PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 3
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Methods section 2, page 3+4
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Methods section 1, Page 3
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Supplementary material
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Methods section 1 + 3, page 3+4
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Methods section 3, page 4
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Methods section 3, page 4
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Methods sections 3 + 5, page 4
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Methods section 4
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Methods section 3
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Methods section 5
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Methods section 5, page 4
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Methods section 3

Section and Topic	Item #	Checklist item	Location where item is reported
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Methods section 5
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Methods section 5
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Methods section 5
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	NA
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Methods section 5
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Table 3 supplementary material
Study characteristics	17	Cite each included study and present its characteristics.	Table 1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Table 4 supplementary material
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Table 2
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Results section pages 5 + 6
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Results section pages 6 + 7 with additional figures presented in supplementary material
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Results section and figures presented in supplementary material

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Results section, Figure 2b
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	NA
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Results text and figures
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Discussion section, page 6
	23b	Discuss any limitations of the evidence included in the review.	Discussion section, page 7
	23c	Discuss any limitations of the review processes used.	Discussion section, page 7
	23d	Discuss implications of the results for practice, policy, and future research.	Discussion section page 7
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Methods, section 1, page 3
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Methods section 1
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	NA
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Title page
Competing interests	26	Declare any competing interests of review authors.	Title page
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	NA

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

Ovid MEDLINE(R) ALL <1946 to August 10, 2022>

1	exp Obesity/	247730
2	obes$.tw.	350326
3	exp Overweight/	258607
4	overweight.tw.	81385
5	exp Weight Loss/	47828
6	(weight adj1 composition).tw.	266
7	exp Body Composition/	61983
8	(body adj1 composition).tw.	41883
9	exp Energy Metabolism/	408618
10	(energy adj1 metabolism).tw.	38648
11	exp Body Mass Index/	144659
12	(body adj1 mass adj1 index).tw.	217628
13	(weight adj3 reduc$).tw.	40687
14	adipos$.tw.	123772
15	exp Anthropometry/	553164
16	anthropometry.tw.	9864
17	or/1-16	1470031
18	chrononutrition.tw.	60
19	chrono-nutrition.tw.	35
20	((meal$ or food or eat$ or nutrient$) adj3 tim$).tw.	9337
21	((break-fast or breakfast or break fast) adj3 tim$).tw.	350
22	((lunch$ or dinner$ or supper$) adj3 tim$).tw.	516
23	exp Circadian Rhythm/	75671
24	(circadian adj1 rhythm).tw.	16665
25	exp Energy Intake/	50355
26	((energy or calorie$) adj1 intake).tw.	26436
27	or/18-26	153248
28	exp Controlled Clinical Trial/	666278
29	(random$ adj3 trial$).tw.	434388
30	(control$ adj1 clincial adj trial$).tw.	1

31	interven$.tw.	1253724
32	or/28-31	1967232
33	17 and 27 and 32	10110
34	limit 33 to humans	9106
35	limit 34 to "all adult (19 plus years)"	6349

APA PsycInfo <1806 to August Week 1 2022>

1	exp Obesity/	27326
2	obes$.tw.	45575
3	exp Overweight/	28923
4	overweight.tw.	16901
5	exp Weight Loss/	4345
6	(weight adj1 composition).tw.	53
7	exp Body Composition/	0
8	(body adj1 composition).tw.	2963
9	exp Energy Metabolism/	0
10	(energy adj1 metabolism).tw.	1930
11	exp Body Mass Index/	7269
12	(body adj1 mass adj1 index).tw.	23030
13	(weight adj3 reduc$).tw.	4200
14	adipos$.tw.	4275
15	exp Anthropometry/	709
16	anthropometry.tw.	1081
17	or/1-16	72105
18	chrononutrition.tw.	13
19	chrono-nutrition.tw.	7
20	((meal$ or food or eat$ or nutrient$) adj3 tim$).tw.	2877
21	((break-fast or breakfast or break fast) adj3 tim$).tw.	77
22	((lunch$ or dinner$ or supper$) adj3 tim$).tw.	227
23	exp Circadian Rhythm/	0
24	(circadian adj1 rhythm).tw.	4583
25	exp Energy Intake/	0
26	((energy or calorie$) adj1 intake).tw.	3137
27	or/18-26	10675
28	exp Controlled Clinical Trial/	0
29	(random$ adj3 trial$).tw.	63857
30	(control$ adj1 clincial adj trial$).tw.	0

31 interven$.tw. 466325

32 or/28-31 494944

33 17 and 27 and 32 541

34 limit 33 to humans 541

35 limit 34 to "all adult (19 plus years)" 541

36 limit 35 to last 2 years 87

37 exp Obesity/ 27326

38 obes$.tw. 45575

39 exp Overweight/ 28923

40 overweight.tw. 16901

41 exp Weight Loss/ 4345

42 (weight adj1 composition).tw. 53

43 exp Body Composition/ 0

44 (body adj1 composition).tw. 2963

45 exp Energy Metabolism/ 0

46 (energy adj1 metabolism).tw. 1930

47 exp Body Mass Index/ 7269

48 (body adj1 mass adj1 index).tw. 23030

49 (weight adj3 reduc$).tw. 4200

50 adipos$.tw. 4275

51 exp Anthropometry/ 709

52 anthropometry.tw. 1081

53 or/37-52 72105

54 chrononutrition.tw. 13

55 chrono-nutrition.tw. 7

56 ((meal$ or food or eat$ or nutrient$) adj3 tim$).tw. 2877

57 ((break-fast or breakfast or break fast) adj3 tim$).tw. 77

58 ((lunch$ or dinner$ or supper$) adj3 tim$).tw. 227

59 exp Circadian Rhythm/ 0

60 (circadian adj1 rhythm).tw. 4583

61 exp Energy Intake/ 0

62 ((energy or calorie$) adj1 intake).tw. 3137

63	or/54-62	10675
64	exp Controlled Clinical Trial/	0
65	(random$ adj3 trial$).tw.	63857
66	(control$ adj1 clincial adj trial$).tw.	0
67	interven$.tw.	466325
68	or/64-67	494944
69	53 and 63 and 68	541
70	limit 69 to human	518
71	limit 70 to adulthood <18+ years>	319

Embase Classic+Embase <1947 to 2022 August 11>

1	timing of food intake*.mp.	208
2	meal tim*.mp.	1888
3	nutrient tim*.mp.	51
4	"timing of meal*".mp.	225
5	food tim*.mp.	165
6	chrononutrition.mp.	132
7	eating time*.mp.	398
8	breakfast time*.mp.	97
9	lunch time*.mp.	328
10	dinner time*.mp.	143
11	supper time*.mp.	15
12	circadian rhythm/	101017
13	circadian rhythm.mp.	106705
14	calorie intake*.mp.	4594
15	energy intake*.mp.	31875
16	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15	144985
17	body weight loss/	68263
18	weight loss*.mp.	196851
19	obesity/	506605
20	overweight*.mp.	126064
21	obesity*.mp.	655414
22	body composition/	72086
23	body composition*.mp.	86103
24	energy metabolism/	71632
25	energy metabolism*.mp.	90824
26	(body mass index or BMI).mp.	534821
27	weight reduction*.mp.	157641
28	adipos*.mp.	217966
29	glucose blood level/	315097
30	blood glucose.tw.	127228

31 ghrelin/17423

32 ghrelin.mp. 19459

33 waist circumference/ 64919

34 waist circumference*.mp. 72091

35 anthropometry/ 66476

36 anthropometry.mp. 71224

37 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 1704398

38 16 and 37 33242

39 limit 38 to human 25546

40 limit 39 to (adult <18 to 64 years> or aged <65+ years>) 13593

41 limit 40 to embase 8921

EBM Reviews - Cochrane Database of Systematic Reviews <2005 to August 12, 2022>

1	timing of food intake*.mp.	2
2	meal tim*.mp.	25
3	nutrient tim*.mp.	0
4	"timing of meal*".mp.	6
5	food tim*.mp.	2
6	chrononutrition.mp.	0
7	eating tim*.mp.	1
8	breakfast time*.mp.	1
9	lunch time*.mp.	4
10	dinner time*.mp.	0
11	supper time*.mp.	0
12	Circadian rhythm.mp. [mp=title, abstract, full text, keywords, caption text]	53
13	Calorie intake*.mp.	59
14	energy intake*.mp.	169
15	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14	271
16	weight loss*.mp.	810
17	overweight*.mp.	358
18	obesity*.mp.	961
19	body composition*.mp.	153
20	energy metabolism*.mp.	46
21	(body mass index or BMI).mp.	979
22	weight reduction*.mp.	135
23	adipos*.mp.	202
24	blood glucose.tw.	367
25	ghrelin.mp.	16
26	waist circumference*.mp.	112
27	anthropometry.mp.	59
28	16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27	2321
29	15 and 28	198

Scopus search strategy 12/8/22

((TITLE-ABS-KEY ("timing of food intake*" OR "meal tim*" OR "Nutrient tim*" OR "timing of meal*" OR "food tim*" OR chrononutrition OR "eating time*" OR "Breakfast time*" OR "Lunch time*" OR "Dinner time*" OR "supper time*" OR "Circadian Rhythm" OR "Circadian rhythm")) OR (TITLE-ABS-KEY ("Calorie intake*" OR "Energy intake*"))) AND ((TITLE-ABS-KEY ("Weight Loss" OR "weight loss*" OR overweight OR overweight* OR obesity OR obesity* OR "Body Composition" OR "body composition*" OR "Energy Metabolism" OR "energy metabolism*")) OR (TITLE-ABS-KEY ("Body Mass Index" OR bmi OR "Weight reduction*" OR adipos* OR "Blood Glucose" OR ghrelin OR "Waist Circumference" OR "waist circumference*" OR anthropometry))) AND (LIMIT-TO (EXACTKEYWORD , "Human*") OR LIMIT-TO (EXACTKEYWORD , "Humans")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (EXACTKEYWORD , "Adult") OR LIMIT-TO (EXACTKEYWORD , "Middle Aged") OR LIMIT-TO (EXACTKEYWORD , "Young Adult") OR LIMIT-TO (EXACTKEYWORD , "Aged, 80 And Over"))

MY

EBSCOhost

Monday, August 15, 2022 2:22:28 AM

#	Query	Limiters/Expanders	Last Run Via	Results
S40	S17 AND S39	Limiters - Human; Age Groups: Adult: 19-44 years, Middle Aged: 45-64 years, Aged: 65+ years, Aged, 80 and over, All Adult Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S39	S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S38	"anthropometry"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S37	(MH "Anthropometry+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S36	"waist circumference*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S35	(MH "Waist Circumference")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display

S34	"ghrelin"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S33	(MH "Ghrelin")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S32	"blood glucose"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S31	(MH "Blood Glucose")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S30	"adipos*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S29	"weight reduction"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S28	"body mass index or bmi"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S27	(MH "Body Mass Index")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S26	"energy metabolism*"	Expanders - Apply equivalent subjects	Interface - EBSCOhost Research Databases Search Screen - Advanced	Display

		Search modes - Boolean/Phrase	Search Database - CINAHL Complete	
S25	(MH "Energy Metabolism+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S24	"body composition*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S23	(MH "Body Composition+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S22	"obesity*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S21	(MH "Obesity+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S20	"overweight"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S19	"weight loss*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S18	(MH "Weight Loss+")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display

S17	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S16	"energy intake*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S15	(MH "Energy Intake")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S14	"calorie intake*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S13	"circadian rhythm*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S12	(MH "Circadian Rhythm")	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S11	"supper time*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S10	"dinner time*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S9	"lunch time*"	Expanders - Apply equivalent subjects	Interface - EBSCOhost Research Databases Search Screen - Advanced	Display

		Search modes - Boolean/Phrase	Search Database - CINAHL Complete	
S8	"breakfast time*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S7	"eating time*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S6	"chrononutrition"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S5	"food tim*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S4	"timing of meal*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S3	"nutrient tim*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S2	"meal tim*"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display
S1	"timing of food intake"	Expanders - Apply equivalent subjects Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	Display

Full text screening		
Title	Citation	Reason for exclusion
Circadian timing of food intake is associated with cardiometabolic risk in us hispanics/latinos: Results from the hispanic community health study/study of latinos	Makarem N, Aggarwal B, Sears DD, St-Onge MP, Castañeda SF, Talavera GA, Marinac CR, Patterson R, Sotres-Alvarez D, Garcia ML, Gallo LC. Circadian timing of food intake is associated with cardiometabolic risk in US Hispanics/Latinos: results from the Hispanic community health study/study of Latinos. Circulation. 2018 Nov 6;138(Suppl_1):A11503-.	Wrong study design - Cross-sectional
The influence of portion size and timing of meals on weight balance and obesity	Berg C, Forslund HB. The influence of portion size and timing of meals on weight balance and obesity. Current obesity reports. 2015 Mar;4(1):11-8.	Wrong study design - Cross-sectional
Caloric and macronutrient intake differ with circadian phase and between lean and overweight young adults	McHill AW, Czeisler CA, Phillips AJ, Keating L, Barger LK, Garaulet M, Scheer FA, Klerman EB. Caloric and macronutrient intake differ with circadian phase and between lean and overweight young adults. Nutrients. 2019 Mar 11;11(3):587.	Wrong study design - Cross-sectional
New perspectives on chrononutrition	Aparecida Crispim C, Carliana Mota M. New perspectives on chrononutrition. Biological Rhythm Research. 2019 Jan 2;50(1):63-77.	Wrong study design - Narrative review
Metabolic impacts of altering meal frequency and timing–does when we eat matter?	Hutchison AT, Heilbronn LK. Metabolic impacts of altering meal frequency and timing–does when we eat matter?. Biochimie. 2016 May 1;124:187-97.	Wrong study design - Review
Meal timing regulates the human circadian system	Wehrens SM, Christou S, Isherwood C, Middleton B, Gibbs MA, Archer SN, Skene DJ, Johnston JD. Meal	Wrong outcomes - Short duration study exploring metabolic and genetic outcomes only

	timing regulates the human circadian system. Current Biology. 2017 Jun 19;27(12):1768-75.	
Meal timing affects glucose tolerance, substrate oxidation and circadian-related variables: A randomized, crossover trial	Bandin C, Scheer FA, Luque AJ, Avila-Gandia V, Zamora S, Madrid JA, Gómez-Abellán P, Garaulet M. Meal timing affects glucose tolerance, substrate oxidation and circadian-related variables: A randomized, crossover trial. International journal of obesity. 2015 May;39(5):828-33.	Wrong outcomes - Short duration study with no anthropometric measurements
Effects of circadian restricted feeding on parameters of metabolic syndrome among healthy subjects	Singh RB, Cornelissen G, Mojto V, Fatima G, Wichansawakun S, Singh M, Kartikey K, Sharma JP, Torshin VI, Chibisov S, Kharlitskaya E. Effects of circadian restricted feeding on parameters of metabolic syndrome among healthy subjects. Chronobiology international. 2020 Mar 3;37(3):395-402.	Wrong intervention - Intervention involves period of fasting and time-restricted feeding
Timing of food intake is associated with weight loss evolution in severe obese patients after bariatric surgery	Ruiz-Lozano T, Vidal J, De Hollanda A, Scheer FA, Garaulet M, Izquierdo-Pulido M. Timing of food intake is associated with weight loss evolution in severe obese patients after bariatric surgery. Clinical nutrition. 2016 Dec 1;35(6):1308-14.	Wrong patient population - Study population did not meet inclusion criteria (bariatric surgery patients)
Sleep and meal timing influence food intake and its hormonal regulation in healthy adults with overweight/obesity	St-Onge MP, Pizinger T, Kovtun K, RoyChoudhury A. Sleep and meal timing influence food intake and its hormonal regulation in healthy adults with overweight/obesity. European journal of clinical nutrition. 2019 Jul;72(1):76-82.	Wrong outcomes - Anthropometric measurements were not included
Postprandial metabolism and appetite do not differ between lean adults that eat breakfast or morning fast for 6 weeks	Chowdhury EA, Richardson JD, Tsintzas K, Thompson D, Betts JA. Postprandial metabolism and appetite do not differ between lean adults that eat breakfast or morning fast for 6 weeks. The Journal of nutrition. 2018 Jan 1;148(1):13-21.	Wrong outcomes - Study intervention included a period of fasting in the morning
Increased meal frequency attenuates fat-free mass losses and some markers of health status with a portion-controlled weight loss diet	Alencar MK, Beam JR, McCormick JJ, White AC, Salgado RM, Kravitz LR, Mermier CM, Gibson AL, Conn CA, Kolkmeyer D, Ferraro RT. Increased meal	Wrong intervention – study duration not long enough to warrant meaningful weight loss

	frequency attenuates fat-free mass losses and some markers of health status with a portion-controlled weight loss diet. Nutrition research. 2015 May 1;35(5):375-83.	
Timing of food intake: Sounding the alarm about metabolic impairments? A systematic review	Beccuti G, Monagheddu C, Evangelista A, Ciccone G, Broglio F, Soldati L, Bo S. Timing of food intake: Sounding the alarm about metabolic impairments? A systematic review. Pharmacological research. 2017 Nov 1;125:132-41.	Wrong study design – review
Frequency and circadian timing of eating may influence metabolic risk of breast cancer	Marinac CR, Sears DD, Natarajan L, Gallo LC, Breen CI, Patterson RE. Frequency and circadian timing of eating may influence biomarkers of inflammation and insulin resistance associated with breast cancer risk. PloS one. 2015 Aug 25;10(8):e0136240.	Wrong study design – cross sectional
Chrono-nutrition: a review of current evidence from observational studies on global trends in time-of-day of energy intake and its association with obesity	Almoosawi S, Vingeliene S, Karagounis LG, Pot GK. Chrono-nutrition: a review of current evidence from observational studies on global trends in time-of-day of energy intake and its association with obesity. Proceedings of the Nutrition Society. 2016 Nov;75(4):487-500.	Wrong study design – review
Differences in meal patterns and timing with regard to central obesity in the ANIBES ('Anthropometric data, macronutrients and micronutrients intake, practice of physical activity, socioeconomic data and lifestyles in Spain') Study	Aparicio A, Rodríguez-Rodríguez EE, Aranceta-Bartrina J, Gil Á, González-Gross M, Serra-Majem L, Varela-Moreiras G, Ortega RM. Differences in meal patterns and timing with regard to central obesity in the ANIBES ('Anthropometric data, macronutrients and micronutrients intake, practice of physical activity, socioeconomic data and lifestyles in Spain') Study. Public health nutrition. 2017 Sep;20(13):2364-73.	Wrong study design – Cross sectional
The association among chronotype, timing of food intake and food preferences depends on body mass status	Munoz JS, Cañavate R, Hernandez CM, Cara-Salmerón V, Morante JJ. The association among chronotype, timing of food intake and food	Wrong study design – cross sectional

	preferences depends on body mass status. European journal of clinical nutrition. 2017 Jun;71(6):736-42.	
Association of night eating habits with metabolic syndrome and its components: a longitudinal study	Yoshida J, Eguchi E, Nagaoka K, Ito T, Ogino K. Association of night eating habits with metabolic syndrome and its components: a longitudinal study. BMC Public Health. 2018 Dec;18(1):1-2.	Wrong study design – cross sectional
Timing of eating in adults across the weight spectrum: Metabolic factors and potential circadian mechanisms	Allison KC, Goel N. Timing of eating in adults across the weight spectrum: Metabolic factors and potential circadian mechanisms. Physiology & behavior. 2018 Aug 1;192:158-66.	Wrong study design – cross sectional
Pilot study of sleep and meal timing effects, independent of sleep duration and food intake, on insulin sensitivity in healthy individuals	Pizinger T, Kovtun K, RoyChoudhury A, Laferrère B, Shechter A, St-Onge MP. Pilot study of sleep and meal timing effects, independent of sleep duration and food intake, on insulin sensitivity in healthy individuals. Sleep health. 2018 Feb 1;4(1):33-9.	Wrong outcomes – amthropemtry not measured
The effect of meal frequency in a reduced-energy regimen on the gastrointestinal and appetite hormones in patients with type 2 diabetes: A randomised crossover study	Belinova L, Kahleova H, Malinska H, Topolcan O, Windrichova J, Oliyarnyk O, Kazdova L, Hill M, Pelikanova T. The effect of meal frequency in a reduced-energy regimen on the gastrointestinal and appetite hormones in patients with type 2 diabetes: A randomised crossover study. PLoS One. 2017 Apr 3;12(4):e0174820.	Wrong intervention – study alters meal frequency and not total energy distribution
Meal timing and obesity: Interactions with macronutrient intake and chronotype	Xiao Q, Garaulet M, Scheer FA. Meal timing and obesity: Interactions with macronutrient intake and chronotype. International journal of obesity. 2019 Sep;43(9):1701-11.	Wrong study design – cross sectional
Meal patterns in relation to energy and protein intake in older adults in home health care	Engelheart S, Brummer RJ, Forslund HB. Meal patterns in relation to energy and protein intake in older adults in home health care. Clinical nutrition ESPEN. 2020 Feb 1;35:180-7.	Wrong study design – cross sectional
Effect of dinner timing on nocturnal metabolism in healthy volunteers	Gu C, Brereton N, Schweitzer A, Cotter M, Borsheim E, Wolfe RR, Jun JC. 0104 Effect of Dinner Timing on	Wrong outcomes – anthropometry not measured

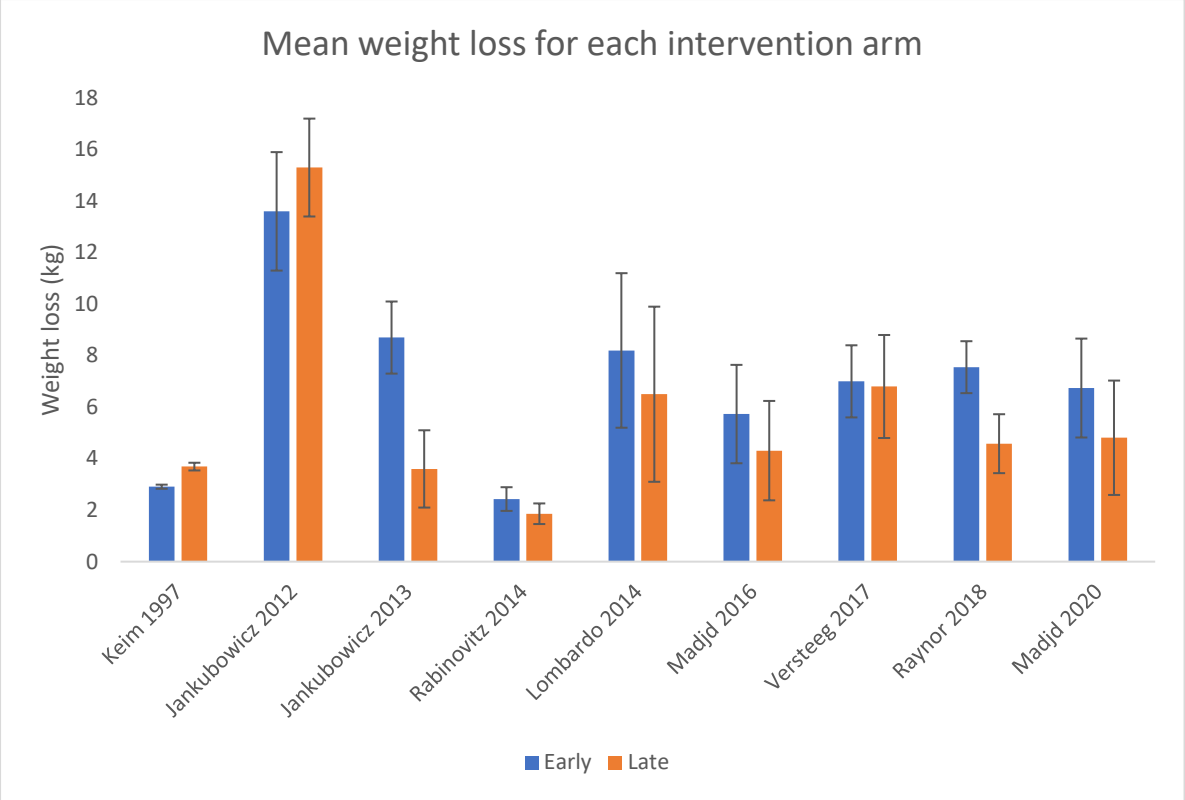
	Nocturnal Metabolism in Healthy Volunteers. Sleep. 2019 Apr 1;42:A43.	
Twice as High Diet-Induced Thermogenesis After Breakfast vs Dinner On High-Calorie as Well as Low-Calorie Meals	Richter J, Herzog N, Janka S, Baumann T, Kistenmacher A, Oltmanns KM. Twice as high diet-induced thermogenesis after breakfast vs dinner on high-calorie as well as low-calorie meals. The Journal of Clinical Endocrinology & Metabolism. 2020 Mar;105(3):e211-21.	Wrong outcomes – anthropometry not measured
Food intake and energy turnover - Time of day makes a difference	Gohla G, Herzog N, Janka S, Baumann T, Martens JC, Kistenmacher A, Wardzinski EK, Oltmanns KM. Food intake and energy turnover-time of day makes a difference. InACTA PHYSIOLOGICA 2016 Mar 1 (Vol. 216). 111 RIVER ST, HOBOKEN 07030-5774, NJ USA: WILEY-BLACKWELL.	Wrong study outcomes – anthropometry not measured
Impact of breakfast skipping compared with dinner skipping on regulation of energy balance and metabolic risk	Nas A, Mirza N, Hägele F, Kahlhöfer J, Keller J, Rising R, Kufer TA, Bosy-Westphal A. Impact of breakfast skipping compared with dinner skipping on regulation of energy balance and metabolic risk. The American journal of clinical nutrition. 2017 Jun 1;105(6):1351-61.	Wrong study intervention – study duration not long enough to warrant meaningful weight loss
Three meals diet with high energy breakfast is an effective strategy for weight loss, reduction of glucose variability and of total daily insulin dose in type 2 diabetes	Jakubowicz D, Froy O, Tsameret S, Wainstein J, Raz I, Menaged M, Bar-Dayan Y, Mor N, Ganz T, Landau Z. Three meals diet with high energy breakfast is an effective strategy for weight loss, reduction of glucose variability and of total daily insulin dose in type 2 diabetes. InDIABETOLOGIA 2018 Oct 1 (Vol. 61, pp. S99-S99). 233 SPRING ST, NEW YORK, NY 10013 USA: SPRINGER.	Wrong intervention
High energy breakfast diet is an effective strategy for weight loss and reduction of the total daily insulin dose in type 2 diabetes	High energy breakfast diet is an effective strategy for weight loss and reduction of the total daily insulin dose in type 2 diabetes Jakubowicz, D.; Froy, O.; Tsameret, S.; Wainstein, J.; Raz, I.; Menaged, M.; Bar-Dayan, Y.; Mor, N.; Ganz,	Wrong intervention

	T.; Landau, Z. Endocrine Reviews. Conference: 100th Annual Meeting of the Endocrine Society, ENDO 2018;39(2 Supplement 1):2018	
The causal role of breakfast in energy balance and health: A randomized controlled trial in obese adults	Chowdhury EA, Richardson JD, Holman GD, Tsintzas K, Thompson D, Betts JA. The causal role of breakfast in energy balance and health: a randomized controlled trial in obese adults. The American journal of clinical nutrition. 2016 Mar 1;103(3):747-56.	Wrong intervention – study included a period of fasting
Six Weeks of Morning Fasting Causes Little Adaptation of Metabolic or Appetite Responses to Feeding in Adults with Obesity	Chowdhury EA, Richardson JD, Gonzalez JT, Tsintzas K, Thompson D, Betts JA. Six weeks of morning fasting causes little adaptation of metabolic or appetite responses to feeding in adults with obesity. Obesity. 2019 May;27(5):813-21.	Wrong intervention - study included a period of fasting
The causal role of breakfast in energy balance and health: a randomized controlled trial in lean adults	Betts JA, Richardson JD, Chowdhury EA, Holman GD, Tsintzas K, Thompson D. The causal role of breakfast in energy balance and health: a randomized controlled trial in lean adults. The American journal of clinical nutrition. 2014 Aug 1;100(2):539-47.	Wrong intervention - study included a period of fasting
Eating occasions, obesity and related behaviors in working adults: Does it matter when you snack?	Barrington WE, Beresford SA. Eating occasions, obesity and related behaviors in working adults: does it matter when you snack?. Nutrients. 2019 Oct 1;11(10):2320.	Wrong study design – cross sectional
An Earlier First Meal Timing Associate with Weight Loss Effectiveness in A 12-Week Weight Loss Support Program	Hatanaka M, Hatamoto Y, Tajiri E, Matsumoto N, Tanaka S, Yoshimura E. An Earlier First Meal Timing Associates with Weight Loss Effectiveness in A 12-Week Weight Loss Support Program. Nutrients. 2022 Jan 7;14(2):249.	Wrong intervention - study included a period of fasting
Personalized weight loss strategies—the role of macronutrient distribution	Martinez JA, Navas-Carretero S, Saris WH, Astrup A. Personalized weight loss strategies—the role of macronutrient distribution. Nature Reviews Endocrinology. 2014 Dec;10(12):749-60.	Wrong study design – review

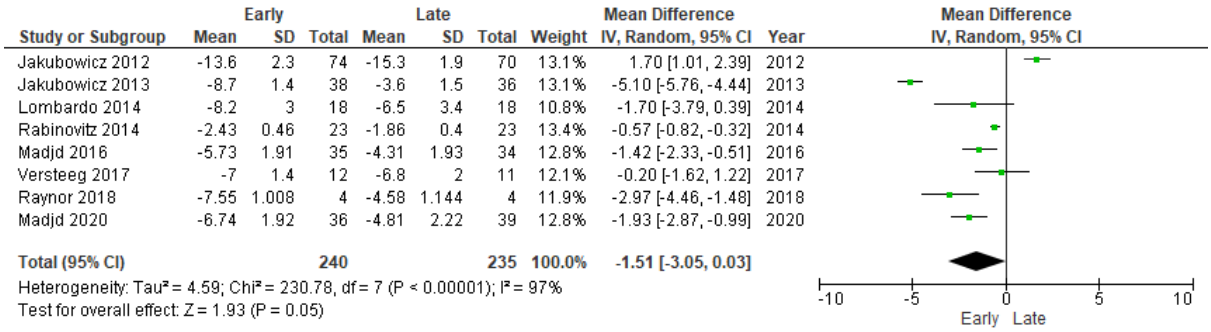
Timing of food intake predicts weight loss effectiveness	Garaulet M, Gómez-Abellán P, Alburquerque-Béjar JJ, Lee YC, Ordovás JM, Scheer FA. Timing of food intake predicts weight loss effectiveness. International journal of obesity. 2013 Apr;37(4):604-11.	Wrong study design – cross sectional
Circadian rhythms and meal timing: impact on energy balance and body weight	Boege HL, Bhatti MZ, St-Onge MP. Circadian rhythms and meal timing: impact on energy balance and body weight. Current Opinion in Biotechnology. 2021 Aug 1;70:1-6.	Wrong study design – review
Timing of food intake and obesity: A novel association	Garaulet M, Gómez-Abellán P. Timing of food intake and obesity: a novel association. Physiology & behavior. 2014 Jul 1;134:44-50.	Wrong study design – cross sectional
Delayed Timing of Eating: Impact on Weight and Metabolism	Allison KC, Goel N, Ahima RS. Delayed timing of eating: impact on weight and metabolism. Current obesity reports. 2014 Mar;3(1):91-100.	Wrong study design – review
Meal timing influences daily caloric intake in healthy adults	Reid KJ, Baron KG, Zee PC. Meal timing influences daily caloric intake in healthy adults. Nutrition research. 2014 Nov 1;34(11):930-5.	Wrong outcomes – weight loss not measured
Chronobiological Aspects of Weight Loss in Obesity: Effects of Different Meal Timing Regimens	Sensi S, Capani F. Chronobiological aspects of weight loss in obesity: effects of different meal timing regimens. Chronobiology international. 1987 Jan 1;4(2):251-61.	Wrong study intervention – study duration not long enough to warrant meaningful weight loss
Irregularity in breakfast consumption and daily meal timing patterns in association with body weight status and inflammation	Guinter MA, Campbell PT, Patel AV, McCullough ML. Irregularity in breakfast consumption and daily meal timing patterns in association with body weight status and inflammation. British Journal of Nutrition. 2019 Nov;122(10):1192-200.	Wrong study design – cross sectional

Paper	Jakubowitz 2012	Jakubowitz 2013	Keim 1997	Lombardo 2014	Madjd 2016	Rabinovitz 2014	Raynor 2018	Versteeg 2017	Versteeg 2018	Madjd 2020
Was true randomisation used for assignment of participants to this treatment? (yes, no, unclear)										
Was allocation to treatment groups concealed?										
Were treatment groups similar at baseline?										
Were participants blind to treatment assignment?										
Were those delivering treatment blind to treatment assignment?										
Were outcome assessors blind to treatment assignment?										
Were treatment groups treated identically other than the intervention of interest?										
Was follow up complete and if not, were differences in between groups in terms of their follow up adequately described and analysed?										
Were participants analysed in the groups to which they were randomised?										
Were outcomes measured in the same way for treatment groups?										
Were outcomes measured in a reliable way?										
Was appropriate statistical analysis used?										
Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?										
Overall appraisal	Moderate	Moderate	Weak	Weak	Moderate	Moderate	Moderate	Weak	Moderate	Moderate

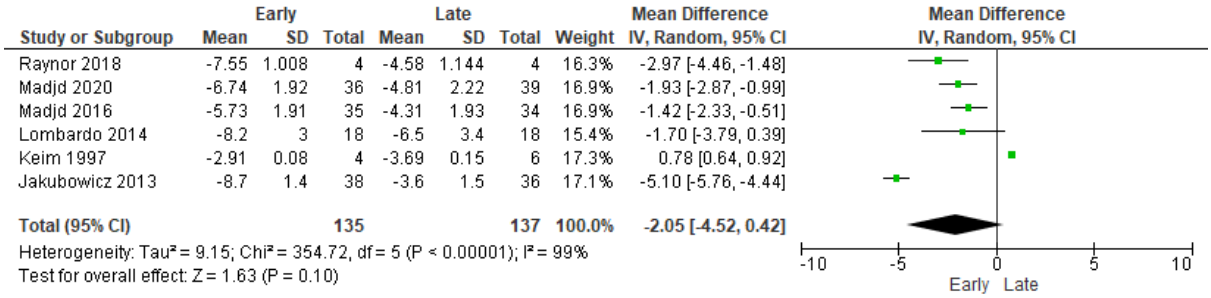
Appendix 2: Critical appraisal of included studies using Joanna Briggs Institute Checklist for Randomised Controlled Trials. Green=yes; Red=no; Orange=unclear



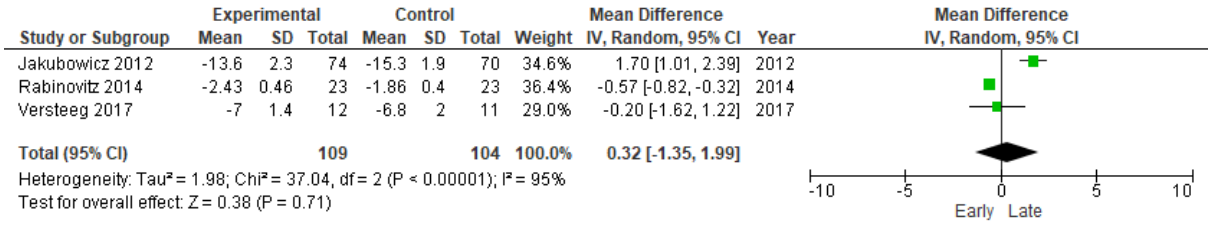
Mean (SD) weight loss (kg) for each intervention arm per study



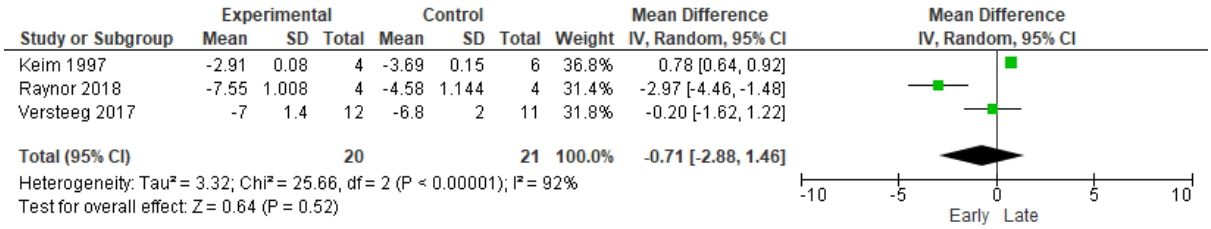
Forest plot for meta-analysis of trials reporting weight loss (kg) for earlier versus later eating patterns (excluding Keim 1997)



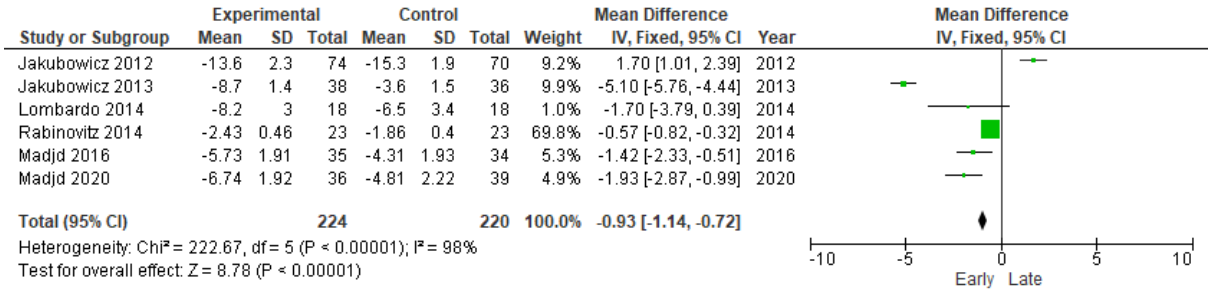
Forest plot for sub-analysis of studies reporting weight loss (kg) for earlier versus later eating patterns (studies reporting female participants only)



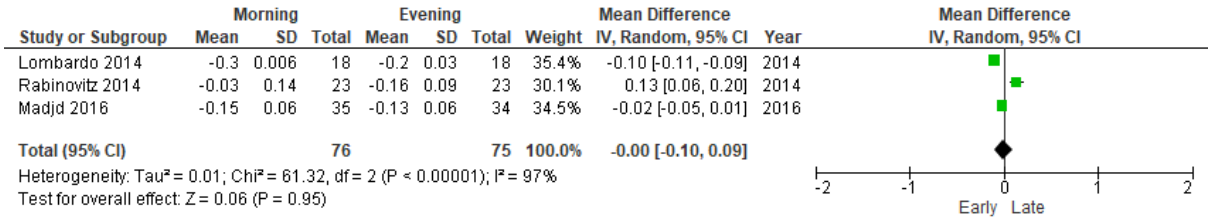
Forest plot for sub-analysis of studies reporting weight loss (kg) for earlier versus later eating patterns (studies reporting male participants with or without females)



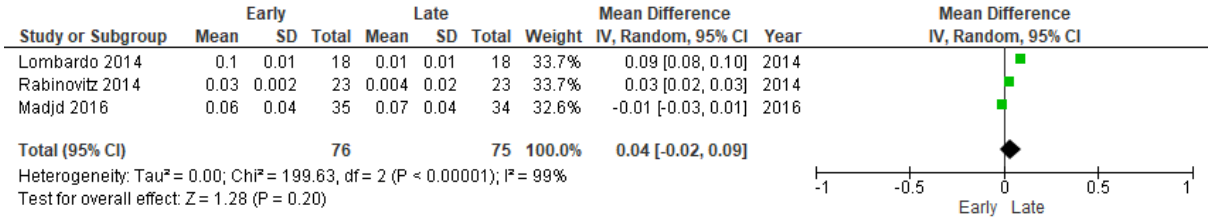
Forest plot for sub-analysis of studies reporting weight loss (kg) for earlier versus later eating patterns (study intervention duration <12weeks)



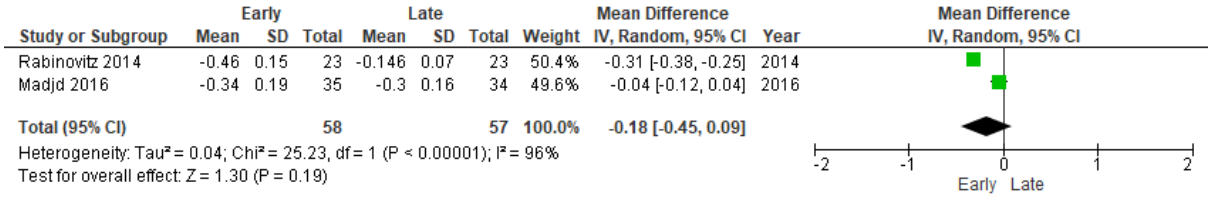
Forest plot for sub-analysis of studies reporting weight loss (kg) for earlier versus later eating patterns (study intervention duration ≥12weeks)



Forest plot of meta-analysis for change in fasting triglycerides



Forest plot of meta-analysis for change in fasting serum HDL cholesterol



Forest plot of meta-analysis for change in HbA1c