Use of Healthy Eating Index in Intervention Studies for Cardiometabolic Risk Conditions: A Systematic Review by P. Brauer et al.
Online Supplementary Material

Supplementary Table 1. Comparison of Scoring Components of Healthy Eating Index (HEI) and its Adaptations

	HEI 1995	HEI-C 1995	HEI-C 2005	AHEI 2002	AHEI 2010 [a]	HEI-2005[b]	HEI-2010[b]	HEI-2015[b]
Adequacy								
Fruits and fruit subgroups								
Total Fruit - standard	2 to 4 svgs			≥ 4 svgs		≥ 0.8 c/1000 kcal	≥ 0.8 c/1000 kcal	≥ 0.8 c/1000 kcal
max score	10			10		5	5	5
Whole fruit			0.8 to 2.1 svgs		≥ 4 svgs (≥2 cups)	≥ 0.4 c/1000 kcal	≥ 0.4 c/1000 kcal	≥ 0.4 c/1000 kcal
max score			5		10	*5*	5	5
Vegetables and vegetable subgroups								
Total vegetables	3 to 5 svgs			≥ 5 svgs	≥ 5 svgs (≥2.5 cups)	≥ 1.1 c/1000 kcal	≥ 1.1 c/1000 kcal	≥ 1.1 c/1000 kcal
max score	10			10	10	5	5	5
Dark Green and orange vegetables and legumes			0.8 to 2.1 svgs			≥ 0.4 c/1000 kcal		
max score			5			*5*		
Greens and beans							≥ 0.2 c/1000 kcal	≥ 0.2 c/1000 kcal
max score							5	5
Total Vegetables and Fruits		5 to 10 svgs	4 to 10 svgs					
max score		20	10					
Grains and grains subgroups								

	HEI 1995	HEI-C 1995	HEI-C 2005	AHEI 2002	AHEI 2010 [a]	HEI-2005[b]	HEI-2010[b]	HEI-2015[b]
Total grains	6 to 11 svgs	5 to 12 svgs	3 to 8 svgs			≥ 3 oz/1000 kcal		
max score	*10*	*10*	5			5		
Whole grains			1.5 to 4 svgs	15 g	W: 75 g M: 90 g	≥ 1.5 oz/1000 kcal	≥ 1.5 oz/1000 kcal	≥ 1.5 oz/1000 kcal
max score			5	10	10	5	10	10
Milk / dairy	2 to 3 svgs	2 svgs	2 to 4 svgs			≥ 1.3 c/1000 kcal	≥ 1.3 c/1000 kcal	≥ 1.3 c/1000 kcal
max score	10	10	10			10	10	10
Meat and beans and total protein foods and protein subgroups								
Meat and beans	2 to 3 svgs	2 to 3 svgs	1 to 3 svgs			≥ 2.5 oz/1000 kcal		
max score	10	10	10			10		
Total protein foods							≥ 2.5 oz/1000 kcal	≥ 2.5 oz/1000 kcal
max score							5	5
Seafood and plant proteins							≥ 0.8 oz/1000 kcal	≥ 0.8 oz/1000 kcal
max score							5	5
Nuts and legumes				1 svg	≥ 1oz			
max score				10	10			
Red and/or processed meats				white:red 0 vs >4	≤ 1.5 svg			

	HEI 1995	HEI-C 1995	HEI-C 2005	AHEI 2002	AHEI 2010 [a]	HEI-2005[b]	HEI-2010[b]	HEI-2015[b]
max score				10	10			
Oils and fatty acids subgroups								
Oils			30-45 g unsaturated			≥ 12g/1000 kcal		
max score			10			10		
Fatty acids				PUFA:SFA ≤ 0.1 vs ≥ 1	PUFA ≤ 2 vs ≥ 10% energy		(PUFA + MUFA)/SFA ≥ 2.5 vs ≤1.2	(PUFA + MUFA)/SFA ≥ 2.5 vs ≤1.2
max score				10	10		10	10
Trans fat				≥ 4% vs ≤ 0.5% energy	≥ 4% vs ≤0.5% energy			
max score				10	10			
Omega-3 fats					250 mg			
max score					10			
Variety	≥ 8 vs ≤ 3 items/d	≥ 1 svg each food group vs not all food groups consumed						
max score	10	10						
Multivitamin use				<5 y to ≥5 y				
max score				10				
Moderation								

	HEI 1995	HEI-C 1995	HEI-C 2005	AHEI 2002	AHEI 2010 [a]	HEI-2005[b]	HEI-2010[b]	HEI-2015[b]
Total fat	≤ 30% vs ≥ 45% energy	≤ 30% vs ≥ 45% energy						
max score	10	10						
Saturated Fats - max/min standard	≤ 10% vs ≥ 15% energy	≤10% vs ≥ 15% energy	7 to 15% energy			≤7 vs ≥15% energy		≤8 vs ≥16% energy
max score	10	10	10			10		10
Cholesterol	≤ 300 vs ≥ 450 mg	≤ 300 vs ≥ 450 mg						
max score	10	10						
Refined grains							≤1.8 vs ≥4.3 equiv/1000 kcal	≤1.8 vs ≥4.3 equiv/1000 kcal
max score							10	10
Sodium	≤ 2.4 vs ≥ 4.8 g	≤ 2.4 vs ≥ 4.8 g	AI to UL		lowest to highest decile	≤0.7 vs ≥2.0 g/1000 kcal	≤1.1 vs ≥2.0 g/1000 kcal	≤1.1 vs ≥2.0 g/1000 kcal
max score	10	10	10		10	10	10	10
Empty calories (solid fat, alcohol, added sugar)			<5 vs >40% energy			≤20 vs ≥50% energy	≤19% vs ≥50% energy	
max score			20			20	20	
Added sugars								≤6.5 vs ≥26% energy

	HEI 1995	HEI-C 1995	HEI-C 2005	AHEI 2002	AHEI 2010 [a]	HEI-2005[b]	HEI-2010[b]	HEI-2015[b]
max score								10
SSB and fruit juice					< 8 oz			
max score					10			
Alcohol				W: 0.5-1.5 vs ≥ 2.5 drinks M: 0.5-2 vs ≥ 3.5 drinks	W: 0.5-1.5 vs ≥ 2.5 drinks M: 0.5-2 vs ≥ 3.5 drinks			
max score				10	10			
Total score	**100**	**100**	**100**	**90**	**110**	**100**	**100**	**100**

Notes: PUFA = polyunsaturated fatty acid, SFA = saturated fatty acid, MUFA = monounsaturated fatty acid

[a]Wang DD, Leung CW, Li Y, Ding EL, Chiuve SE, Hu FB, Willett WC. Trends in dietary quality among adults in the United States, 1999 through 2010. JAMA Intern Med. 2014 Oct;174(10):1587-95. doi: 10.1001/jamainternmed.2014.3422. PMID: 25179639; PMCID: PMC5924699.

[b]National Cancer Institute. Developing the Healthy Eating Index; 2020 (cited 2021 May 4). Available from: https://epi.grants.cancer.gov/hei/developing.html

Supplementary Table 2. Search strategy for PubMed and CINAHL

Date of search: January 5, 2020

Searched from: January 1, 1995 to December 31, 2019

PubMed Search

	Box 1 (intervention)	Box 2 (diet measures)	Box 3 (Conditions)
Text	Behavioral intervention Behavioural intervention Diet intervention Dietary intervention Diet education Dietary education Diet counselling Diet counseling Dietary counseling Dietary counselling Diet advice Dietary advice Lifestyle intervention Lifestyle counseling Lifestyle counselling Lifestyle modification Lifestyle program Nutrition advice Nutrition counselling Nutrition counseling Nutrition intervention Nutrition education	1. Alternative healthy eating index 2. Diet assessment 3. Dietary assessment 4. Diet quality 5. Diet quality index 6. Diet score 7. Healthy eating index	Diabetes Type 2 diabetes Prediabetes Pre-diabetes Metabolic syndrome Cardiovascular risk Cardio-metabolic risk Cardiometabolic risk
MeSH	**Diet therapy (M)** [Therapy, Diet Diet Therapies Therapies, Diet Dietary Modification Dietary Modifications Modification, Dietary Modifications, Dietary Diet Modification Diet Modifications		Overweight (M) Body weight changes (M) Body weight (M) Diabetes mellitus (M) Chronic disease (M) Dyslipidemias (M) Hypertension (M) Coronary disease (M) Cardiovascular disease (M)

	Modification, Diet Modifications, Diet] **Medical Nutrition therapy (M)** [Therapy, Nutrition Medical Nutrition Therapy Nutrition Therapy, Medical Therapy, Medical Nutrition] **Patient education (M)** [Education, Patient Patient Education Education of Patients] **Health education (M)** [Education, Health Community Health Education Education, Community Health Health Education, Community]		Metabolic syndrome X (M) Body mass index (M) Prediabetic State (M)

*(M) = Medical Subject Heading term

CINAHL Search

	Box 1 (intervention)	Box 2 (diet measures)	Box 3 (Conditions)
Text	Behavioral intervention Behavioural intervention Diet intervention Dietary intervention Diet education Dietary education Diet counselling Diet counseling Dietary counseling Dietary counselling Diet advice Dietary advice Lifestyle intervention Lifestyle counseling Lifestyle counselling Lifestyle modification Lifestyle program Nutrition counselling Nutrition counseling Nutrition intervention Nutrition education	1. Alternative healthy eating index 2. Diet assessment 3. Dietary assessment 4. Diet quality 5. Diet quality index 6. Diet score 7. Healthy eating index	Diabetes Type 2 diabetes Prediabetes Pre-diabetes Metabolic syndrome Cardiovascular risk Cardio-metabolic risk Cardiometabolic risk
Subject Terms	Diet therapy Nutrition therapy Patient education Health education		Overweight (M) Body weight changes (M) Body weight (M) Diabetes mellitus (M) Chronic disease (M) Dyslipidemias (M) Hypertension (M) Coronary disease (M) Cardiovascular disease (M) Metabolic syndrome X (M) Body mass index (M) Prediabetic State (M)

Supplementary Table 3. Quality Assessment of Included Studies

A. Quality assessment using Cochrane risk of bias tool for randomized studies

	random sequence generation	allocation concealment	blinding of participants and personnel	blinding of outcome assessment	incomplete outcome data	selective reporting	other sources of bias
Hedrick et al. (2017)	L	L	H	H	L	L	L
Keogh et al. (2014)	L	U	H	L	H	U	H
Lewis et al. (2015)	U	L	H	U	L	L	L
Lin et al. (2013)	L	L	L	L	L	L	L
Lynch et al. (2019)	U	U	H	L	L	L	L
Mohammadshahi et al. (2014)	L	L	H	H	L	L	L
Njike et al. (2016)	L	U	H	H	L	U	H
Ortega et al. (2006)	L	U	L	L	L	U	H
Petrogianni et al. (2013)	U	U	H	L	L	L	H
Stolley et al. (2009)	L	U	H	L	L	L	L
Swoboda et al. (2017)	L	L	H	U	U	U	H
Turner-McGrievy et al. (2008)	L	U	L	L	L	L	H
Ventura Marra et al. (2019)	U	H	U	L	L	L	L
Webel et al. (2018)	L	L	U	L	L	H	L
Ma et al. (2015)	L	L	L	L	L	L	L

Notes: L = low, U = unclear, H = high

B. Quality Assessment using ROBINS-1 for nonrandomized studies

	Overall	**Confoun-ding**	**Selection**	**Classifi-cation**	**Devia-tions**	**Missing data**	**Measure-ment of outcomes**	**Selection of Reported Result**
Arnold et al. (2018)	Serious	Serious	Moderate	Low	Low	Low	Low	Moderate
Asaad et al. (2016)	Moderate	Moderate	Moderate	Low	Low	Moderate	Low	Low
Carbonneau et al. (2017)	Moderate	Moderate	Moderate	Low	Low	Moderate	Moderate	Moderate
Chang et al. (2019)	Serious	Serious	Serious	Moderate	Moderate	Moderate	Moderate	Moderate
Jeejeebhoy et al. (2017)	Moderate	Moderate	Moderate	Low	Low	Low	Moderate	Moderate
Landry et al. (2017)	Moderate	Low	Low	Low	Low	Low	Moderate	Low
Marques-Rocha et al. (2016)	Serious	Low	Moderate	Low	Low	Low	Low	Serious
Ptomey et al. (2016)	Critical	Low	Critical	Low	Low	Serious	Moderate	Low
Thomson et al. (2015)	Moderate	Low	Low	Low	Low	Low	Moderate	Low
Webber and Lee (2011)	Serious	Serious	Low	Serious	Moderate	Moderate	Serious	Moderate