

Association between lipid ratios and sarcopenia and the mediating roles of inflammatory biomarkers in a Cross-Sectional Study from NHANES 2011-2018

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Table S1. Distribution of mediating variables between sarcopenia and non-sarcopenia groups among the US population, NHANES, 2011-2018.

Variables	Non-sarcopenia (n=9500)	Sarcopenia (n=849)	<i>P</i> -value
NLR (no units)	0.26 (0.14, 0.38)	0.29 (0.18, 0.41)	<0.001
Missing	28 (0.00)	1 (0.00)	
dNLR (no units)	-0.08 (-0.10, -0.06)	-0.07 (-0.09, -0.06)	<0.001
Missing	28 (0.00)	1 (0.00)	
MLR (no units)	-0.60 (-0.72, -0.51)	-0.62 (-0.72, -0.52)	0.289
Missing	28 (0.00)	1 (0.00)	
NMLR (no units)	0.32 (0.21, 0.43)	0.34 (0.24, 0.45)	<0.001
Missing	28 (0.00)	1 (0.00)	
SIRI (no units)	-0.02 (-0.19, 0.14)	0.03 (-0.13, 0.21)	<0.001
Missing	28 (0.00)	1 (0.00)	
SII (no units)	2.63 (2.49, 2.78)	2.71 (2.55, 2.84)	<0.001
Missing	28 (0.00)	1 (0.00)	

The continuous variables were transformed logarithmically (log10) and presented as median (interquartile range, IQR).

NLR, neutrophil-to-lymphocyte ratio; dNLR, derived neutrophil-to-lymphocyte ratio; MLR, monocyte-to-lymphocyte ratio; NMLR, neutrophil-monocyte to lymphocyte ratio; SIRI, systemic inflammatory response index; SII, systemic immune-inflammation index.

Table S2. Associations between the conventional lipid parameters and sarcopenia among the US population, NHANES, 2011-2018.

Variables	Non-sarcopenia (n=9500)	Sarcopenia (n=849)	Model 1 †	
			OR (95%CI)	P-value
Total cholesterol (TC, mg/dL)	184.00 (160.00, 211.00)	192.00 (169.00, 220.00)	1.001 (0.999, 1.004)	0.387
Triglyceride (TG, mg/dL)	87.00 (59.00, 133.00)	123.00 (89.50, 172.00)	1.001 (1.000, 1.001)	0.101
Missing	5052 (0.00)	446 (0.00)		
LDL-C (mg/dL)	108.00 (87.00, 132.00)	117.00 (98.00, 143.00)	1.005 (1.001, 1.009)	0.020
Missing	5114 (0.00)	459 (0.00)		
HDL-C (mg/dL)	50.00 (42.00, 61.00)	45.00 (39.00, 54.00)	0.986 (0.976, 0.996)	0.008
non-HDL-C (mg/dL)	131.00 (105.00, 159.00)	144.00 (120.00, 174.00)	1.002 (1.000, 1.005)	0.049
Remnant cholesterol (RC, mg/dL)	17.00 (12.00, 26.00)	24.00 (18.00, 33.00)	1.014 (1.005, 1.023)	0.002
Missing	5114 (0.00)	459 (0.00)		

† To fully present the data, the OR and its 95%CI were rounded to three decimal places.

Model 1: adjusted for age, sex, race, education level, marital status, PIR, smoking status, sedentary time, self-reported diabetes, self-reported hypertension, self-reported CVDs, self-reported cancer, and glycohemoglobin.

CI, confidence interval; CVDs, cardiovascular diseases; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; OR, odd ratio; PIR, family poverty income ratio; RC, remnant cholesterol; TG, triglyceride.

Table S3. Sensitivity analysis 1: associations between the lipid ratios and sarcopenia among the US population by further adjusting for alcohol drinking, NHANES, 2011-2018.

Variables	Non-sarcopenia (n=9500)	Sarcopenia (n=849)	Model 1	
			OR (95%CI)	P-value
non-HDL/HDL-C ratio (continuous)			1.13 (1.05, 1.21)	0.001
non-HDL/HDL-C ratio (quartile)				
≤1.85	2387 (25.13)	98 (11.54)	Ref.	
(1.85, 2.56]	2354 (24.78)	155 (18.26)	1.22 (0.63, 2.35)	0.540
(2.56, 3.53]	2384 (25.09)	256 (30.15)	1.90 (1.11, 3.24)	0.020
>3.53	2375 (25.00)	340 (40.05)	2.33 (1.31, 4.17)	0.005
<i>P for trend</i>				<0.001
TG/HDL-C ratio (continuous)			1.03 (1.00, 1.06)	0.036
TG/HDL-C ratio (quartile)				
≤1.02	1106 (24.87)	38 (9.43)	Ref.	
(1.02, 1.68]	1119 (25.16)	58 (14.39)	0.98 (0.36, 2.68)	0.962
(1.68, 2.92]	1107 (24.89)	136 (33.75)	2.68 (1.26, 5.68)	0.011
>2.92	1116 (25.09)	171 (42.43)	2.86 (1.39, 5.89)	0.005
Missing	5052 (0.00)	446 (0.00)		
<i>P for trend</i>				0.002
LDL/HDL-C ratio (continuous)			1.42 (1.12, 1.79)	0.004
LDL/HDL-C ratio (quartile)				
≤1.55	1102 (25.13)	50 (12.82)	Ref.	
(1.55, 2.09]	1096 (24.99)	76 (19.49)	1.10 (0.48, 2.52)	0.823
(2.09, 2.77]	1091 (24.87)	108 (27.69)	2.15 (0.93, 4.98)	0.072
>2.77	1097 (25.01)	156 (40.00)	2.50 (1.14, 5.47)	0.023
Missing	5114 (0.00)	459 (0.00)		
<i>P for trend</i>				0.002
RC/HDL-C ratio (continuous)			1.69 (1.10, 2.60)	0.017
RC/HDL-C ratio (quartile)				
≤0.20	1075 (24.51)	37 (9.49)	Ref.	
(0.20, 0.33]	1115 (25.42)	57 (14.62)	0.87 (0.33, 2.33)	0.777
(0.33, 0.57]	1104 (25.17)	135 (34.62)	2.38 (1.15, 4.94)	0.021
>0.57	1092 (24.90)	161 (41.28)	2.67 (1.27, 5.64)	0.011
Missing	5114 (0.00)	459 (0.00)		<0.001
<i>P for trend</i>				0.003

Model 1: adjusted for age, sex, race, education level, marital status, PIR, smoking status, sedentary time, self-reported diabetes, self-reported hypertension, self-reported CVDs, self-reported cancer, glycohemoglobin, and alcohol drinking.

CI, confidence interval; CVDs, cardiovascular diseases; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; OR, odd ratio; PIR, family poverty income ratio; RC, remnant cholesterol; TG, triglyceride.

Table S4. Sensitivity analysis 2: associations between the lipid ratios and sarcopenia among the US population after propensity score matching, NHANES, 2011-2018.

Variables	Non-sarcopenia	Sarcopenia	Model 1	
			OR (95%CI)	P-value
non-HDL/HDL-C ratio (continuous)			1.10 (1.04, 1.16)	0.001
non-HDL/HDL-C ratio (quartile)				
≤1.85	242 (18.45)	77 (11.14)	Ref.	
(1.85, 2.56]	289 (22.03)	121 (17.51)	1.32 (0.95, 1.84)	0.096
(2.56, 3.53]	336 (25.61)	210 (30.39)	2.01 (1.47, 2.76)	<0.001
>3.53	445 (33.92)	283 (40.96)	2.00 (1.49, 2.70)	<0.001
<i>P for trend</i>				<0.001
TG/HDL-C ratio (continuous)			1.01 (0.99, 1.03)	0.391
TG/HDL-C ratio (quartile)				
≤1.02	99 (17.10)	30 (9.65)	Ref.	
(1.02, 1.68]	123 (21.24)	44 (14.15)	1.17 (0.68, 2.03)	0.569
(1.68, 2.92]	161 (27.81)	102 (32.80)	2.06 (1.26, 3.34)	0.004
>2.92	196 (33.85)	135 (43.41)	2.20 (1.37, 3.52)	0.001
<i>P for trend</i>				<0.001
LDL/HDL-C ratio (continuous)			1.34 (1.16, 1.55)	<0.001
LDL/HDL-C ratio (quartile)				
≤1.55	113 (19.76)	37 (11.97)	Ref.	
(1.55, 2.09]	128 (22.38)	59 (19.09)	1.40 (0.86, 2.28)	0.170
(2.09, 2.77]	160 (27.97)	82 (26.54)	1.61 (1.01, 2.57)	0.046
>2.77	171 (29.90)	131 (42.39)	2.34 (1.50, 3.65)	<0.001
<i>P for trend</i>				<0.001
RC/HDL-C ratio (continuous)			1.73 (1.26, 2.39)	<0.001
RC/HDL-C ratio (quartile)				
≤0.20	102 (17.83)	30 (9.71)	Ref.	
(0.20, 0.33]	131 (22.90)	42 (13.59)	1.10 (0.64, 1.89)	0.737
(0.33, 0.57]	166 (29.02)	103 (33.33)	2.08 (1.27, 3.39)	0.004
>0.57	173 (30.24)	134 (43.37)	2.44 (1.53, 3.88)	<0.001
<i>P for trend</i>				<0.001

Model 1: Conditional logistic regression analysis without adjusting for any variables.

CI, confidence interval; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; OR, odd ratio; RC, remnant cholesterol; TG, triglyceride.

Table S5. The collinearity assessment of variables included in the fully-adjusted models.

Variables	VIF-1	VIF-2	VIF-3	VIF-4
Age	1.98	1.90	1.96	1.93
Sex	1.34	1.18	1.23	1.15
Race	1.36	1.32	1.28	1.30
Education level	1.45	1.34	1.33	1.36
Marital status	1.34	1.43	1.53	1.43
PIR	1.62	1.62	1.55	1.65
Smoking status	1.48	1.33	1.27	1.32
Sedentary time	1.74	1.73	1.64	1.71
Self-reported diabetes	1.61	2.01	1.91	1.95
Self-reported hypertension	1.71	1.84	1.81	1.72
Self-reported CVDs	1.44	1.44	1.52	1.45
Self-reported cancer	1.25	1.29	1.30	1.26
Glycohemoglobin	1.58	1.77	1.73	1.70
non-HDL/HDL-C ratio	1.30	-	-	-
TG/HDL-C ratio	-	1.27	-	-
LDL/HDL-C ratio	-	-	1.64	-
RC/HDL-C ratio	-	-	-	1.28

CVDs, cardiovascular diseases; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; PIR, family poverty income ratio; RC, remnant cholesterol; TG, triglyceride; VIF, variance inflation factor.

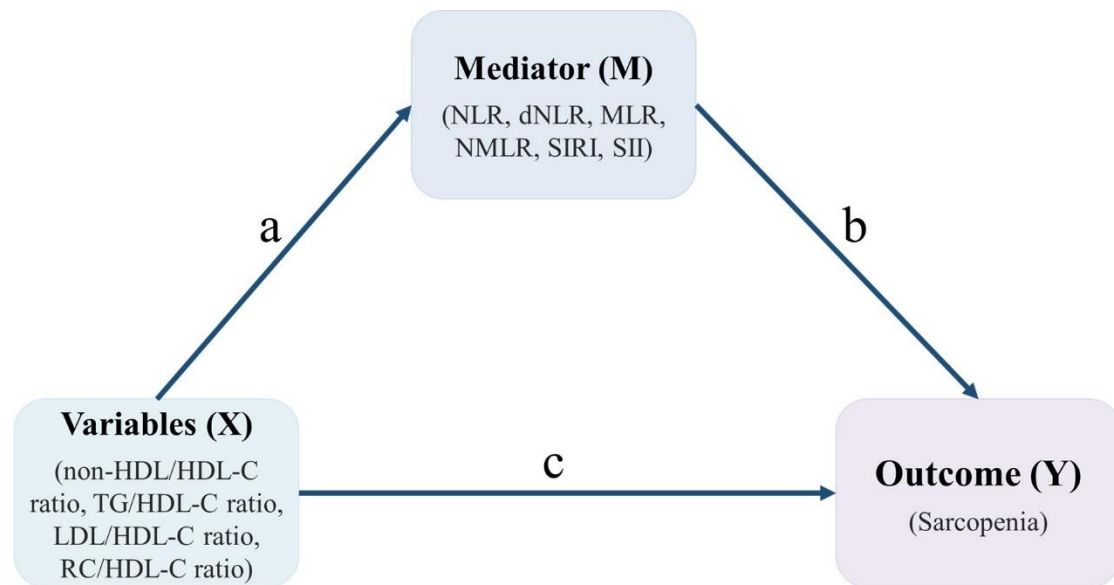


Figure S1. The mediating effect model diagram. If the variable X exerts a certain influence on the outcome Y through the mediator variable M, then M is referred to as the mediator variable between X and Y. The total effect of X on Y is divided into direct effect and indirect effect. The direct effect refers to the impact of the variable X on the Y when the M is fixed at a certain level. The indirect effect, refers to the influence of the variable X on the Y through the M. As shown in the diagram above, c represents the direct effect, while the indirect effect is the combination of a and b.

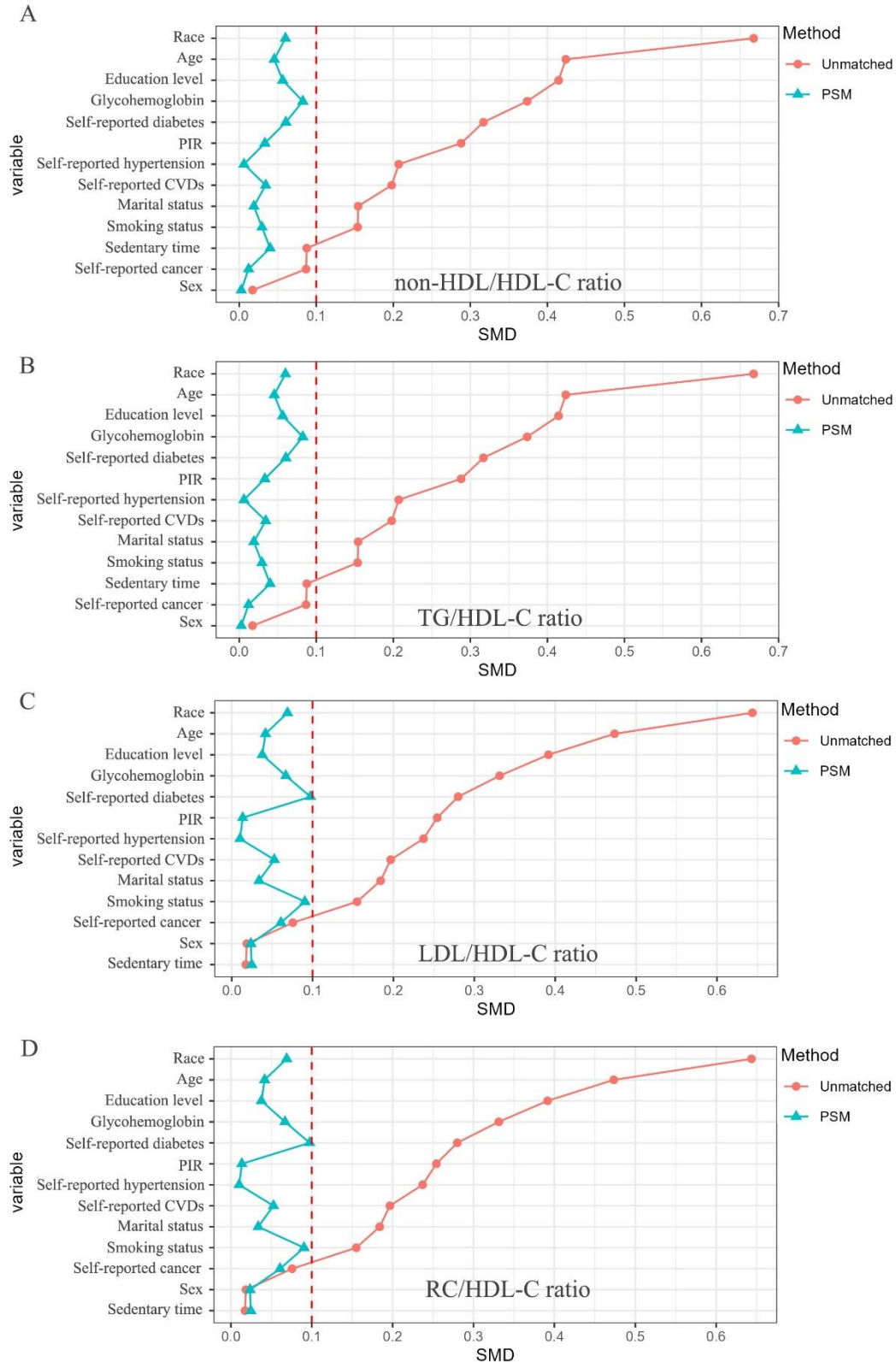


Figure S2. The SMD of variables before and after propensity score matching: non-HDL/HDL-C ratio (A), TG/HDL-C ratio (B), LDL/HDL-C ratio (C), and RC/HDL-C ratio (D). CVDs, cardiovascular diseases; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; PIR, family poverty income ratio; RC, remnant cholesterol; SMD, standardized mean difference; TG, triglyceride.