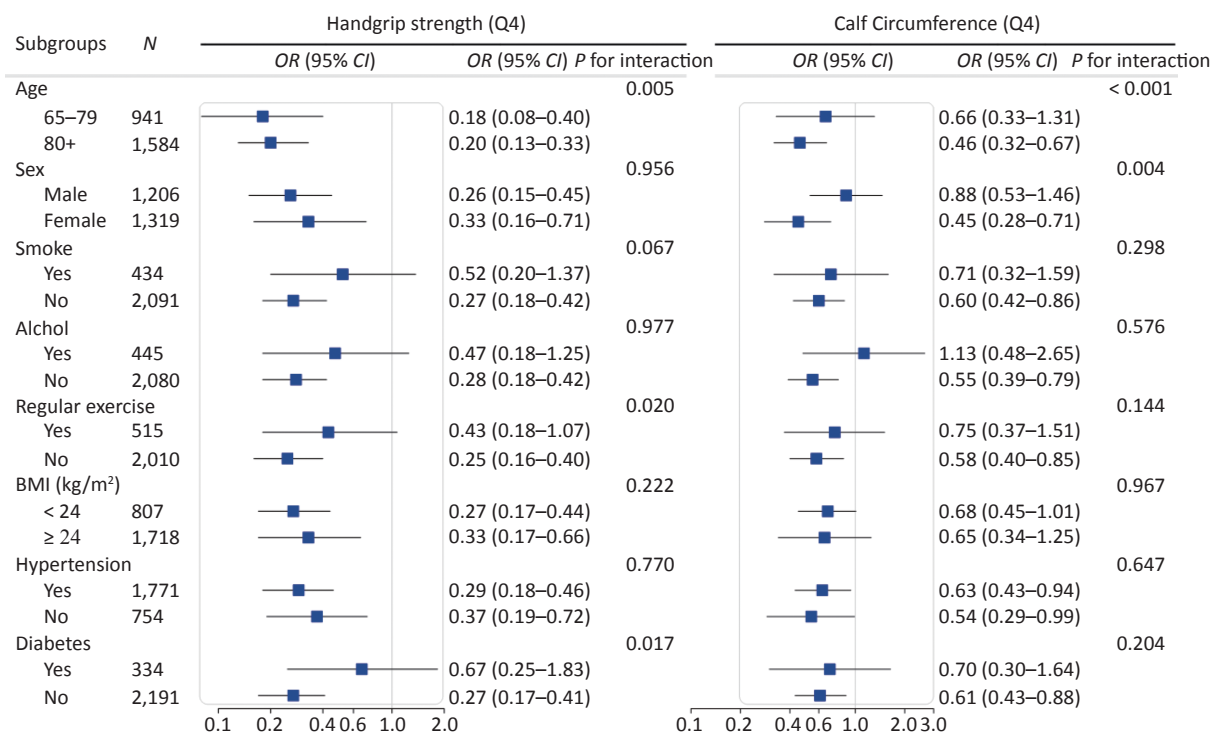


**Supplementary Figure S1.** The stem-and-leaf display of calf circumference and grip strength. (A) The stem-and-leaf display of calf circumference; (B) The stem-and-leaf display of calf circumference and grip strength.



**Supplementary Figure S2.** Stratified analyses of association of handgrip strength and calf circumference with cognitive impairment in logistic regression models among Chinese older adults. *CI*, confidence interval; *OR*, odd ratio. Adjusted covariates included age, gender, nationality, education attainment, marital status, smoking, drinking, regular exercise, BMI, hypertension, diabetes, heart disease, and respiratory disease.

**Supplementary Table S1.** Components of the mini-mental state examination (MMSE)

Components	Question	Score
Orientation	What is the (year) (season) (date) (day) (month)?	5
	Where are we: (state) (county) (town) (hospital) (floor)?	5
Registration	Name 3 objects ("table", "apple", "clothes"): 1 second to say each. Then ask the patient all 3 after you have said them. Give 1 point for each correct answer. Then repeat them until he learns all 3. Count trials and record.	3
Attention and Calculation	Serial 7's. 1 point for each correct. Stop after 5 answers.	5
	\$20-\$3=?	
	\$20-\$3-\$3=?	
	\$20-\$3-\$3-\$3=?	
	\$20-\$3-\$3-\$3-\$3=?	
Recall	Ask for the 3 objects repeated above. Give 1 point for each correct.	3
Language	Name a pencil, and watch (2 points)	9
	Repeat the following "As a man sows, so he shall reap" (1 point)	
	Follow a 3-stage command: "Take a paper in your right hand, fold it in half, and put it on the floor" (3 points)	
	Read and obey the following:	
	CLOSE YOUR EYES (1 point)	
	Write a sentence (1 point)	
	Copy design (1 point)	

**Supplementary Table S2.** Characteristics of participants according to sarcopenia status

Variables	Total	Sarcopenia	Non-sarcopenia
	(N = 2,525)	(N = 2,032)	(N = 493)
Age (years)	84.50 (84.06–84.94)	87.23 (86.77–87.69)	73.27 (72.71–73.83)
Handgrip strength	17.58 (17.20–17.95)	14.93 (14.59–15.28)	28.47 (27.80–29.14)
Calf circumference	30.58 (30.40–30.75)	29.58 (29.41–29.75)	34.67 (34.39–34.96)
Education attainment (years)	2.66 (2.53–2.79)	2.11 (1.98–2.25)	4.90 (4.59–5.22)
Cognitive impairment (%)			
Yes	0.35 (0.33–0.36)	0.4 (0.38–0.42)	0.12 (0.09–0.15)
No	0.65 (0.64–0.67)	0.6 (0.58–0.62)	0.88 (0.85–0.91)
Nationality			
Han	0.91 (0.90–0.93)	0.91 (0.90–0.92)	0.92 (0.90–0.95)
Minority	0.09 (0.07–0.10)	0.09 (0.08–0.10)	0.08 (0.05–0.10)
Gender (%)			
Male	0.48 (0.46–0.50)	0.47 (0.45–0.50)	0.49 (0.45–0.54)
Female	0.52 (0.50–0.54)	0.53 (0.50–0.55)	0.51 (0.46–0.55)
Current marital status (%)			
Married	0.99 (0.99–0.99)	0.99 (0.99–1.00)	0.99 (0.98–1.00)
Unmarried	0.01 (0.00–0.01)	0.01 (0.00–0.02)	0.01 (0.01–0.01)
Smoking (%)			
Yes	0.17 (0.16–0.19)	0.17 (0.15–0.18)	0.19 (0.16–0.23)
No	0.83 (0.81–0.84)	0.83 (0.82–0.85)	0.81 (0.77–0.84)

Continued

Variables	Total	Sarcopenia	Non-sarcopenia
	(N = 2,525)	(N = 2,032)	(N = 493)
Alcohol consumption (%)			
Yes	0.18 (0.16–0.19)	0.16 (0.15–0.18)	0.84 (0.82–0.85)
No	0.82 (0.81–0.84)	0.23 (0.19–0.26)	0.77 (0.74–0.81)
Exercise (%)			
Yes	0.20 (0.19–0.22)	0.18 (0.16–0.19)	0.32 (0.28–0.36)
No	0.80 (0.78–0.81)	0.32 (0.28–0.36)	0.68 (0.64–0.72)
Hypertension (%)			
Yes	0.70 (0.68–0.72)	0.69 (0.67–0.71)	0.75 (0.71–0.79)
No	0.30 (0.28–0.32)	0.31 (0.29–0.33)	0.25 (0.21–0.29)
Diabetes (%)			
Yes	0.13 (0.12–0.15)	0.13 (0.11–0.14)	0.15 (0.11–0.18)
No	0.87 (0.85–0.88)	0.87 (0.86–0.89)	0.85 (0.82–0.89)
Heart disease (%)			
Yes	0.11 (0.09–0.12)	0.1 (0.09–0.12)	0.12 (0.09–0.15)
No	0.89 (0.88–0.91)	0.9 (0.88–0.91)	0.88 (0.85–0.91)
Respiratory diseases (%)			
Yes	0.09 (0.08–0.10)	0.09 (0.08–0.10)	0.06 (0.04–0.09)
No	0.91 (0.90–0.93)	0.91 (0.9–0.92)	0.94 (0.91–0.96)

**Supplementary Table S3.** Associations of handgrip strength, calf circumference and sarcopenia with cognitive impairment (excluding participants with chronic disease)

Independent variables	Crude model		Model 1		Model 2		Model 3	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Sarcopenia								
No	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Yes	5.37 (2.78–10.39)	< 0.001	2.22 (1.06–4.67)	0.035	2.22 (1.05–4.70)	0.037	2.23 (1.05–4.74)	0.038
Calf circumference (cm)	0.84 (0.81–0.88)	< 0.001	0.94 (0.89–0.99)	0.031	0.94 (0.89–1.00)	0.037	0.94 (0.89–0.99)	0.018
Calf circumference quartile								
Q1	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Q2	0.41 (0.26–0.65)	< 0.001	0.65 (0.38–1.09)	0.104	0.61 (0.36–1.03)	0.064	0.6 (0.35–1.03)	0.062
Q3	0.21 (0.13–0.36)	< 0.001	0.50 (0.27–0.93)	0.029	0.5 (0.27–0.94)	0.031	0.48 (0.26–0.91)	0.023
Q4	0.15 (0.09–0.27)	< 0.001	0.63 (0.31–1.28)	0.200	0.65 (0.32–1.32)	0.232	0.58 (0.28–1.21)	0.147
Handgrip strength (kg)	0.88 (0.86–0.90)	< 0.001	0.94 (0.91–0.98)	0.001	0.94 (0.91–0.97)	0.001	0.94 (0.91–0.97)	< 0.001
Handgrip strength quartile								
Q1	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Q2	0.26 (0.16–0.42)	< 0.001	0.34 (0.2–0.59)	< 0.001	0.32 (0.19–0.56)	< 0.001	0.32 (0.18–0.55)	< 0.001
Q3	0.11 (0.06–0.19)	< 0.001	0.29 (0.15–0.56)	< 0.001	0.25 (0.13–0.5)	< 0.001	0.25 (0.13–0.49)	< 0.001
Q4	0.05 (0.02–0.09)	< 0.001	0.25 (0.10–0.58)	< 0.001	0.24 (0.10–0.57)	< 0.001	0.23 (0.10–0.56)	< 0.001

**Note.** Handgrip Strength was calculated by the highest value of dominant hand; OR, odds ratio; CI, confidence interval; Model 1: Multivariate logistic analysis was performed after adjusting for age, gender, nationality, education attainment, and marital status. Model 2 was adjusted for variables in model 1 plus smoking, drinking and physical exercise, Model 3 was adjusted for variables in model 2 plus BMI.

**Supplementary Table S4.** Associations of handgrip strength (the maximum value of the dominant hand) and sarcopenia with cognitive impairment

Independent variables	Crude model		Model 1		Model 2		Model 3	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Sarcopenia								
No	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Yes	5.33 (4.13–6.89)	< 0.001	3.18 (2.41–4.20)	< 0.001	3.18 (2.40–4.20)	< 0.001	3.04 (2.28–4.04)	< 0.001
Handgrip strength (kg)	0.90 (0.89–0.91)	< 0.001	0.96 (0.94–0.97)	< 0.001	0.96 (0.94–0.97)	< 0.001	0.96 (0.94–0.97)	< 0.001
Handgrip strength quartile								
Q1	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Q2	0.39 (0.31–0.50)	< 0.001	0.59 (0.46–0.76)	< 0.001	0.58 (0.45–0.75)	< 0.001	0.58 (0.45–0.75)	< 0.001
Q3	0.15 (0.11–0.19)	< 0.001	0.36 (0.27–0.48)	< 0.001	0.35 (0.26–0.47)	< 0.001	0.35 (0.26–0.47)	< 0.001
Q4	0.08 (0.06–0.11)	< 0.001	0.37 (0.25–0.54)	< 0.001	0.36 (0.25–0.53)	< 0.001	0.35 (0.24–0.52)	< 0.001

**Note.** Handgrip Strength was calculated by the highest value of dominant hand; OR, odds ratio; CI, confidence interval; Model 1: Multivariate logistic analysis was performed after adjusting for age, gender, nationality, education attainment, and marital status. Model 2 was adjusted for variables in model 1 plus smoking, drinking and physical exercise, Model 3 was adjusted for variables in model 2 plus BMI, hypertension, diabetes, heart disease, and respiratory disease.

**Supplementary Table S5.** Associations of sarcopenia, handgrip strength and calf circumference (including outliers) with cognitive impairment

Independent variables	Crude model		Model 1		Model 2		Model 3	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Sarcopenia								
No	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Yes	4.97 (3.76–6.57)	< 0.001	2.83 (2.09–3.83)	< 0.001	2.81 (2.08–3.81)	< 0.001	2.65 (1.95–3.62)	< 0.001
Calf circumference (cm)	0.88 (0.86–0.90)	< 0.001	0.97 (0.95–0.99)	0.002	0.97 (0.95–0.99)	0.002	0.97 (0.94–0.99)	0.002
Calf circumference quartile								
Q1	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Q2	0.47 (0.37–0.59)	< 0.001	0.75 (0.59–0.97)	0.028	0.75 (0.59–0.97)	0.029	0.76 (0.59–0.98)	0.032
Q3	0.25 (0.20–0.32)	< 0.001	0.60 (0.45–0.79)	0.000	0.60 (0.45–0.80)	0.000	0.60 (0.45–0.80)	< 0.001
Q4	0.19 (0.15–0.24)	< 0.001	0.63 (0.46–0.84)	0.002	0.62 (0.46–0.84)	0.002	0.60 (0.43–0.82)	0.002
Handgrip strength (kg)	0.89 (0.88–0.90)	< 0.001	0.94 (0.93–0.96)	< 0.001	0.94 (0.93–0.96)	< 0.001	0.94 (0.92–0.95)	< 0.001
Handgrip strength quartile								
Q1	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Q2	0.35 (0.28–0.44)	< 0.001	0.49 (0.39–0.63)	< 0.001	0.48 (0.38–0.62)	< 0.001	0.49 (0.38–0.62)	< 0.001
Q3	0.13 (0.10–0.16)	< 0.001	0.31 (0.23–0.41)	< 0.001	0.30 (0.22–0.41)	< 0.001	0.30 (0.22–0.40)	< 0.001
Q4	0.07 (0.05–0.09)	< 0.001	0.30 (0.21–0.44)	< 0.001	0.29 (0.20–0.43)	< 0.001	0.29 (0.20–0.42)	< 0.001

**Note.** OR, odds ratio; CI, confidence interval; Model 1: Multivariate logistic analysis was performed after adjusting for age, gender, nationality, education attainment, and marital status. Model 2 was adjusted for variables in model 1 plus smoking, drinking and physical exercise, Model 3 was adjusted for variables in model 2 plus BMI, hypertension, diabetes, heart disease, and respiratory disease.

**Supplementary Table S6.** Associations of sarcopenia, handgrip strength and calf circumference with cognitive impairment (food consumption was added to model 2)

Independent variables	Crude model		Model 1		Model 2		Model 3	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Sarcopenia								
No	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Yes	4.81 (3.62–6.40) < 0.001		2.73 (2.00–3.71) < 0.001		2.61 (1.91–3.58) < 0.001		2.46 (1.79–3.39) < 0.001	
Calf circumference (cm)	0.86 (0.85–0.88) < 0.001		0.96 (0.93–0.98) < 0.001		0.96 (0.94–0.98) 0.001		0.96 (0.93–0.98) 0.001	
Calf circumference quartile								
Q1	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Q2	0.46 (0.37–0.58) < 0.001		0.75 (0.58–0.96) 0.023		0.75 (0.58–0.97) 0.026		0.74 (0.57–0.96) 0.025	
Q3	0.25 (0.19–0.31) < 0.001		0.59 (0.45–0.78) < 0.001		0.59 (0.44–0.78) < 0.001		0.58 (0.43–0.78) < 0.001	
Q4	0.19 (0.15–0.25) < 0.001		0.64 (0.48–0.87) 0.004		0.66 (0.48–0.90) 0.008		0.63 (0.45–0.88) 0.007	
Handgrip strength (kg)	0.89 (0.88–0.90) < 0.001		0.94 (0.93–0.96) < 0.001		0.94 (0.93–0.96) < 0.001		0.94 (0.93–0.96) < 0.001	
Handgrip strength quartile								
Q1	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Q2	0.35 (0.28–0.44) < 0.001		0.50 (0.39–0.63) < 0.001		0.48 (0.38–0.62) < 0.001		0.49 (0.38–0.63) < 0.001	
Q3	0.13 (0.10–0.17) < 0.001		0.32 (0.23–0.43) < 0.001		0.31 (0.23–0.42) < 0.001		0.31 (0.23–0.42) < 0.001	
Q4	0.07 (0.05–0.10) < 0.001		0.32 (0.22–0.46) < 0.001		0.33 (0.22–0.49) < 0.001		0.32 (0.22–0.48) < 0.001	

**Note.** OR, odds ratio; CI, confidence interval; Model 1: Multivariate logistic analysis was performed after adjusting for age, gender, nationality, education attainment, and marital status. Model 2 was adjusted for variables in model 1 plus smoking, drinking, physical exercise, intake frequencies of vegetables, eggs, meat and fish (almost every day, at least once a week, at least once a month, sometimes, or rarely). Model 3 was adjusted for variables in model 2 plus BMI, hypertension, diabetes, heart disease, and respiratory disease.

**Supplementary Table S7.** Associations of sarcopenia, handgrip strength and calf circumference with cognitive impairment (dyslipidemia was added to model 3)

Independent variables	Crude model		Model 1		Model 2		Model 3	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Sarcopenia								
No	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Yes	4.81 (3.62–6.40) < 0.0001		2.73 (2.00–3.71) < 0.0001		2.72 (1.99–3.70) < 0.0001		2.53 (1.85–3.48) < 0.001	
Calf circumference (cm)	0.86 (0.85–0.88) < 0.0001		0.96 (0.93–0.98) 0.001		0.96 (0.93–0.98) 0.001		0.95 (0.93–0.98) 0.001	
Calf circumference quartile								
Q1	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Q2	0.46 (0.37–0.58) < 0.0001		0.75 (0.58–0.96) 0.023		0.74 (0.58–0.96) 0.023		0.73 (0.56–0.94) 0.015	
Q3	0.25 (0.19–0.31) < 0.0001		0.59 (0.45–0.78) 0.000		0.59 (0.45–0.79) 0.000		0.59 (0.44–0.79) < 0.001	
Q4	0.19 (0.15–0.25) < 0.0001		0.64 (0.48–0.87) 0.004		0.64 (0.47–0.87) 0.004		0.62 (0.45–0.86) 0.004	
Handgrip strength (kg)	0.89 (0.88–0.90) < 0.0001		0.94 (0.93–0.96) < 0.0001		0.94 (0.93–0.96) < 0.0001		0.94 (0.93–0.96) < 0.001	
Handgrip strength quartile								
Q1	1.00 [Reference]		1.00 [Reference]		1.00 [Reference]		1.00 [Reference]	
Q2	0.35 (0.28–0.44) < 0.0001		0.50 (0.39–0.63) < 0.0001		0.49 (0.38–0.62) < 0.0001		0.49 (0.39–0.63) < 0.001	
Q3	0.13 (0.10–0.17) < 0.0001		0.32 (0.23–0.43) < 0.0001		0.31 (0.23–0.42) < 0.0001		0.31 (0.23–0.41) < 0.001	
Q4	0.07 (0.05–0.10) < 0.0001		0.32 (0.22–0.46) < 0.0001		0.31 (0.21–0.45) < 0.0001		0.31 (0.21–0.45) < 0.001	

**Note.** OR, odds ratio; CI, confidence interval; Model 1: Multivariate logistic analysis was performed after adjusting for age, gender, nationality, education attainment, and marital status. Model 2 was adjusted for variables in model 1 plus smoking, drinking and physical exercise, Model 3 was adjusted for variables in model 2 plus BMI, hypertension, diabetes, heart disease, respiratory disease and dyslipidemia.