

Identification

Articles identified through
database searching
(n = 1,651)

Additional article identified
through manual search
(n = 16)

Screening

Articles screened
(n = 1,667)

Articles excluded after title and
abstract screening (n = 1,641)

Eligibility

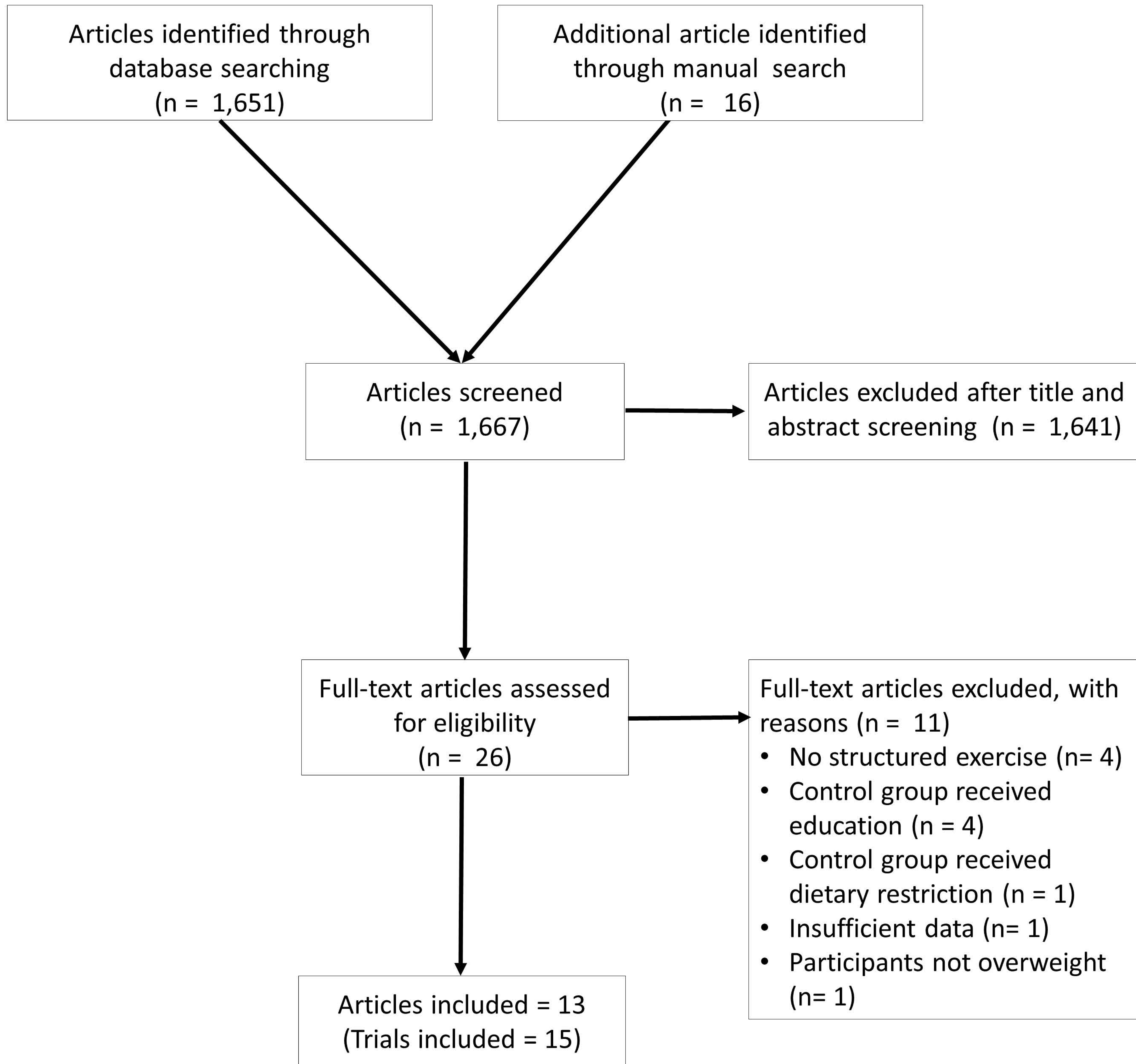
Full-text articles assessed
for eligibility
(n = 26)

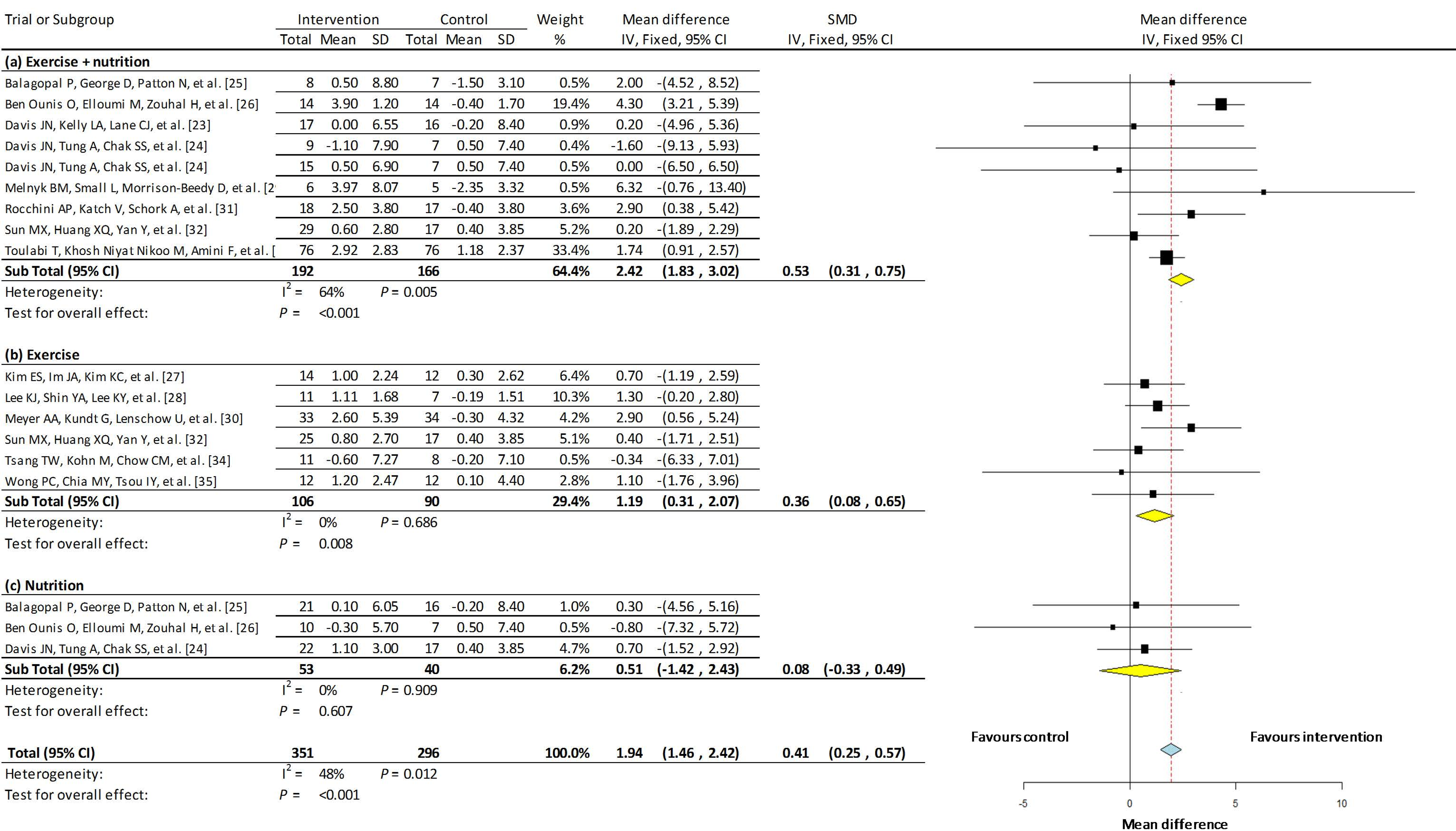
Full-text articles excluded, with
reasons (n = 11)

- No structured exercise (n= 4)
- Control group received
education (n = 4)
- Control group received
dietary restriction (n = 1)
- Insufficient data (n= 1)
- Participants not overweight
(n= 1)

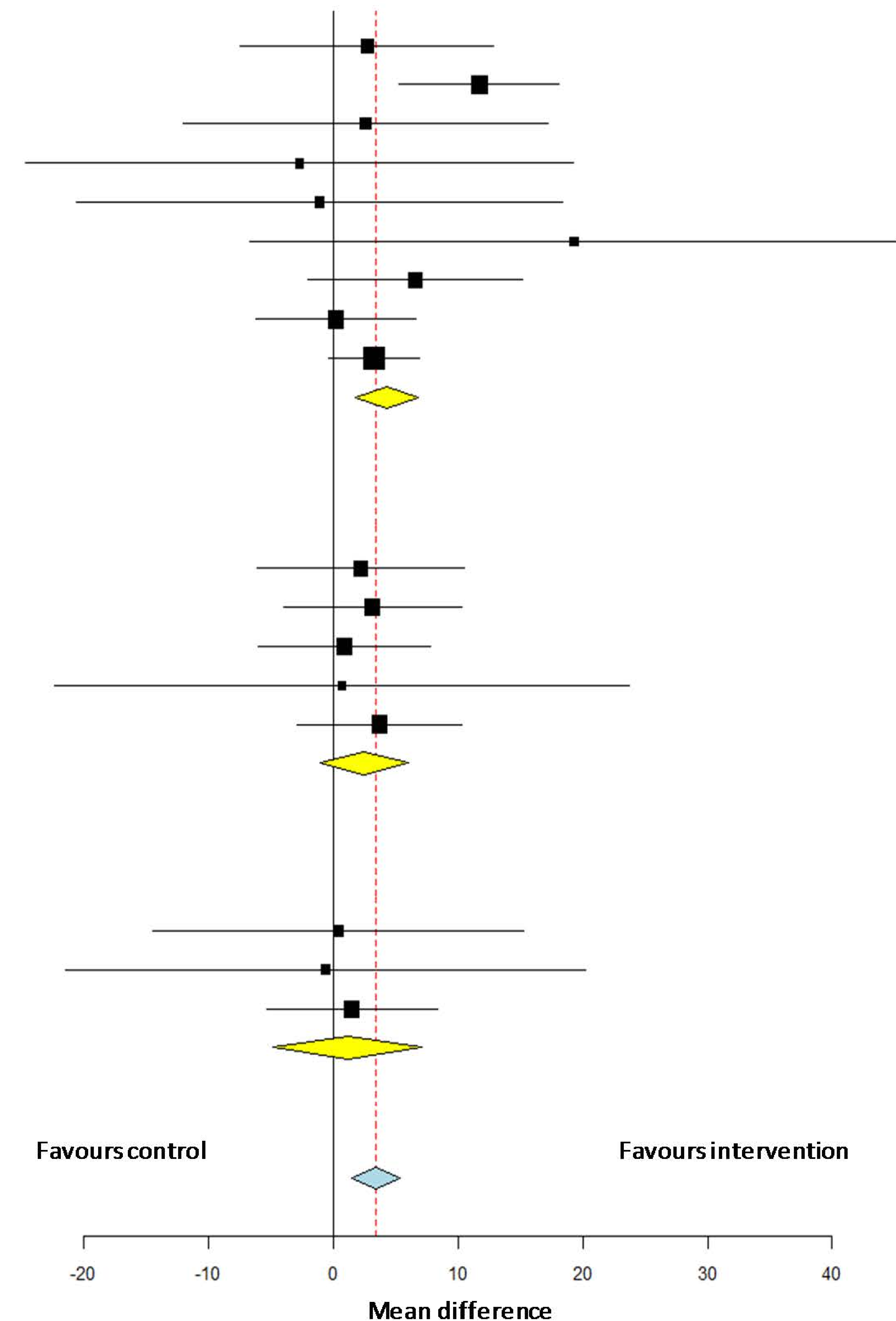
Included

Articles included = 13
(Trials included = 15)

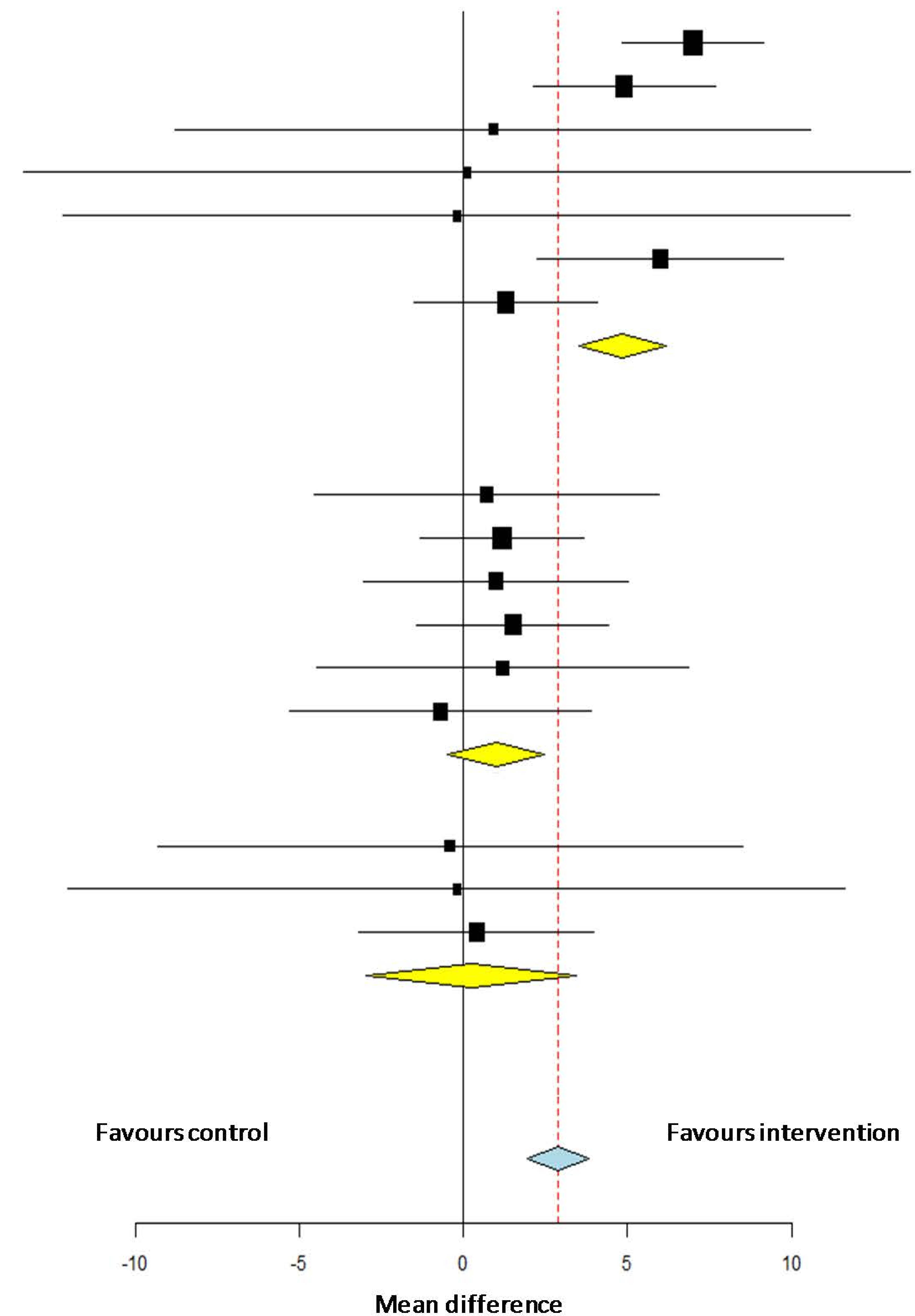




Trial or Subgroup	Intervention			Control			Weight %	Mean difference		SMD		Mean difference	
	Total	Mean	SD	Total	Mean	SD		IV, Fixed, 95% CI	IV, Fixed, 95% CI	IV, Fixed, 95% CI	IV, Fixed, 95% CI		
(a) Exercise + nutrition													
Balagopal P, George D, Patton N, et al. [25]	8	1.30	5.25	7	-1.40	12.85	3.63%	2.70	-(20.63	0.00)			
Ben Ounis O, Elloumi M, Zouhal H, et al. [26]	14	10.50	7.01	14	-1.20	10.06	9.14%	11.70	-(6.10	4.60)			
Davis JN, Kelly LA, Lane CJ, et al. [23]	17	2.00	15.30	16	-0.60	25.90	1.76%	2.60	-(4.01	0.00)			
Davis JN, Tung A, Chak SS, et al. [24]	9	-2.40	21.40	7	0.30	22.90	0.78%	-2.70	-(6.69	0.00)			
Davis JN, Tung A, Chak SS, et al. [24]	15	-0.80	19.10	7	0.30	22.90	0.99%	-1.10	(0.00	0.00)			
Melnyk BM, Small L, Morrison-Beedy D, et al. [2]	6	14.40	30.23	5	-4.90	10.82	0.56%	19.30	-(1.98	UCI)			
Rocchini AP, Katch V, Schork A, et al. [31]	18	2.80	11.05	17	-3.80	14.51	5.12%	6.60	-(5.99	8.47)			
Sun MX, Huang XQ, Yan Y, et al. [32]	29	0.60	9.45	17	0.40	11.40	9.15%	0.20	-(6.22	8.09)			
Toulabi T, Khosh Niyat Nikoo M, Amini F, et al. [76	4.17	11.72	76	0.92	11.30	28.13%	3.25	-(0.41	3.95)			
Sub Total (95% CI)	192			166			59.3%	4.32	(1.80	6.48)	0.30	(0.09	0.51)
Heterogeneity:	$I^2 = 15%$		$P = 0.312$										
Test for overall effect:	$P = <0.001$												
(b) Exercise													
Kim ES, Im JA, Kim KC, et al. [27]	14	2.20	9.17	12	0.00	11.96	5.47%	2.20	-(6.10	4.60)			
Lee KJ, Shin YA, Lee KY, et al. [28]	11	2.56	7.08	7	-0.58	7.83	7.37%	3.14	-(4.01	0.00)			
Sun MX, Huang XQ, Yan Y, et al. [32]	25	1.30	10.85	17	0.40	11.40	7.94%	0.90	-(5.99	8.47)			
Tsang TW, Kohn M, Chow CM, et al. [34]	11	-2.30	24.81	8	-3.00	25.60	0.71%	-0.82	-(25.10	4.10)			
Wong PC, Chia MY, Tsou IY, et al. [35]	12	2.40	8.10	12	-1.30	8.35	8.70%	3.70	-(2.88	3.84)			
Sub Total (95% CI)	73			56			30.2%	2.48	(-1.05	6.02)	0.21	(-0.14	0.56)
Heterogeneity:	$I^2 = 0%$		$P = 0.983$										
Test for overall effect:	$P = 0.168$												
(c) Nutrition													
Balagopal P, George D, Patton N, et al. [25]	21	-0.20	18.20	16	-0.60	25.90	1.70%	0.40	-(14.49	15.29)			
Ben Ounis O, Elloumi M, Zouhal H, et al. [26]	10	-0.30	19.60	7	0.30	22.90	0.87%	-0.60	-(21.47	20.27)			
Davis JN, Tung A, Chak SS, et al. [24]	22	1.90	10.10	17	0.40	11.40	7.99%	1.50	-(5.37	8.37)			
Sub Total (95% CI)	53			40			10.6%	1.15	(-4.83	7.13)	0.06	(-0.35	0.47)
Heterogeneity:	$I^2 = 0%$		$P = 0.997$										
Test for overall effect:	$P = 0.706$												
Total (95% CI)	318			262			100.0%	3.43	(-1.49	5.37)	0.24	(0.08	0.41)
Heterogeneity:	$I^2 = 0%$		$P = 0.802$										
Test for overall effect:	$P = <0.001$												



Trial or Subgroup	Intervention			Control			Weight %	Mean difference		SMD	
	Total	Mean	SD	Total	Mean	SD		IV, Fixed, 95% CI	IV, Fixed, 95% CI	Mean difference	IV, Fixed, 95% CI
(a) Exercise + nutrition											
Balagopal P, George D, Patton N, et al. [25]	8	6.30	2.30	7	-0.70	1.95	19.3%	7.00	(4.85 , 9.15)		
Ben Ounis O, Elloumi M, Zouhal H, et al. [26]	14	4.50	5.02	14	-0.40	1.70	11.6%	4.90	(2.13 , 7.67)		
Davis JN, Kelly LA, Lane CJ, et al. [23]	17	1.20	12.14	16	0.30	15.84	1.0%	0.90	-(8.77 , 10.57)		
Davis JN, Tung A, Chak SS, et al. [24]	9	0.40	13.10	7	0.30	14.10	0.5%	0.10	-(13.40 , 13.60)		
Davis JN, Tung A, Chak SS, et al. [24]	15	0.10	11.60	7	0.30	14.10	0.6%	-0.20	-(12.18 , 11.78)		
Rocchini AP, Katch V, Schork A, et al. [31]	18	6.00	4.53	17	0.00	6.52	6.4%	6.00	(2.26 , 9.74)		
Sun MX, Huang XQ, Yan Y, et al. [32]	29	2.40	4.07	17	1.10	5.00	11.4%	1.30	-(1.50 , 4.10)		
Sub Total (95% CI)	110			85			50.8%	4.85	(3.52 , 6.17)	0.57	(0.27 , 0.87)
Heterogeneity:	$I^2 = 51%$		$P = 0.058$								
Test for overall effect:	$P = <0.001$										
(b) Exercise											
Kim ES, Im JA, Kim KC, et al. [27]	14	2.20	7.86	12	1.50	5.78	3.2%	0.70	-(4.56 , 5.96)		
Lee KJ, Shin YA, Lee KY, et al. [28]	11	1.37	3.32	7	0.19	2.08	14.4%	1.18	-(1.32 , 3.68)		
Meyer AA, Kundt G, Lenschow U, et al. [30]	33	1.00	8.46	34	0.00	8.36	5.5%	1.00	-(3.03 , 5.03)		
Sun MX, Huang XQ, Yan Y, et al. [32]	25	2.60	4.37	17	1.10	5.00	10.4%	1.50	-(1.43 , 4.43)		
Tsang TW, Kohn M, Chow CM, et al. [34]	11	1.50	7.12	8	0.30	5.45	2.8%	1.20	-(4.45 , 6.85)		
Wong PC, Chia MY, Tsou IY, et al. [35]	12	0.80	7.10	12	1.50	3.95	4.2%	-0.70	-(5.30 , 3.90)		
Sub Total (95% CI)	106			90			40.5%	1.19	(-0.48 , 2.49)	0.16	(-0.13 , 0.44)
Heterogeneity:	$I^2 = 0%$		$P = 0.984$								
Test for overall effect:	$P = 0.185$										
(c) Nutrition											
Balagopal P, George D, Patton N, et al. [25]	21	-0.11	10.20	16	0.30	15.84	1.1%	-0.41	-(9.32 , 8.49)		
Ben Ounis O, Elloumi M, Zouhal H, et al. [26]	10	0.10	9.00	7	0.30	14.10	0.6%	-0.20	-(12.04 , 11.64)		
Davis JN, Tung A, Chak SS, et al. [24]	22	1.50	6.42	17	1.10	5.00	7.0%	0.40	-(3.18 , 3.98)		
Sub Total (95% CI)	53			40			8.7%	0.25	(-2.95 , 3.45)	0.01	(-0.40 , 0.42)
Heterogeneity:	$I^2 = 0%$		$P = 0.983$								
Test for overall effect:	$P = 0.878$										
Total (95% CI)	269			215			100.0%	2.89	(1.94 , 3.83)	0.28	(0.10 , 0.47)
Heterogeneity:	$I^2 = 50%$		$P = 0.012$								
Test for overall effect:	$P = <0.001$										



Trial or Subgroup	Intervention			Control			Weight %	Mean difference		SMD	
	Total	Mean	SD	Total	Mean	SD		IV, Fixed, 95% CI	IV, Fixed, 95% CI		
(a) Exercise + nutrition											
Balagopal P, George D, Patton N, et al. [25]	8	5.87	2.30	7	-0.03	1.95	21.3%	5.91	(3.76 , 8.06)		
Ben Ounis O, Elloumi M, Zouhal H, et al. [26]	14	-3.03	4.36	14	0.10	5.35	7.5%	-3.13	-(6.74 , 0.49)		
Davis JN, Kelly LA, Lane CJ, et al. [23]	17	1.10	11.40	16	1.10	10.66	3.5%	0.00	-(7.53 , 7.53)		
Davis JN, Tung A, Chak SS, et al. [24]	9	1.40	7.60	7	0.10	8.80	1.5%	1.30	-(6.89 , 9.49)		
Davis JN, Tung A, Chak SS, et al. [24]	15	0.80	6.70	7	0.10	8.80	1.8%	0.70	-(6.65 , 8.05)		
Rocchini AP, Katch V, Schork A, et al. [31]	18	2.42	6.08	17	1.52	6.52	5.6%	0.91	-(3.28 , 5.09)		
Sun MX, Huang XQ, Yan Y, et al. [32]	29	0.60	6.50	17	0.00	5.60	7.8%	0.60	-(2.96 , 4.16)		
Sub Total (95% CI)	110			85			49.0%	2.53	(1.11 , 3.50)	0.16	(0.14 , 0.45)
Heterogeneity:	$I^2 = 71%$		$P = 0.002$								
Test for overall effect:	$P = <0.001$										
(b) Exercise											
Kim ES, Im JA, Kim KC, et al. [27]	14	0.20	5.43	12	1.40	5.78	5.2%	-1.20	-(5.53 , 3.13)		
Lee KJ, Shin YA, Lee KY, et al. [28]	11	0.65	1.90	7	-0.19	2.08	27.1%	0.84	-(1.07 , 2.75)		
Sun MX, Huang XQ, Yan Y, et al. [32]	25	0.20	7.15	17	0.00	5.60	6.6%	0.20	-(3.67 , 4.07)		
Tsang TW, Kohn M, Chow CM, et al. [34]	11	2.30	10.16	8	1.80	10.25	1.1%	0.50	-(8.80 , 9.80)		
Wong PC, Chia MY, Tsou IY, et al. [35]	12	1.60	7.15	12	1.60	11.55	1.7%	0.00	-(7.69 , 7.69)		
Sub Total (95% CI)	73			56			41.7%	0.44	(-1.10 , 1.98)	0.03	(-0.14 , 0.45)
Heterogeneity:	$I^2 = 0%$		$P = 0.945$								
Test for overall effect:	$P = 0.575$										
(c) Nutrition											
Balagopal P, George D, Patton N, et al. [25]	21	0.00	10.52	16	1.10	10.66	2.1%	-1.10	-(7.99 , 5.79)		
Ben Ounis O, Elloumi M, Zouhal H, et al. [26]	10	0.10	9.70	7	0.10	8.80	1.3%	0.00	-(8.87 , 8.87)		
Davis JN, Tung A, Chak SS, et al. [24]	22	-0.40	7.40	17	0.00	5.60	5.9%	-0.40	-(4.48 , 3.68)		
Sub Total (95% CI)	53			40			9.2%	-0.50	(-3.77 , 2.76)	-0.07	(-0.48 , 0.35)
Heterogeneity:	$I^2 = 0%$		$P = 0.978$								
Test for overall effect:	$P = 0.763$										
Total (95% CI)	236			181			100.0%	1.38	(0.39 , 2.37)	0.07	(-0.13 , 0.26)
Heterogeneity:	$I^2 = 48%$		$P = 0.020$								
Test for overall effect:	$P = 0.007$										

