

Supplementary file 1. Search strategy

MEDLINE

1. randomized controlled trial[Publication Type]
2. controlled clinical trial[Publication Type]
3. randomi*ed[Title/Abstract]
4. trial[Title]
5. "clinical trials as topic"[MeSH Major Topic]
6. #1 OR #2 OR #3 OR #4 OR #5
7. obesity[Title/Abstract]
8. obes*[Title/Abstract]
9. overweight[Title/Abstract]
10. child*[Title/Abstract]
11. adolescent*[Title/Abstract]
12. infan* [Title/Abstract]
13. #7 OR #8 OR #9 OR #10 OR #11 OR #12
14. Physical activity[Title/Abstract]
15. Exercise[Title/Abstract]
16. Aerobic[Title/Abstract]
17. Resistance[Title/Abstract]
18. Strength[Title/Abstract]
19. Concurrent[Title/Abstract]
20. #14 OR #15 OR #16 OR #17 OR #18 OR #19
21. #6 AND #13 AND #20

CENTRAL (Cochrane Central Register of Controlled Trials)

((((((((((((((((((((randomized controlled trial) OR controlled clinical trial) OR randomied) OR trial) OR "clinical trials as topic") AND obesity) OR overweight*) AND physical activity) OR exercise) OR aerobic) OR resistance) OR strength) OR concurrent) OR stretching) AND health

EMBASE

(((((((((randomized AND controlled AND trial) OR controlled) AND clinical AND trial) OR randomied OR trial OR 'clinical trials as topic'/exp OR 'clinical trials as topic') AND (obesity/exp OR obesity) OR (overweight/exp)) AND physical AND activity) OR exercise/exp OR exercise OR aerobic OR resistance OR strength/exp OR strength OR concurrent/exp OR concurrent) AND (health/exp OR health)

Supplementary file 2. List of excluded studies

1 de Albuquerque-Filho NB, Bellaguarda E, Rebouças G, et al. Concurrent exercise program plus diet intervention on body adiposity and lipid profile in obese adolescents. *Gazz Medital-Arch Sci Med* 2015;174(6):259-66.

No aerobic group.

2 Antunes BdMM, Christofaro DGD, Monteiro PA, et al. Effect of concurrent training on gender-specific biochemical variables and adiposity in obese adolescents. *Arch Endocrinol Metab* 2015;59(4):303-09

No aerobic group.

3 Antunes BdMM, Monteiro PA, Silveira LS, et al. Effect of concurrent training on risk factors and hepatic steatosis in obese adolescents. *Rev Paul Pediatr* 2013;31(3):371-76

No aerobic group.

4 Davis JN, Gyllenhammer LE, Vanni AA, et al. Startup circuit training program reduces metabolic risk in Latino adolescents. *Med Sci Sports Exerc* 2011;43(11):2195-203

No aerobic group.

5 Davis JN, Tung A, Chak SS, et al. Aerobic and strength training reduces adiposity in overweight Latina adolescents. *Med Sci Sports Exerc* 2009;41(7):1494-503

No aerobic group.

6 de Albuquerque Filho NJB, Mendes G, Rebouças VAFM, et al. Effect of concurrent training on body composition and lipid profile in overweight adolescents. *J Exerc Physiol Online* 2014;17(6):371-6

7 Fazelifar S. On improving VO₂ peak, body composition and physical fitness of obese children by concurrent training. *Biol J Armenia* 2011;63(4):51-56

No aerobic group.

8 Foschini D, Araújo RC, Bacurau RF, et al. Treatment of obese adolescents: the influence of periodization models and ACE genotype. *Obesity* 2010;18(4):766-72

No aerobic group.

9 Goldfield GS, Kenny GP, Albergá AS, et al. Effects of aerobic training, resistance training, or both on psychological health in adolescents with obesity: The HEARTY randomized controlled trial. *J Consult Clin Psychol* 2015;83(6):1123-35

No health outcomes.

10 Gomes Silva HJ, Andersen LB, Lofrano-Prado MC, et al. Improvements on Cardiovascular Diseases Risk Factors in Obese Adolescents: A Randomized Exercise Intervention Study. *J Phys Act Health* 2015;12(4):553-60

No concurrent group.

11 Ho SS, Dhaliwal SS, Hills AP, et al. The effect of 12 weeks of aerobic, resistance or combination exercise training on cardiovascular risk factors in the overweight and obese in a randomized trial. *BMC Public Health* 2012;12(1):1
No paediatric population.

12 Lee S, Bacha F, Hannon T, et al. Effects of aerobic versus resistance exercise without caloric restriction on abdominal fat, intrahepatic lipid, and insulin sensitivity in obese adolescent boys a randomized, controlled trial. *Diabetes* 2012;61(11):2787-95
No concurrent group.

13 Lee S, Deldin AR, White D, et al. Aerobic exercise but not resistance exercise reduces intrahepatic lipid content and visceral fat and improves insulin sensitivity in obese adolescent girls: a randomized controlled trial. *Am J Physiol Endocrinol Metab* 2013;305(10):E1222-E29
No concurrent group.

14 Leite N, Lazarotto L, Cavazza JF, et al. Effects of aquatic exercise and nutritional guidance on the body composition of obese children and adolescents. *Rev Bras Cineantropom Desempenho Hum* 2010;12(4):232-38
No aerobic group.

15 Suh S, Jeong I-K, Kim MY, et al. Effects of resistance training and aerobic exercise on insulin sensitivity in overweight korean adolescents: a controlled randomized trial. *Diabetes Metab J* 2011;35(4):418-26
No concurrent group.

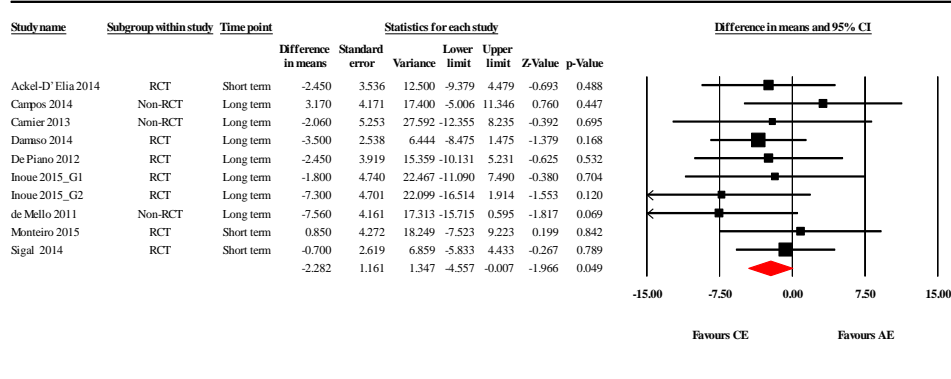
Supplementary file 3. Criteria list for the quality assessment of studies (The Delphi list)

Study	Allocation randomized	Allocation concealed	Inclusion criteria specified	Baseline similar	Blinded outcome assessment	Blinded care provider	Blinded participants	Point estimate and variability	Intention to treat	Total (0-9)
Ackel-D'Elia et al. 2014	Y	N	Y	Y	N	N	N	Y	N	4
Alberga et al. 2015a										
Alberga et al. 2015b	Y	N	Y	Y	Y	N	N	Y	Y	6
Sigal et al. 2015										
Campos et al. 2014	N	N	Y	Y	N	N	N	Y	N	3
Carnier et al. 2013	N	N	Y	Y	N	N	N	Y	N	3
Damaso et al. 2014	Y	N	Y	Y	Y	N	N	Y	N	5
de Mello et al. 2011	N	N	Y	Y	N	N	N	Y	N	3
de Piano et al. 2012	Y	N	Y	Y	Y	N	N	Y	N	5
Inoue et al. 2015	Y	N	Y	Y	N	N	N	Y	N	4
Lee et al. 2010	N	N	Y	Y	N	N	N	Y	N	3
Monteiro et al. 2015	Y	N	Y	Y	N	N	N	Y	Y	5
	60%	0%	100%	100%	30%	0%	0%	100%	20%	

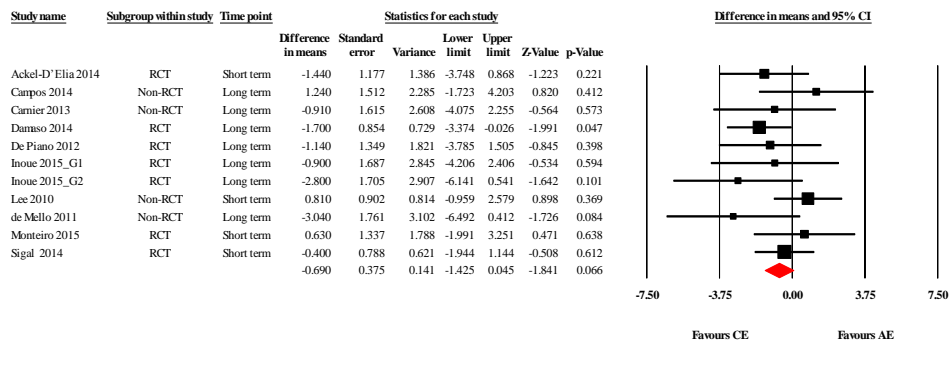
N, No; Y, Yes.

Supplementary file 4. Forest-plots

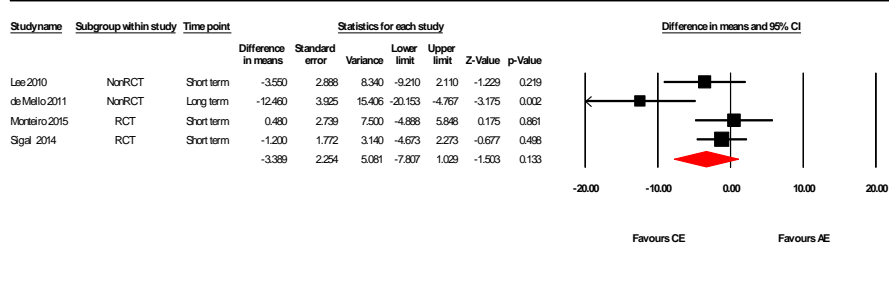
Body weight, kg



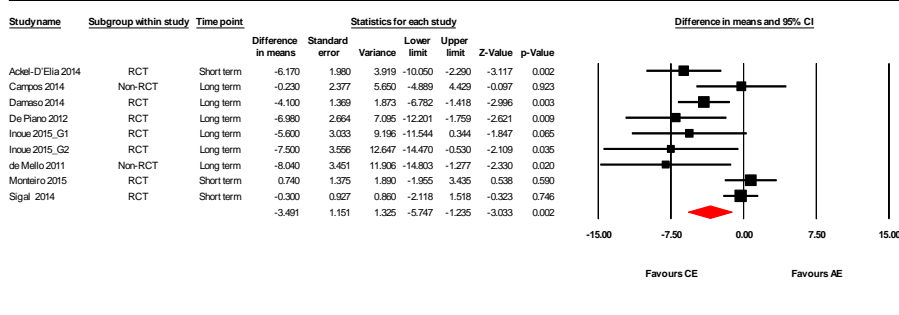
Body mass index, kg/m²



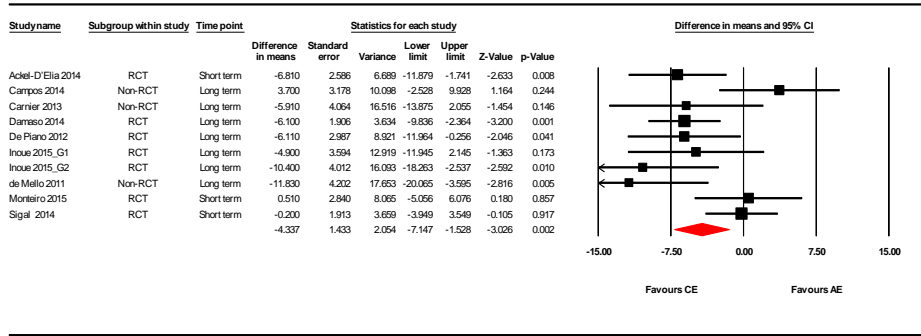
Waist circumference, cm



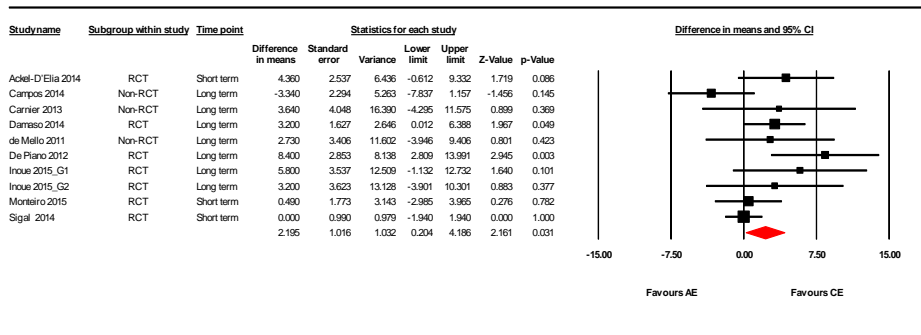
Fat mass, %



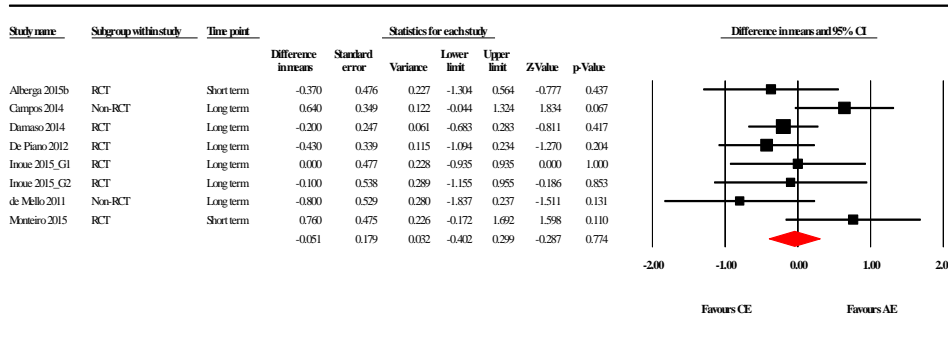
Fat mass, kg



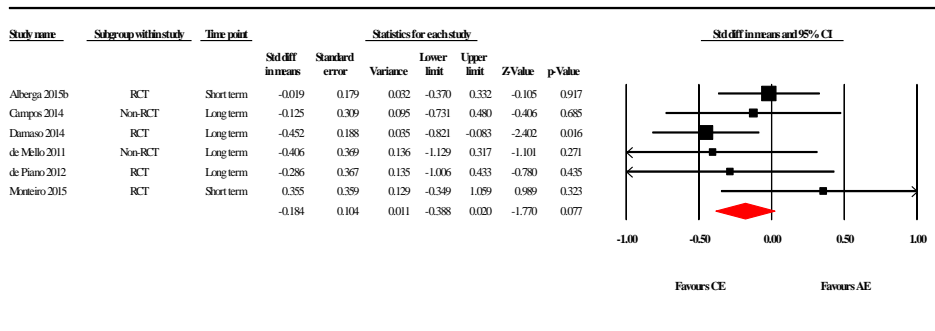
Lean body mass, kg



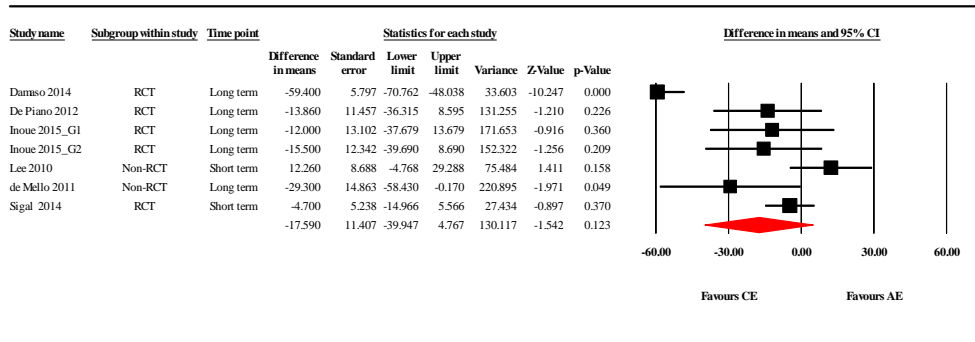
Visceral fat, cm



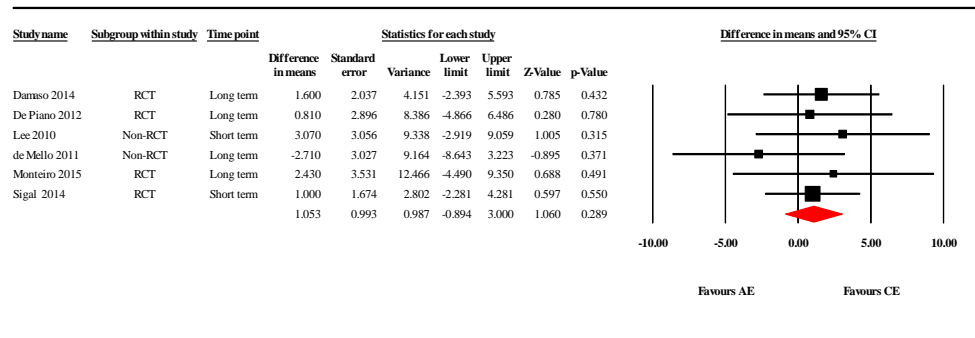
Subcutaneous fat, cm



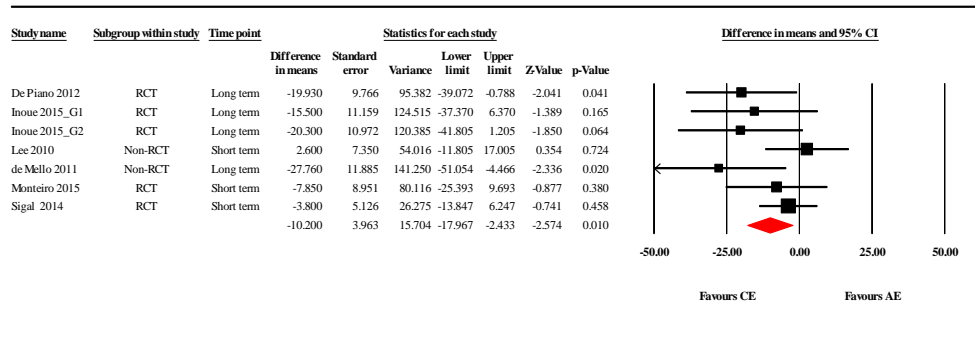
Total Cholesterol, mg/dL



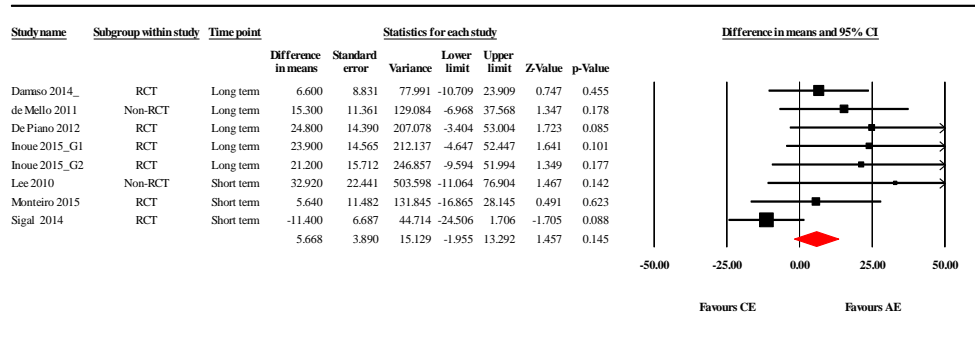
HDL Cholesterol, mg/dL



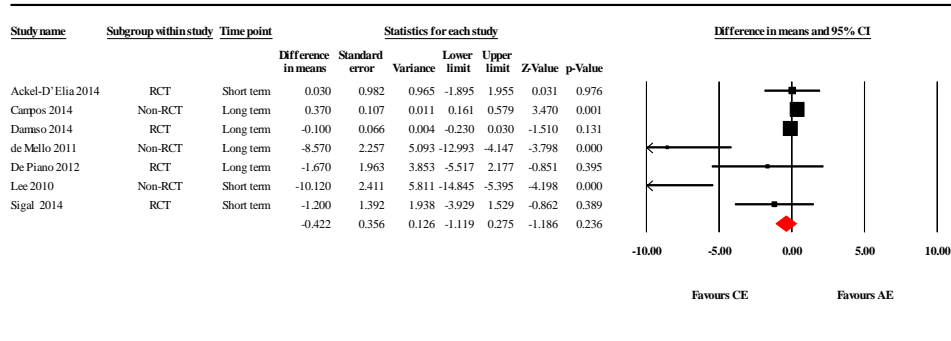
LDL Cholesterol, mg/dL



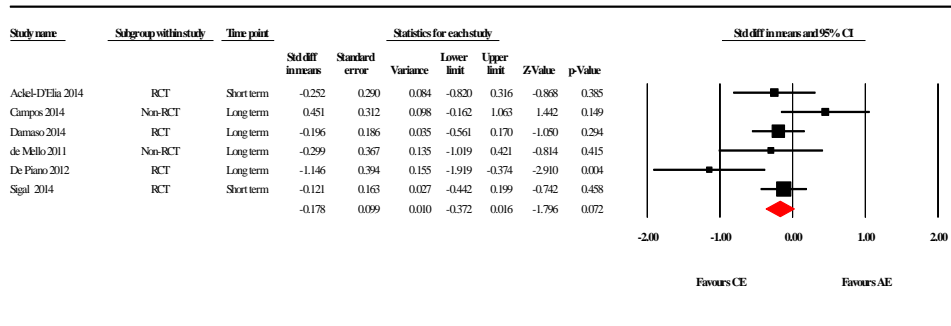
Triglycerides, mg/dL



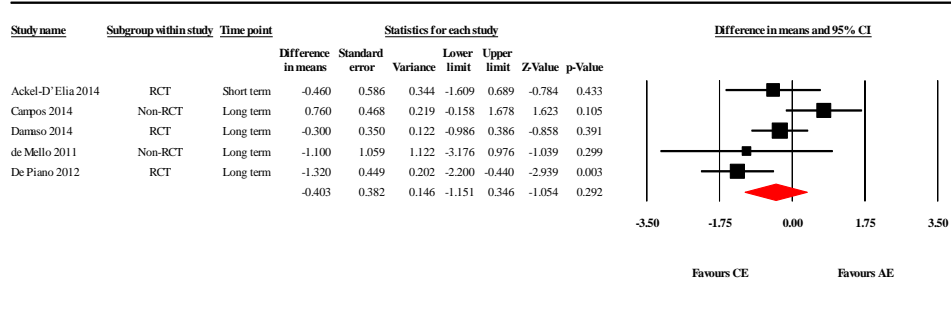
Glucose, mg/dL



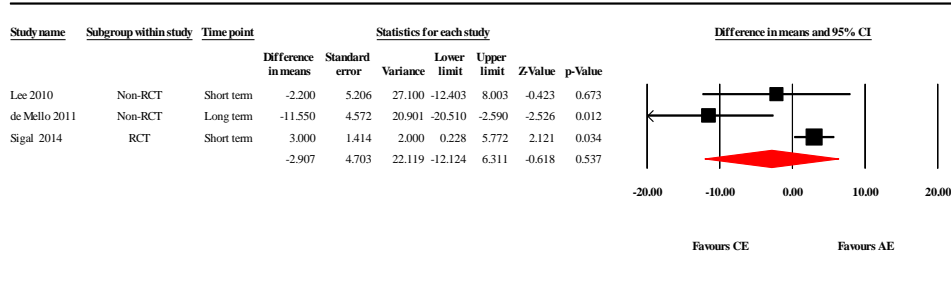
Insulin, $\mu\text{U/mL}$



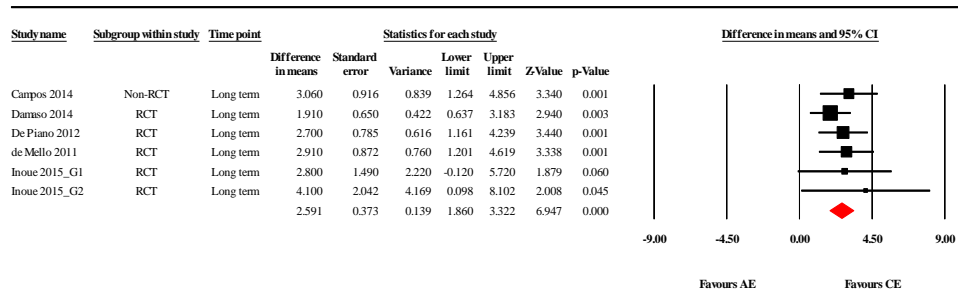
HOMA-index



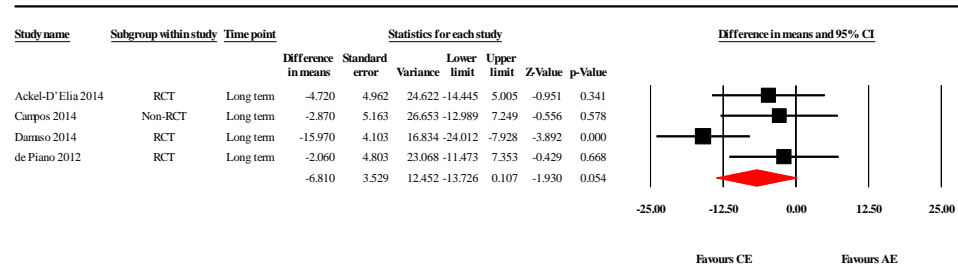
Systolic blood pressure, mmHg



Adiponectin, $\mu\text{g}/\text{mL}$



Leptin, $\mu\text{g}/\text{mL}$



Supplementary file 5. Subgroup analysis.

Effects of CE compared to AE on body composition, lipid profile, glucose homeostasis, blood pressure and adipokines in paediatric population, by study design (RCT and non-RCT).

	RCT			Non-RCT		
	Study (n)	MD (95% CI)	p	Study (n)	MD (95% CI)	p
Body composition						
Body Mass, kg	6	-2.310 (-4.861 to 0.240)	0.076	3	-0.136 (-0.536 to 0.264)	0.505
Body Mass Index, kg/m ²	6	-1.011 (-1.846 to -0.176)	0.018	4	-0.139 (-1.852 to 1.574)	0.873
Waist circumference, cm	-	-	-	-	-	-
Fat Mass, %	6	-3.536 (-6.053 to -1.018)	0.006	-	-	-
Fat Mass, kg	6	-4.412 (-7.208 to -1.615)	0.002	3	-4.367 (-13.67 to 4.938)	0.358
Lean body mass, kg	6	2.806 (0.573 to 5.040)	0.014	3	0.194 (-4.523 to 4.912)	0.936
Visceral fat, cm	5	-0.135 (-0.438 to 0.168)	0.382	-	-	-
Subcutaneous fat, cm	4	-0.170 (-0.397 to 0.056)	0.141	-	-	-
Lipids and lipoprotein						
Total Cholesterol, mg/dL	4	-21.64 (-48.30 to 5.021)	0.112	-	-	-
HDL, mg/dL	4	1.297 (-0.898 to 3.492)	0.247	-	-	-
LDL, mg/dL	4	-9.626 (-16.67 to -2.579)	0.007	-	-	-
Triglycerides, mg/dL	5	8.208 (-4.762 to 21.18)*	0.215	-	-	-
Insulin resistance						
Fasting glucose, mg/dL	4	-0.104 (-0.233 to 0.026)	0.116	3	-5.484 (-13.66 to 1.969)	0.143
Fasting insulin, μ U/mL	4	-2.433 (-4.549 to -0.318)	0.024	-	-	-
HOMA-index	3	-0.676 (-1.332 to -0.020)	0.043	-	-	-
Blood pressure						
Systolic Blood Pressure, mmHg	-	-	-	-	-	-
Adipokines						
Adiponectin, μ g/mL	4	2.498 (1.697 to 3.298)	<0.001	-	-	-
Leptin, μ g/mL	3	-7.908 (-16.71 to 0.896)	0.078	-	-	-

MD, weighted mean difference; CE, concurrent exercise programs; AE, aerobic exercise programs.

* Positive mean difference indicates values that favor AE group; all other values indicate results that favor CE group.

Effects of CE compared to AE on body composition, lipid profile, glucose homeostasis, blood pressure and adipokines in paediatric population, by duration of the study (short and long-term studies).

	Short-term (\leq 24 weeks)			Long-term ($>$ 24 weeks)		
	Study (n)	MD (95% CI)	p	Study (n)	MD (95% CI)	p
Body composition						
Body Mass, kg	3	-0.896 (-4.596 to 2.804)	0.635	6	-3.125 (-6.010 to -0.240)	0.034
Body Mass Index, kg/m ²	4	-0.082 (-1.047 to 0.884)	0.868	6	-1.336 (-2.347 to -0.325)	0.010
Waist circumference, cm	3	-1.301 (-3.893 to 1.291)	0.325	-	-	-
Fat Mass, %	3	-1.549 (-4.841 to 1.743)	0.356	5	-4.678 (-6.849 to -2.506)	<0.001
Fat Mass, kg	3	-2.087 (-6.473 to 2.299)	0.351	6	-5.583 (-9.048 to -2.117)	0.002
Lean body mass, kg	3	0.761 (-1.243 to 2.764)	0.457	6	3.072 (0.090 to 6.053)	0.043
Visceral fat, cm	-	-	-	5	-0.133 (-0.488 to 0.262)	0.554
Subcutaneous fat, cm	-	-	-	4	-0.359 (-0.627 to -0.091)	0.009
Lipids and lipoprotein						
Total Cholesterol, mg/dL	-	-	-	4	-27.16 (-51.12 to -3.212)	0.026
HDL, mg/dL	-	-	-	4	0.694 (-1.950 to 3.338)	0.607
LDL, mg/dL	3	-2.816 (-10.27 to 4.642)	0.459	3	-20.61 (-31.25 to -9.962)	<0.001
Triglycerides, mg/dL	3	1.750 (-18.81 to 22.38)*	0.868	4	15.26 (4.660 to 25.87)*	0.005
Insulin resistance						
Fasting glucose, mg/dL	3	-3.250 (-7.900 to 1.399)	0.171	4	-0.082 (-0.708 to 0.544)	0.798
Fasting insulin, μ U/mL	-	-	-	4	-1.848 (-5.839 to 2.144)	0.364
HOMA-index	-	-	-	4	-0.401 (-1.346 to 0.543)	0.405
Blood pressure						
Systolic Blood Pressure, mmHg	-	-	-	-	-	-
Adipokines						
Adiponectin, μ g/mL	-	-	-	5	2.591 (1.860 to 3.322)	<0.001
Leptin, μ g/mL	-	-	-	4	-6.810 (-13.73 to 0.107)	0.054

MD, mean difference; CE, concurrent exercise programs; AE, aerobic exercise programs.

* Positive mean difference indicates values that favor AE group; all other values indicate results that favor CE group.