

The Association between Life's Essential 8 and Gallstones: A Cross-Sectional Study

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Supplementary Table 1 Components and scoring standards of Healthy Eating Index score-2015

Component	Maximum points	Standard for maximum score	Standard for minimum score of zero
Adequacy			
Total Fruits ^a	5	≥0.8 c equivalents/1,000 kcal	No fruit
Whole Fruits	5	≥0.4 c equivalents/1,000 kcal	No whole fruit
Total Vegetables	5	≥1.1 c equivalents/1,000 kcal	No vegetables
Greens and Beans	5	≥0.2 c equivalents/1,000 kcal	No dark green vegetables or beans and peas
Whole Grains	10	≥1.5 oz equivalents/1,000 kcal	No whole grains
Dairy	10	≥1.3 c equivalents/1,000 kcal	No dairy
Total Protein Foods	5	≥2.5 oz equivalents/1,000 kcal	No protein foods
Seafood and Plant Proteins	5	≥0.8 c equivalents/1,000 kcal	No seafood or plant proteins
Fatty Acids	10	(PUFAs+MUFAs)/SFAs ≥2.5	(PUFAs+MUFAs)/SFAs ≤1.2
Moderation			
Refined Grains	10	≤1.8 oz equivalents/1,000 kcal	≥4.3 oz equivalents/1,000 kcal
Sodium	10	≤1.1 g/1,000 kcal	≥2.0 g/1,000 kcal
Added Sugars	10	≤6.5% of energy	≥26% of energy
Saturated Fats	10	≤8% of energy	≥16% of energy

PUFAs=polyunsaturated fatty acids.

MUFAs=monounsaturated fatty acids.

SFAs=saturated fatty acids.

Supplementary Table 2. “Life’s Essential 8” Metrics for Measurement and Quantitative Assessment of CVH

CVH metric	Definition	Quantification of CVH metric	
Diet	Dietary intake consistent with a DASH-style eating pattern and was assessed using 2 interviewer-administered 24-hour dietary recalls	Points	DASH diet score or Healthy Eating Index-2015 (for populations)
			100 95th percentile (top/ideal diet)
			80 75th–94th percentile
			50 50th–74th percentile
			25 25th–49th percentile
Physical activity	Self-reported minutes of moderate or vigorous physical activity per week	Points	1st–24th percentile (bottom/least ideal quartile)
			Minutes of moderate to vigorous physical activity per week
			100 ≥150 minutes
			90 120-149 minutes
			80 90-119 minutes
			60 60-89 minutes
			40 30-59 minutes
Tobacco/nicotine exposure	Self-reported use of cigarettes, inhaled NDS, or secondhand smoke exposure	Points	20 1-29 minutes
			0 0 minutes
			Combustible tobacco, inhaled NDS use; or secondhand smoke exposure
			100 Never smoker
			75 Former smoker, quit ≥ 5 yrs
			50 Former smoker, quit 1–5 yrs
			25 Former smoker, quit <1 yrs, or currently

			using inhaled NDS
			0 Current smoker
		Subtract 20 points (unless score is 0) for living with active indoor smoker in home	
Sleep health	Self-reported average hours of sleep per night	Points	Average hours of sleep per night
		100	7-9 hours
		90	9-10 hours
		70	6-7 hours
		40	5-6 or ≥10 hours
		20	4-5 hours
		0	<4 hours
	BMI was calculated as the weight in kilograms divided by the square of the height in meters from standardized height and weight measurements.	Points	BMI
BMI		100	<25 kg/m ²
		70	25.0-29.9 kg/m ²
		30	30.0-34.9 kg/m ²
		15	35.0-39.9 kg/m ²
		0	≥ 40.0 kg/m ²
	Non-HDL cholesterol was calculated by total cholesterol minus HDL cholesterol.	Points	Non-HDL cholesterol
Blood lipid		100	<130 mg/dL
		60	130-159 mg/dL
		40	160-189 mg/dL
		20	190-219 mg/dL

			0	≥ 220 mg/dL
		If drug-treated, subtract 20 points		
Blood glucose	HbA1c was measured by high-performance liquid chromatography methods. FBG was measured by standard methods.	Points		FBG or HbA1c
			100	No history of diabetes and FBG<100 mg/dL or HbA1c <5.7% No diabetes and FBG 100–125 mg/dL or HbA1c 5.7–6.4%
			60	HbA1c 5.7–6.4%
			40	Diabetes with HbA1c <7.0 %
			30	Diabetes with HbA1c 7.0–7.9 %
			20	Diabetes with HbA1c 8.0–8.9 %
			10	Diabetes with Hb A1c 9.0–9.9 %
			0	Diabetes with HbA1c ≥10.0 %
Blood pressure	The average of all available blood pressure measurements was used to calculate systolic and diastolic blood pressure.	Points		Systolic and diastolic blood pressure
			100	<120/<80 mmHg
			75	120-129/<80 mmHg
			50	130-139 or 80-89 mmHg
			25	140-159 or 90-99 mmHg
			0	≥160 or ≥100 mmHg
		If drug-treated, subtract 20 points		

Supplementary Table 3. Stratified analysis of the correlations between CVH assessed with LE8 and gallstones.

Subgroup category	Adjusted OR (95%CI)	P value	P for interaction
Age			
< 65 years			
LE8 score			0.377
Low	Ref.		
Moderate	0.58 (0.41, 0.80)	<0.001	
High	0.26 (0.15, 0.44)	<0.001	
p for trend		<0.001	
Health behaviors score			0.121
Low	Ref.		
Moderate	0.78 (0.51, 1.18)	0.265	
High	0.58 (0.33, 1.02)	0.089	
p for trend		0.085	
Health factors score			0.971
Low	Ref.		
Moderate	0.70 (0.48, 1.04)	0.112	
High	0.29 (0.18, 0.47)	<0.001	
p for trend		<0.001	
≥65years			
LE8 score			
Low	Ref.		
Moderate	0.97 (0.49, 1.90)	0.921	
High	0.51 (0.16, 1.60)	0.278	
p for trend		0.316	
Health behaviors score			

Low	Ref.	
Moderate	2.15 (0.97, 4.78)	0.093
High	1.44 (0.68, 3.07)	0.365
p for trend		0.826

Health factors score

Low	Ref.	
Moderate	0.67 (0.43, 1.04)	0.109
High	0.25 (0.09, 0.67)	0.023
p for trend		0.008

Gender

Male

LE8 score

0.399

Low	Ref.	
Moderate	0.91 (0.52, 1.58)	0.740
High	0.25 (0.07, 0.90)	0.064
p for trend		0.015

Health behaviors score

0.625

Low	Ref.	
Moderate	1.36 (0.80, 2.32)	0.287
High	0.79 (0.39, 1.61)	0.533
p for trend		0.317

Health factors score

0.350

Low	Ref.	
Moderate	0.92 (0.54, 1.58)	0.772
High	0.27 (0.13, 0.55)	0.006
p for trend		0.009

Female**LE8 score**

Low	Ref.	
Moderate	0.71 (0.50, 1.02)	0.098
High	0.44 (0.24, 0.81)	0.027
p for trend		0.020

Health behaviors score

Low	Ref.	
Moderate	1.01 (0.68, 1.48)	0.977
High	0.79 (0.50, 1.25)	0.346
p for trend		0.231

Health factors score

Low	Ref.	
Moderate	0.70 (0.50, 0.97)	0.061
High	0.40 (0.26, 0.61)	0.002
p for trend		<0.001

Marital**Married****LE8 score**

Low	Ref.	
Moderate	0.79 (0.51, 1.22)	0.329
High	0.40 (0.20, 0.80)	0.037
p for trend		0.018

Health behaviors score

Low	Ref.	
Moderate	0.92 (0.65, 1.30)	0.657

0.415

0.603

High	0.68 (0.39, 1.18)	0.215
p for trend		0.167

Health factors score

0.779

Low	Ref.	
Moderate	0.82 (0.54, 1.24)	0.376
High	0.40 (0.25, 0.65)	0.007
p for trend		0.004

Widowed/Divorced/Separated

LE8 score

Low	Ref.	
Moderate	0.58 (0.37, 0.91)	0.051
High	0.40 (0.12, 1.33)	0.180
p for trend		0.052

Health behaviors score

Low	Ref.	
Moderate	1.53 (0.85, 2.76)	0.196
High	0.86 (0.43, 1.71)	0.676
p for trend		0.588

Health factors score

Low	Ref.	
Moderate	0.58 (0.36, 0.93)	0.058
High	0.40 (0.14, 1.10)	0.118
p for trend		0.034

Never married

LE8 score

Low	Ref.
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Moderate	1.45 (0.58, 3.60)	0.455
High	0.74 (0.19, 2.91)	0.680
p for trend		0.420

Health behaviors score

Low	Ref.	
Moderate	1.22 (0.44, 3.39)	0.713
High	1.25 (0.47, 3.33)	0.671
p for trend		0.698

Health factors score

Low	Ref.	
Moderate	0.93 (0.42, 2.04)	0.859
High	0.33 (0.10, 1.07)	0.107
p for trend		0.049

PIR

<1.3

LE8 score

0.861

Low	Ref.	
Moderate	0.62 (0.37, 1.03)	0.112
High	0.44 (0.09, 2.05)	0.333
p for trend		0.174

Health behaviors score

0.684

Low	Ref.	
Moderate	0.82 (0.45, 1.48)	0.538
High	0.62 (0.23, 1.67)	0.379
p for trend		0.324

Health factors score

0.981

Low	Ref.	
Moderate	0.69 (0.36, 1.33)	0.312
High	0.43 (0.15, 1.22)	0.164
p for trend		0.124
1.3 to <3.5		
LE8 score		
Low	Ref.	
Moderate	0.82 (0.52, 1.32)	0.450
High	0.40 (0.16, 0.99)	0.096
p for trend		0.064
Health behaviors score		
Low	Ref.	
Moderate	1.33 (0.75, 2.36)	0.374
High	0.78 (0.35, 1.72)	0.557
p for trend		0.401
Health factors score		
Low	Ref.	
Moderate	0.77 (0.53, 1.12)	0.216
High	0.32 (0.14, 0.73)	0.035
p for trend		0.011
≥3.5		
LE8 score		
Low	Ref.	
Moderate	0.81 (0.37, 1.76)	0.616
High	0.42 (0.18, 0.98)	0.092
p for trend		0.035

Health behaviors score

Low	Ref.	
Moderate	1.13 (0.47, 2.69)	0.798
High	0.89 (0.38, 2.09)	0.803
p for trend		0.469

Health factors score

Low	Ref.	
Moderate	0.80 (0.54, 1.20)	0.331
High	0.41 (0.22, 0.74)	0.026
p for trend		0.011

Race**White****LE8 score**

0.544

Low	Ref.	
Moderate	0.76 (0.48, 1.20)	0.263
High	0.45 (0.22, 0.93)	0.051
p for trend		0.038

Health behaviors score

0.655

Low	Ref.	
Moderate	1.13 (0.83, 1.55)	0.454
High	0.85 (0.49, 1.48)	0.576
p for trend		0.408

Health factors score

0.146

Low	Ref.	
Moderate	0.90 (0.66, 1.23)	0.532
High	0.42 (0.26, 0.70)	0.005

p for trend 0.002

Non-white

LE8 score

Low	Ref.	
Moderate	0.78 (0.48, 1.27)	0.340
High	0.28 (0.13, 0.60)	0.006

p for trend 0.003

Health behaviors score

Low	Ref.	
Moderate	1.03 (0.62, 1.69)	0.917
High	0.60 (0.37, 0.98)	0.062

p for trend 0.036

Health factors score

Low	Ref.	
Moderate	0.51 (0.33, 0.78)	0.009
High	0.27 (0.15, 0.46)	<0.001

p for trend <0.001

Education

less than high school

LE8 score

<0.001

Low	Ref.	
Moderate	0.32 (0.18, 0.57)	0.006
High	0.47 (0.14, 1.52)	0.247

p for trend 0.048

Health behaviors score

0.060

Low	Ref.	
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Moderate	0.50 (0.28, 0.90)	0.056
High	0.45 (0.20, 1.02)	0.096
p for trend		0.054

Health factors score

0.495

Low	Ref.	
Moderate	0.45 (0.22, 0.91)	0.060
High	0.36 (0.10, 1.34)	0.172
p for trend		0.116

high school graduate/ GED

LE8 score

Low	Ref.	
Moderate	0.84 (0.49, 1.46)	0.562
High	0.71 (0.22, 2.24)	0.576
p for trend		0.503

Health behaviors score

Low	Ref.	
Moderate	1.05 (0.56, 1.99)	0.876
High	1.00 (0.50, 2.02)	0.997
p for trend		0.990

Health factors score

Low	Ref.	
Moderate	1.13 (0.60, 2.13)	0.711
High	0.37 (0.11, 1.19)	0.139
p for trend		0.140

some college or above

LE8 score

Low	Ref.	
Moderate	0.88 (0.57, 1.36)	0.581
High	0.39 (0.19, 0.78)	0.032
p for trend		0.009
Health behaviors score		
Low	Ref.	
Moderate	1.39 (0.99, 1.95)	0.098
High	0.86 (0.54, 1.38)	0.558
p for trend		0.149
Health factors score		
Low	Ref.	
Moderate	0.66 (0.52, 0.84)	0.012
High	0.37 (0.24, 0.58)	0.003
p for trend		<0.001

CVH, cardiovascular health; LE8, Life's Essential 8; OR, adjusted odds ratio; PIR, family poverty income ratio; CI, confidence interval and Ref, reference.

In addition to the variables themselves, adjustments were made for gender, age, race/ethnicity, education level, PIR, marital status.

