [-0.22, 0.95]	0.226	
Marital status										
Married	Reference	0.22 [-0.14, 0.58]	0.228	0.15 [-0.24, 0.54]	0.450	0.38 [-0.06, 0.81]	0.092	0.25 [-0.29, 0.80]	0.365	
Unmarried	Reference	-0.09 [-0.57, 0.40]	0.723	0.33 [-0.22, 0.87]	0.239	-0.18 [-0.80, 0.44]	0.569	-0.30 [-1.10, 0.49]	0.454	
Cardiometabolic										

Yes	Reference	0.02 [-0.33, 0.36]	0.923	-0.02 [-0.40, 0.36]	0.901	0.00 [-0.43, 0.44]	0.982	-0.20 [-0.74, 0.35]	0.477	0.005
No	Reference	0.32 [-0.21, 0.85]	0.243	0.64 [0.07, 1.22]	0.028	0.58 [-0.05, 1.22]	0.071	0.74 [-0.06, 1.54]	0.070	
Iron supplement intake										0.005
Yes	Reference	0.10 [-0.23, 0.44]	0.544	0.18 [-0.19, 0.55]	0.342	0.25 [-0.17, 0.67]	0.248	0.19 [-0.34, 0.72]	0.476	
No	Reference	0.09 [-0.48, 0.66]	0.747	0.11 [-0.50, 0.72]	0.719	-0.03 [-0.72, 0.66]	0.933	-0.21 [-1.07, 0.64]	0.621	
Zinc supplement intake										0.029
Yes	Reference	0.12 [-0.18, 0.42]	0.445	0.15 [-0.19, 0.48]	0.385	0.14 [-0.24, 0.51]	0.473	0.08 [-0.39, 0.55]	0.738	
No	Reference	-0.07 [-1.05, 0.92]	0.893	0.43 [-0.63, 1.49]	0.427	0.46 [-0.77, 1.69]	0.465	-0.04 [-1.58, 1.51]	0.962	
Manganese										
Gender										0.133
Male	Reference	-0.17 [-0.62, 0.28]	0.466	-0.07 [-0.56, 0.42]	0.776	0.39 [-0.16, 0.94]	0.167	-0.12 [-0.83, 0.59]	0.736	
Female	Reference	0.29 [-0.08, 0.67]	0.128	0.18 [-0.25, 0.60]	0.415	0.23 [-0.25, 0.70]	0.353	0.09 [-0.55, 0.72]	0.785	
Age, years										0.188
<65	Reference	0.07 [-0.33, 0.48]	0.728	0.20 [-0.25, 0.66]	0.378	0.57 [0.06, 1.07]	0.028	0.24 [-0.41, 0.89]	0.466	
>=65	Reference	0.15 [-0.27, 0.57]	0.480	-0.07 [-0.52, 0.39]	0.770	-0.00 [-0.52, 0.52]	0.998	-0.27 [-0.95, 0.42]	0.450	
Body mass index, kg/m²										0.006
< 25	Reference	0.74 [0.06, 1.42]	0.033	0.53 [-0.19, 1.26]	0.149	0.62 [-0.17, 1.42]	0.123	0.65 [-0.35, 1.66]	0.203	
>= 25	Reference	-0.05 [-0.37, 0.27]	0.750	-0.06 [-0.41, 0.30]	0.758	0.18 [-0.23, 0.58]	0.394	-0.22 [-0.75, 0.32]	0.429	
Education, years										0.523
< 10	Reference	0.11 [-0.25, 0.48]	0.539	0.15 [-0.25, 0.56]	0.467	0.32 [-0.14, 0.78]	0.174	0.36 [-0.22, 0.95]	0.226	
10-15	Reference	0.15 [-0.38, 0.68]	0.586	0.32 [-0.24, 0.88]	0.261	0.16 [-0.47, 0.79]	0.621	-0.20 [-0.98, 0.58]	0.613	
>= 15	Reference	0.09 [-1.00, 1.18]	0.871	-0.49 [-1.70, 0.72]	0.424	-0.74 [-2.12, 0.64]	0.292	-0.59 [-2.40, 1.21]	0.518	
Marital status										0.358
Married	Reference	0.10 [-0.25, 0.46]	0.568	0.18 [-0.21, 0.57]	0.374	0.48 [0.04, 0.92]	0.031	0.11 [-0.46, 0.68]	0.706	
Unmarried	Reference	0.09 [-0.41, 0.59]	0.721	-0.17 [-0.73, 0.38]	0.545	-0.18 [-0.81, 0.46]	0.584	-0.28 [-1.12, 0.56]	0.507	

Cardiometabolic										0.817
Yes	Reference	0.11 [-0.24, 0.45]	0.538	-0.00 [-0.39, 0.38]	0.991	0.25 [-0.19, 0.69]	0.270	0.08 [-0.50, 0.66]	0.789	
No	Reference	0.14 [-0.40, 0.67]	0.616	0.29 [-0.28, 0.87]	0.318	0.40 [-0.24, 1.03]	0.223	-0.05 [-0.86, 0.77]	0.912	
Iron supplement intake										0.087
Yes	Reference	0.10 [-0.23, 0.44]	0.551	0.11 [-0.26, 0.48]	0.565	0.22 [-0.21, 0.65]	0.315	0.13 [-0.43, 0.69]	0.657	
No	Reference	0.01 [-0.57, 0.60]	0.960	-0.17 [-0.80, 0.45]	0.583	0.22 [-0.47, 0.90]	0.534	-0.41 [-1.29, 0.48]	0.370	
Zinc supplement intake										0.274
Yes	Reference	0.07 [-0.24, 0.37]	0.663	0.08 [-0.25, 0.42]	0.623	0.26 [-0.12, 0.64]	0.185	-0.02 [-0.52, 0.48]	0.945	
No	Reference	0.32 [-0.71, 1.35]	0.542	-0.24 [-1.32, 0.83]	0.660	0.15 [-1.02, 1.32]	0.795	-0.15 [-1.64, 1.33]	0.839	

All subgroup analyses were based on Model 3, which adjusted for age, squared age, sex, race, marriage status, education, physical activity, household income, smoking status, alcohol drinking status, use of vitamin, iron, and zinc supplements, and dietary intake of fat and fiber.

BMI: body mass index

Table S4. Sensitivity analysis for further adjusted associations of mineral intake with cognitive function

	Range	Model 4	P-value	Model 5	P-value	Model 6	P-value	Model 7	P-value
Iron									
Quintile 1	<8.1	0.00 [Reference]		0.00 [Reference]		0.00 [Reference]		0.00 [Reference]	
Quintile 2	8.1-<10.8	0.31 [0.02, 0.60]	0.036	0.33 [0.05, 0.62]	0.022	0.30 [0.01, 0.59]	0.042	0.29 [0.00, 0.58]	0.048
Quintile 3	10.8-<13.7	0.02 [-0.30, 0.33]	0.912	0.03 [-0.28, 0.35]	0.849	0.01 [-0.31, 0.32]	0.956	-0.02 [-0.33, 0.30]	0.921
Quintile 4	13.7-<17.7	0.05 [-0.30, 0.40]	0.784	0.06 [-0.30, 0.41]	0.760	0.05 [-0.31, 0.40]	0.803	0.01 [-0.35, 0.36]	0.969
Quintile 5	>=17.7	-0.46 [-0.90, -0.02]	0.039	-0.45 [-0.89, -0.01]	0.046	-0.51 [-0.95, -0.06]	0.025	-0.59 [-1.04, -0.15]	0.009
p-trend			0.012		0.012		0.006		0.001
Copper									
Quintile 1	<0.8	0.00 [Reference]		0.00 [Reference]		0.00 [Reference]		0.00 [Reference]	
Quintile 2	0.8-<1.1	-0.11 [-0.39, 0.17]	0.447	-0.10 [-0.38, 0.19]	0.501	-0.11 [-0.39, 0.18]	0.466	-0.13 [-0.41, 0.16]	0.388
Quintile 3	1.1-<1.4	-0.16 [-0.46, 0.15]	0.316	-0.15 [-0.45, 0.15]	0.334	-0.17 [-0.47, 0.14]	0.280	-0.20 [-0.50, 0.11]	0.208
Quintile 4	1.4-<1.8	-0.25 [-0.60, 0.10]	0.161	-0.28 [-0.62, 0.07]	0.122	-0.28 [-0.63, 0.07]	0.119	-0.31 [-0.67, 0.04]	0.081
Quintile 5	>=1.8	-0.48 [-0.90, -0.07]	0.023	-0.47 [-0.88, -0.05]	0.028	-0.52 [-0.94, -0.10]	0.015	-0.62 [-1.04, -0.19]	0.005
p-trend			0.004		0.005		0.002		<0.001
Zinc									
Quintile 1	<6.8	0.00 [Reference]		0.00 [Reference]		0.00 [Reference]		0.00 [Reference]	
Quintile 2	6.8-<9.0	0.11 [-0.18, 0.40]	0.445	0.12 [-0.17, 0.40]	0.434	0.09 [-0.20, 0.38]	0.544	0.04 [-0.25, 0.33]	0.786
Quintile 3	9.0-<11.1	0.20 [-0.12, 0.51]	0.224	0.19 [-0.13, 0.50]	0.241	0.17 [-0.15, 0.49]	0.299	0.08 [-0.25, 0.40]	0.645
Quintile 4	11.1-<14.2	0.19 [-0.16, 0.55]	0.286	0.19 [-0.17, 0.55]	0.295	0.16 [-0.20, 0.51]	0.396	0.00 [-0.38, 0.38]	0.983
Quintile 5	>=14.2	0.11 [-0.34, 0.56]	0.617	0.08 [-0.36, 0.53]	0.710	0.03 [-0.42, 0.48]	0.910	-0.21 [-0.71, 0.28]	0.402
p-trend			0.961		0.948		0.680		0.096
Manganese									
Quintile 1	<1.9	0.00 [Reference]		0.00 [Reference]		0.00 [Reference]		0.00 [Reference]	
Quintile 2	1.9-<2.6	0.10 [-0.19, 0.39]	0.492	0.10 [-0.19, 0.39]	0.504	0.10 [-0.19, 0.39]	0.505	0.09 [-0.20, 0.38]	0.541
Quintile 3	2.6-<3.4	0.06 [-0.26, 0.38]	0.717	0.06 [-0.26, 0.38]	0.721	0.06 [-0.26, 0.38]	0.704	0.04 [-0.28, 0.36]	0.793

Quintile 4	3.4-<4.4	0.26 [-0.10, 0.62]	0.164	0.25 [-0.11, 0.61]	0.178	0.27 [-0.09, 0.63]	0.147	0.24 [-0.12, 0.60]	0.197
Quintile 5	>=4.4	-0.02 [-0.49, 0.45]	0.936	-0.01 [-0.48, 0.46]	0.961	-0.01 [-0.49, 0.46]	0.951	-0.09 [-0.56, 0.39]	0.715
p-trend			0.354		0.343		0.326		0.605

Model 4 was based on Model 3 and further adjusted for hypertension, diabetes mellitus, heart problems.

Model 5 was based on Model 3 and further adjusted for depression.

Model 6 was based on Model 3 and further adjusted for body mass index (BMI).

Model 7 was based on Model 3 and further adjusted for intake of pantothenic and phosphorous.

Table S5. Sensitivity analysis for population excluded, mutual adjusted, and energy standardized associations of mineral intake with cognitive function

	Range	Model 8	P-value	Model 9	P-value	Model 10	P-value	Model 11	P-value
Iron									
Quintile 1	<8.1	0.00 [Reference]		0.00 [Reference]		0.00 [Reference]		0.00 [Reference]	
Quintile 2	8.1-<10.8	0.25 [-0.03, 0.54]	0.076	0.27 [-0.03, 0.56]	0.077	0.25 [-0.04, 0.54]	0.092	0.27 [-0.01, 0.55]	0.058
Quintile 3	10.8-<13.7	0.12 [-0.20, 0.43]	0.467	0.03 [-0.29, 0.36]	0.837	-0.09 [-0.42, 0.24]	0.609	0.16 [-0.12, 0.45]	0.267
Quintile 4	13.7-<17.7	0.19 [-0.16, 0.54]	0.291	0.11 [-0.25, 0.48]	0.541	-0.11 [-0.49, 0.28]	0.591	-0.00 [-0.29, 0.28]	0.979
Quintile 5	>=17.7	-0.12 [-0.56, 0.31]	0.579	-0.34 [-0.80, 0.11]	0.138	-0.75 [-1.26, -0.24]	0.004	-0.14 [-0.44, 0.16]	0.355
p-trend			0.111		0.033		< 0.001		0.006
Copper									
Quintile 1	<0.8	0.00 [Reference]		0.00 [Reference]		0.00 [Reference]		0.00 [Reference]	
Quintile 2	0.8-<1.1	-0.04 [-0.32, 0.24]	0.761	-0.14 [-0.43, 0.15]	0.350	-0.13 [-0.42, 0.15]	0.363	-0.01 [-0.30, 0.27]	0.933
Quintile 3	1.1-<1.4	-0.16 [-0.45, 0.14]	0.306	-0.17 [-0.48, 0.15]	0.299	-0.20 [-0.50, 0.11]	0.211	0.06 [-0.23, 0.36]	0.674
Quintile 4	1.4-<1.8	-0.22 [-0.56, 0.13]	0.219	-0.31 [-0.67, 0.05]	0.094	-0.32 [-0.67, 0.03]	0.075	0.04 [-0.25, 0.34]	0.772
Quintile 5	>=1.8	-0.37 [-0.78, 0.04]	0.076	-0.49 [-0.92, -0.06]	0.024	-0.58 [-1.00, -0.16]	0.007	-0.49 [-0.79, -0.19]	0.001
p-trend			0.026		0.007		0.002		<0.001
Zinc									
Quintile 1	<6.8	0.00 [Reference]		0.00 [Reference]		0.00 [Reference]		0.00 [Reference]	
Quintile 2	6.8-<9.0	0.11 [-0.18, 0.39]	0.466	0.10 [-0.20, 0.40]	0.513	0.17 [-0.12, 0.46]	0.255	-0.21 [-0.49, 0.07]	0.137
Quintile 3	9.0-<11.1	0.24 [-0.07, 0.55]	0.135	0.13 [-0.20, 0.46]	0.434	0.31 [-0.02, 0.64]	0.066	0.05 [-0.23, 0.33]	0.722
Quintile 4	11.1-<14.2	0.28 [-0.08, 0.63]	0.125	0.19 [-0.18, 0.56]	0.324	0.37 [-0.02, 0.75]	0.060	-0.05 [-0.33, 0.23]	0.726
Quintile 5	>=14.2	0.24 [-0.21, 0.68]	0.296	0.17 [-0.29, 0.64]	0.462	0.44 [-0.07, 0.95]	0.088	0.08 [-0.20, 0.36]	0.570
p-trend			0.379		0.654		0.033		0.723
Manganese									
Quintile 1	<1.9	0.00 [Reference]		0.00 [Reference]		0.00 [Reference]		0.00 [Reference]	
Quintile 2	1.9-<2.6	0.01 [-0.28, 0.29]	0.958	0.07 [-0.23, 0.36]	0.667	0.14 [-0.16, 0.43]	0.361	-0.23 [-0.51, 0.06]	0.119

Quintile 3	2.6-<3.4	0.05 [-0.26, 0.36]	0.755	0.09 [-0.24, 0.41]	0.610	0.12 [-0.20, 0.45]	0.460	-0.04 [-0.34, 0.26]	0.810
Quintile 4	3.4-<4.4	0.24 [-0.12, 0.59]	0.191	0.30 [-0.07, 0.68]	0.110	0.35 [-0.02, 0.72]	0.065	-0.14 [-0.46, 0.18]	0.383
Quintile 5	>=4.4	-0.04 [-0.50, 0.43]	0.876	-0.02 [-0.51, 0.46]	0.932	0.16 [-0.33, 0.65]	0.521	0.04 [-0.32, 0.40]	0.837
p-trend			0.368		0.318		0.026		0.358

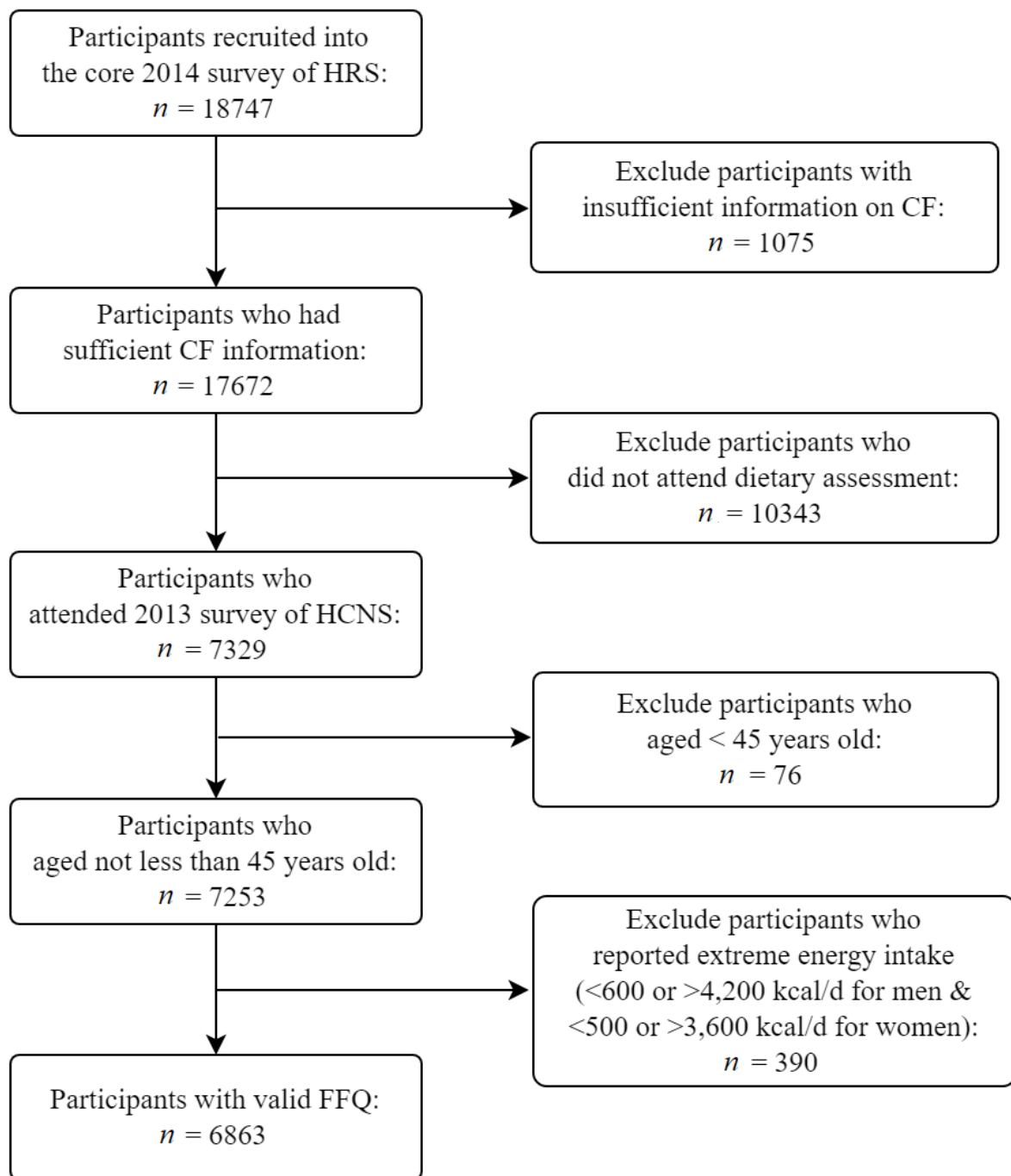
Model 8 was based on Model 3 and excluded participants with global cognitive score <= 6.

Model 9 was based on Model 3 and excluded participants with stroke history.

Model 10 was based on Model 3 and further adjusted for the other three mineral intake when treating certain mineral intake as exposure.

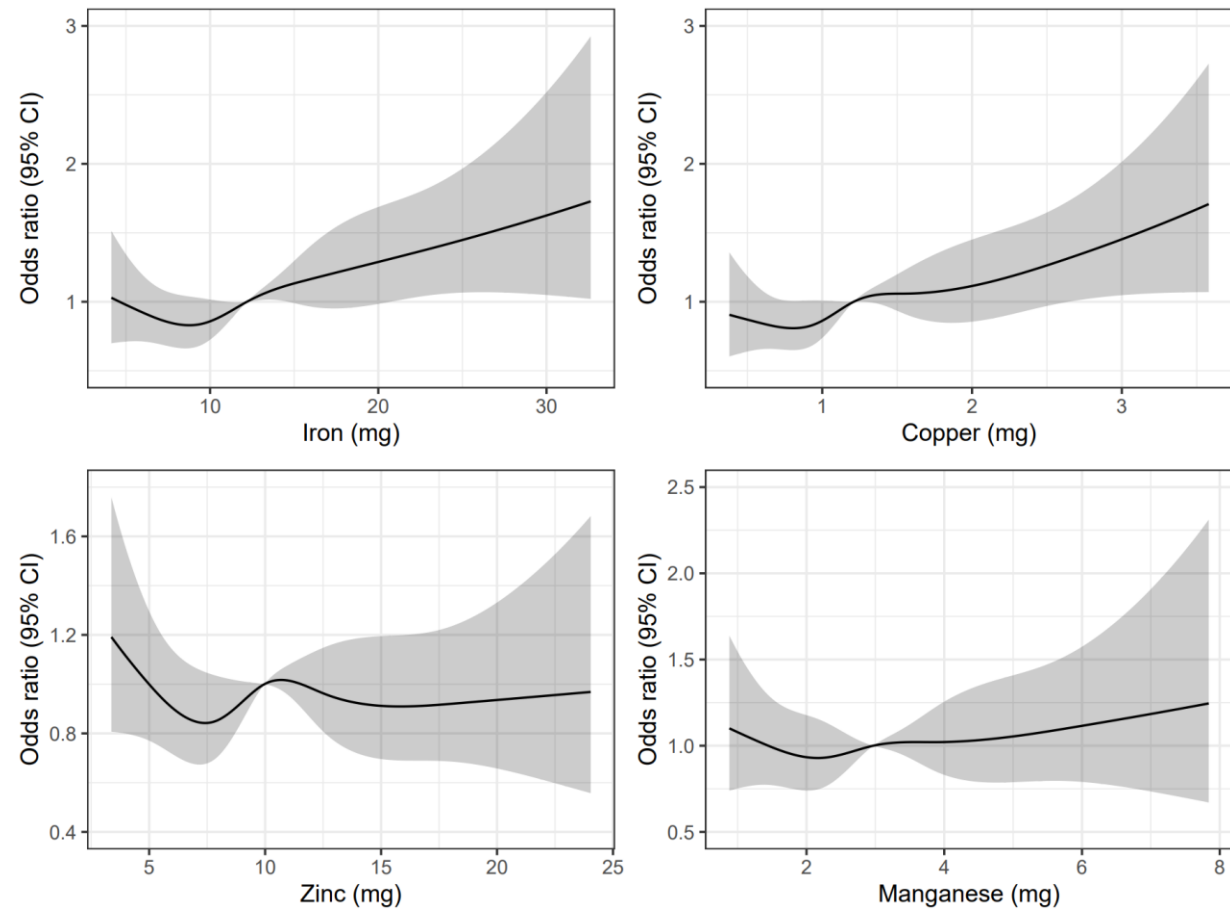
Model 11 was based on Model 3 and standardized dietary intake.

Figure S1. Flow chart of the study population



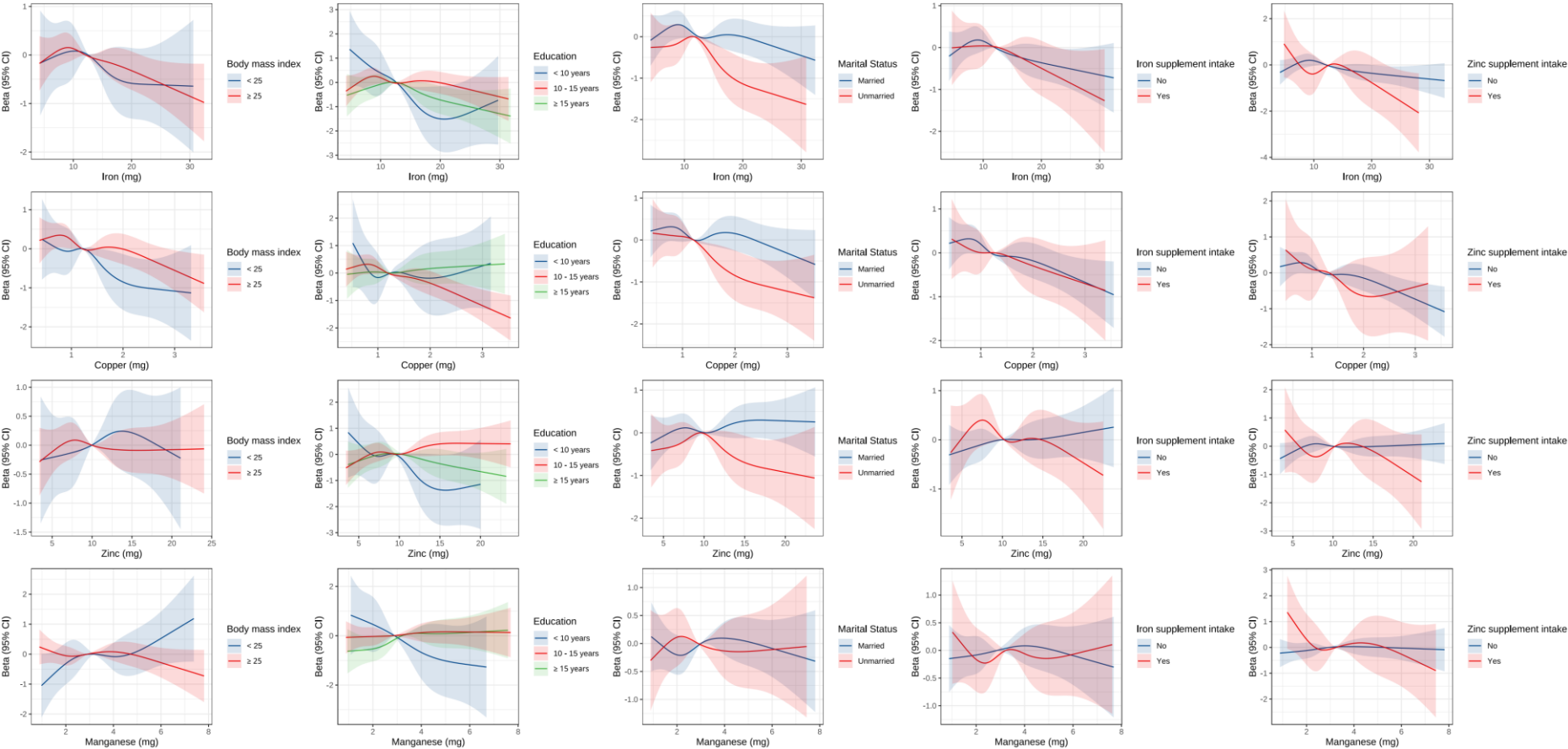
HRS: the Health and Retirement Study, CF: cognitive function, HCNS: the Health Care and Nutritional Study, FFQ: Food Frequency Questionnaires.

Figure S2. Restricted cubic splines for the association of dietary intake of iron, copper, zinc, and manganese with cognitive impairment



The reference point was set as the median values of dietary intake of iron, copper, zinc, and manganese. P-nonlinear = 0.350 for dietary iron intake, 0.634 for dietary copper intake, 0.307 for dietary zinc intake, and 0.786 for dietary manganese intake. The solid line represents the ORs of the logistic model, and the shaded area represents the 95% CIs of ORs.

Figure S3. Restricted cubic splines for the association of dietary intake of iron, copper, zinc, and manganese with global cognitive score by BMI, education, marital status, iron supplement intake, and zinc supplement intake



The solid line represents the beta of linear model, and shaded area represents the 95% CIs of beta