

Table S1. Database search formulas

Data base	Search terms for query
Pubmed	
#1	(((((frailty/) OR frail) OR sarcopenia) OR elderly) OR older adults
#2	[(nursing home) OR (institution)] residents
#3	((progressive resistance training) OR resistance exercise) OR strength training) OR strengthening exercise
#4	((weight training) OR weight lifting/) OR weighted exercise
#5	multicomponent exercise
#6	(physical activity exercise) OR function training
#7	[(whey protein) Or (amino-acid) OR (leucine)] supplement
#8	[(diet) OR (nutrient)] intervention
#9	[(nutrient) OR (nutrition)] supplement
#10	(#1) OR 2
#11	((#3) OR #4) OR #5) OR #6
#12	((#7) OR #8) OR #9
#13	((#10) AND #11) AND #12 AND (randomized controlled trial)

Physiotherapy Evidence Database (PEDro)

Method: clinical trial

Abstract & Title:

- | | |
|----|----------------------------|
| #1 | frail elderly |
| #2 | frailty |
| #3 | sarcopenia |
| #4 | resistance training |
| #5 | strengthening exercise |
| #6 | multicomponent exercise |
| #7 | physical activity exercise |
| #8 | protein supplement |
| #9 | whey protein supplement |

(continued)

Table S1. (continued)

Data base	Search terms for query
Excerpta Medica dataBASE (EMBASE)	
#1	sarcopenia
#2	frailty
#3	frail
#4	elderly
#5	Older adults
#6	('nursing'/exp OR nursing) AND ('home'/exp OR home)
#7	'institutional care'
#8	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7
#9	Resistance AND training OR exercise
#10	strength AND training OR exercise
#11	strengthening exercise
#12	multicomponent AND exercise
#13	physical AND activity AND exercise AND training
#14	function training
#15	#9 OR #10 OR #11 OR #12 OR #13 OR #14
#16	whey protein supplement
#17	whey protein
#18	leucine
#19	nutrition AND supplement
#20	nutrient AND supplement
#21	#16 OR #17 OR #18 OR #19 OR #20
#22	#8 AND #15 AND #21
#23	#22 AND [randomized controlled trial]/lim AND ([article]/lim OR [article in press]/lim) AND [humans]/lim
Cochrane Library Database	
#1	frailty
#2	sarcopenia
#3	resistance training
#4	strengthening exercise
#5	multicomponent exercise
#6	physical activity exercise
#7	protein supplement
#8	#1 OR #2
#9	#3 OR #4 OR #5 OR #6
#10	#7 AND #8 AND #9

(continued)

Table S1. (continued)

Data base	Search terms for query
China knowledge resource integrated database	
#1	(frailty) OR (frail elderly)
#2	exercise training
#3	(whey protein) OR (leucine)
#4	#1 AND #2 AND #3 AND (randomized controlled trial)
Google Scholar	
#1	allintitle: frail elderly OR frailty
#2	allintitle: resistance training OR strengthening exercise
#3	allintitle: multicomponent exercise OR physical activity exercise
#4	allintitle: protein supplement OR whey OR leucine

Figure S1

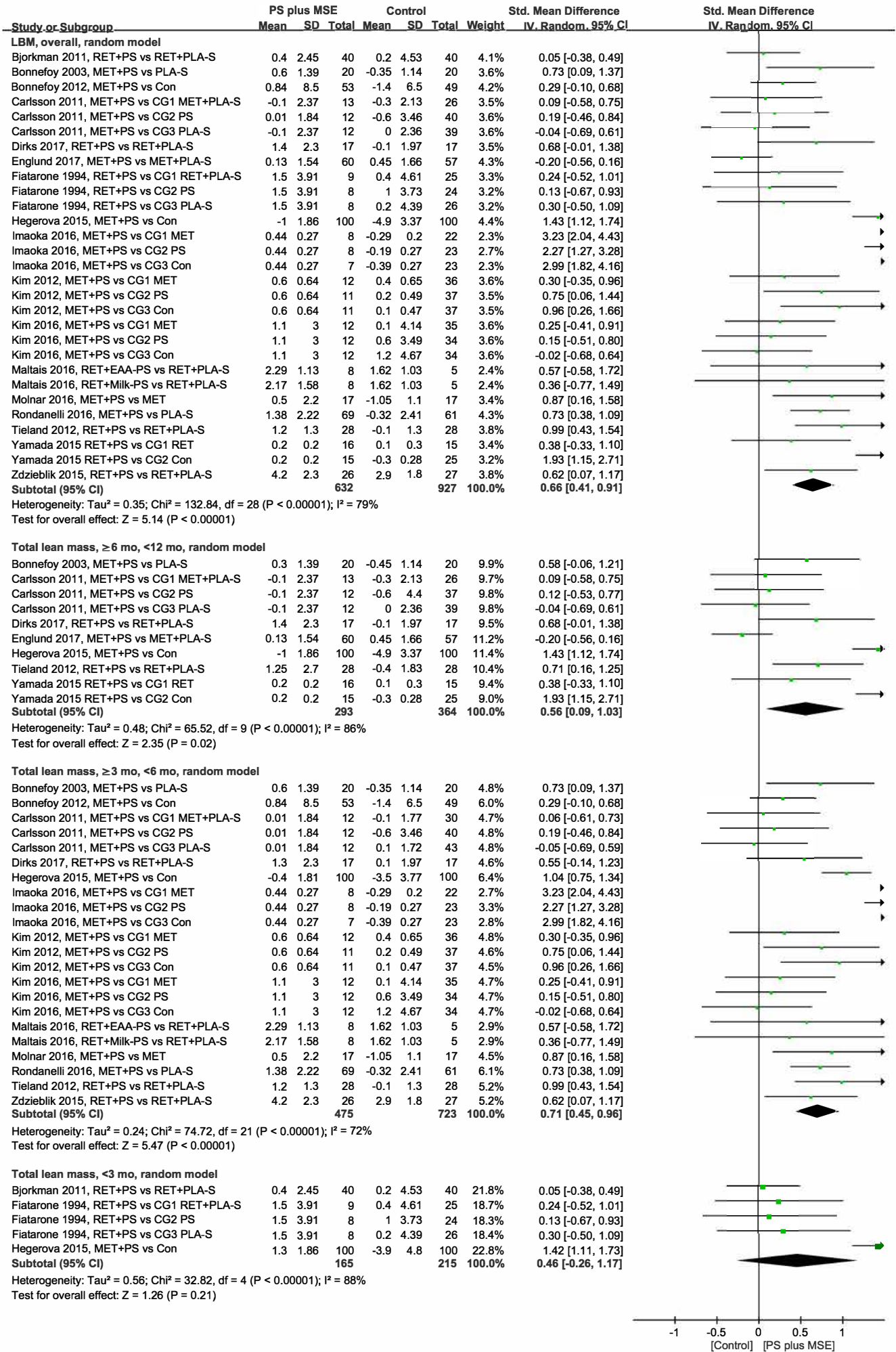


Figure S1. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on lean body mass at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; IV = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training.

Figure S2

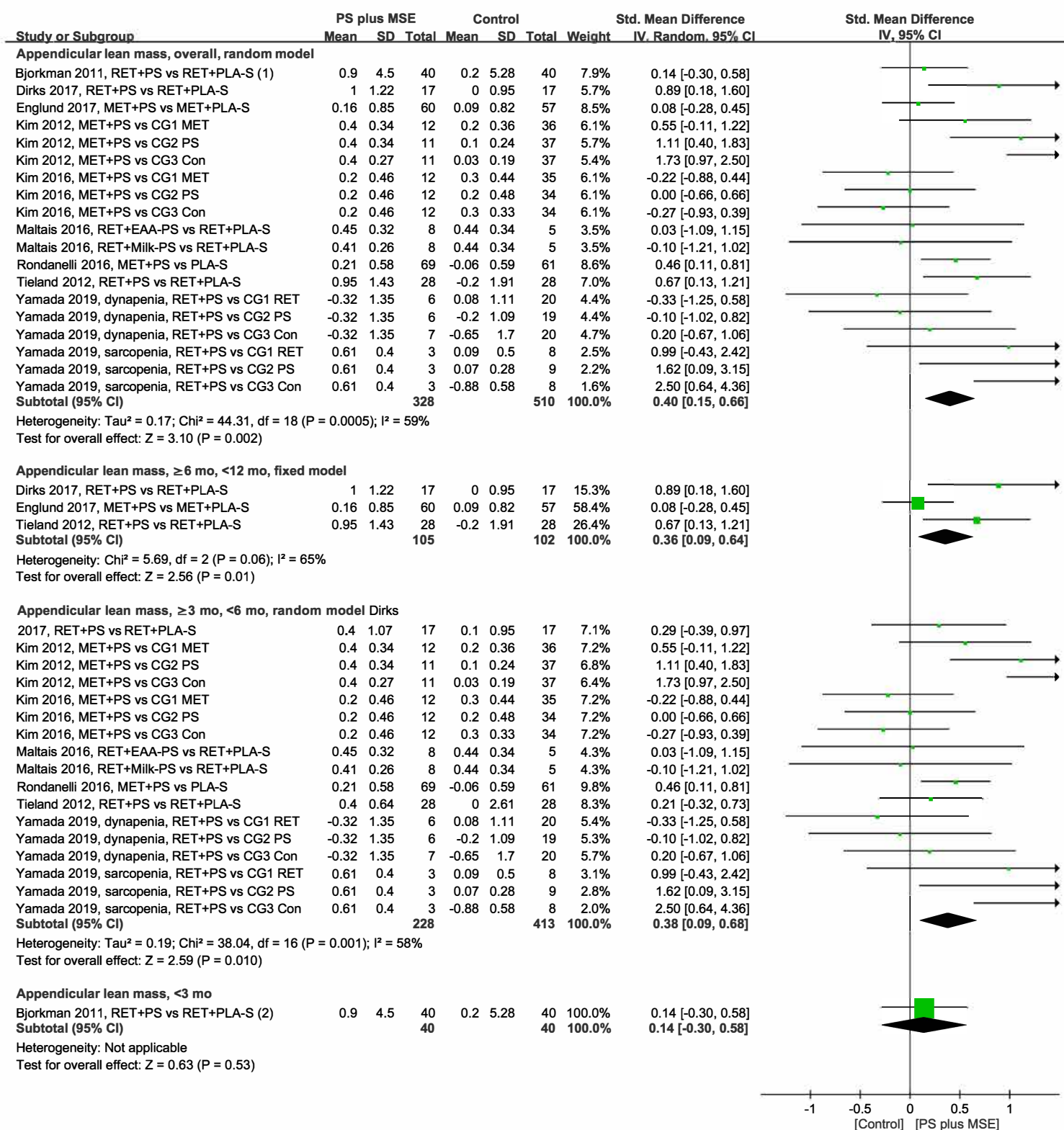


Figure S2. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on appendicular lean mass at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; IV = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training.

Figure S3

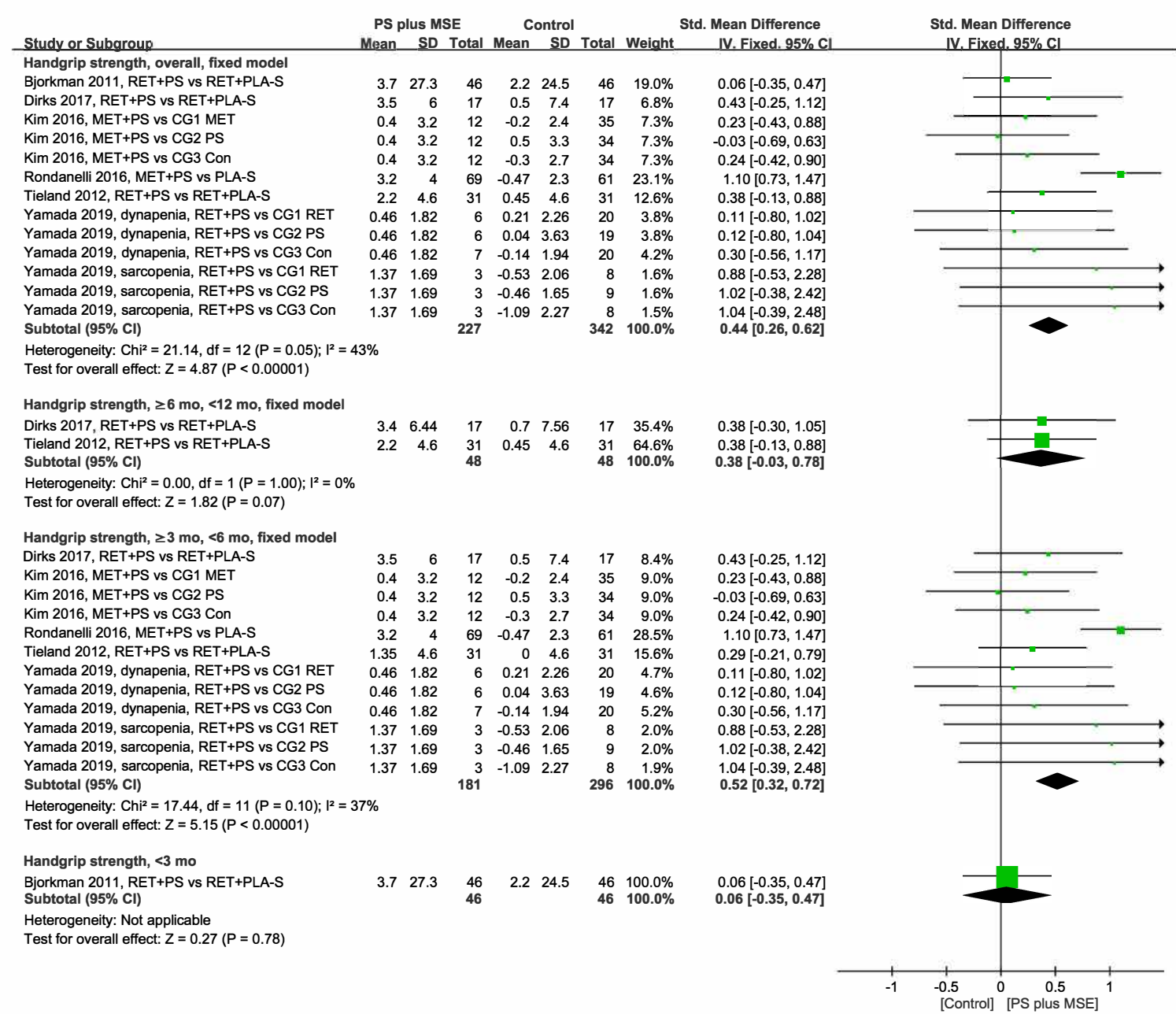


Figure S3. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on handgrip strength at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; IV = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training.

Figure S4

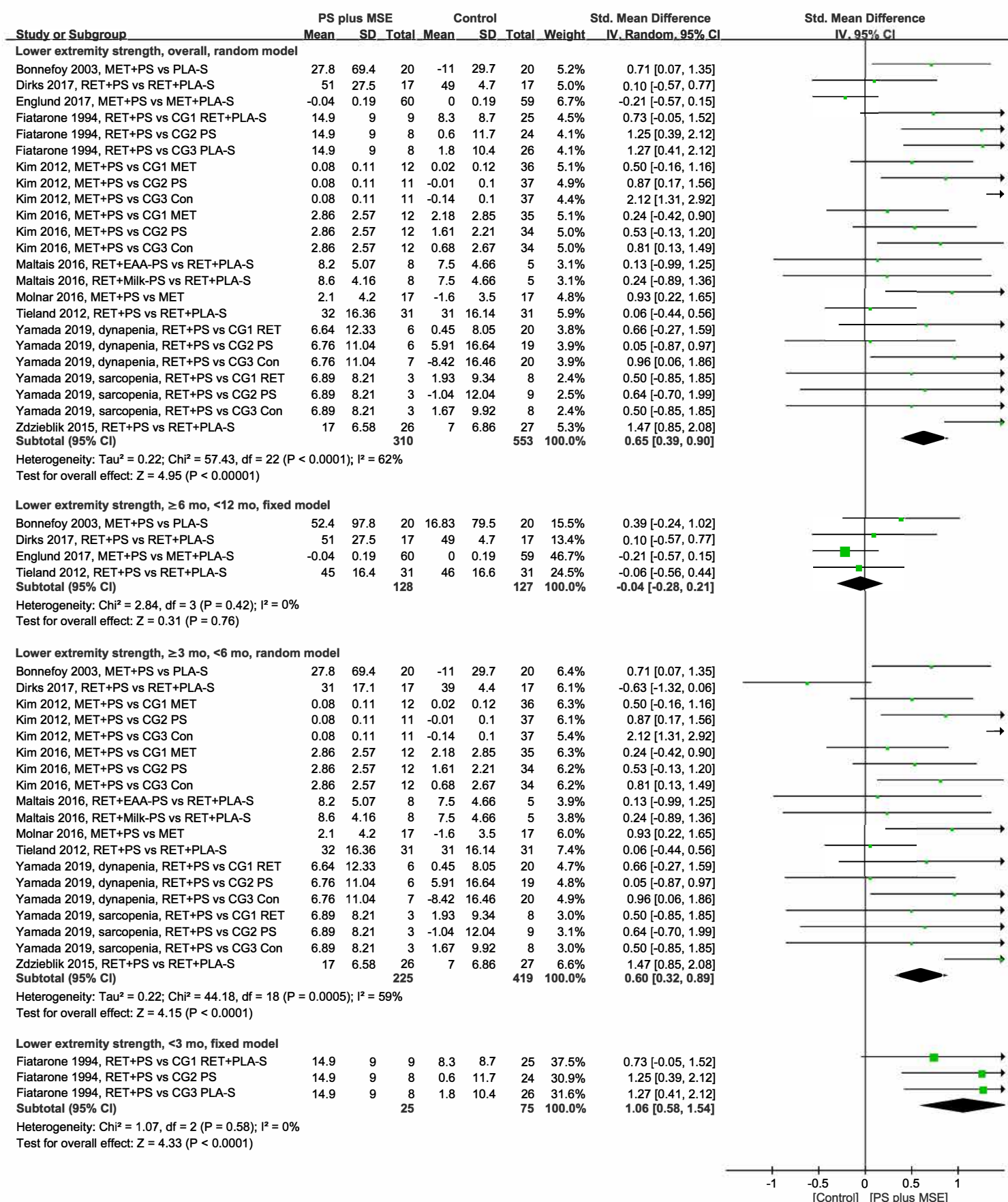


Figure S4. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on leg strength at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; IV = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training.

Figure S5

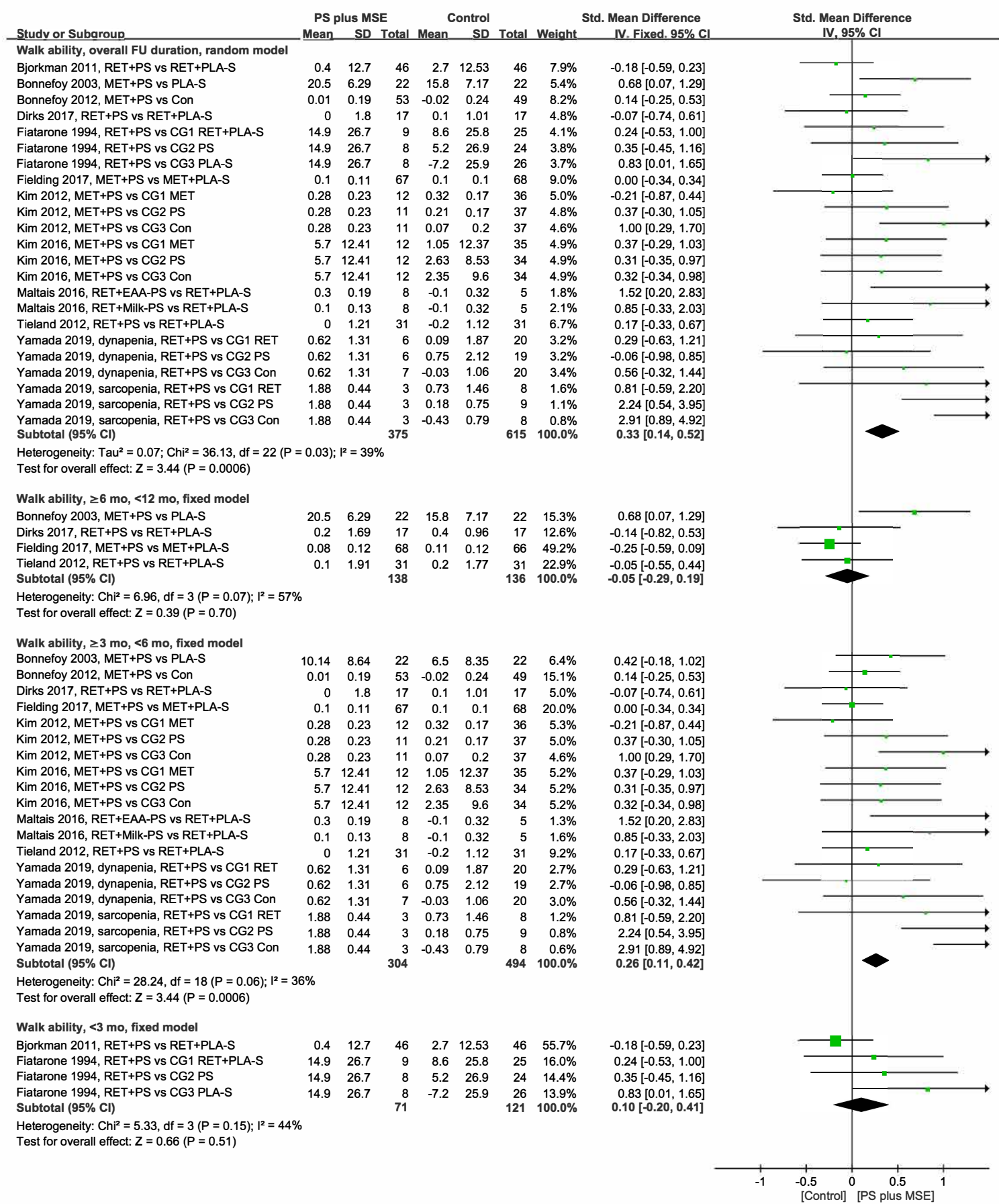


Figure S5. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on walk capability at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; IV = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training.

Figure S6

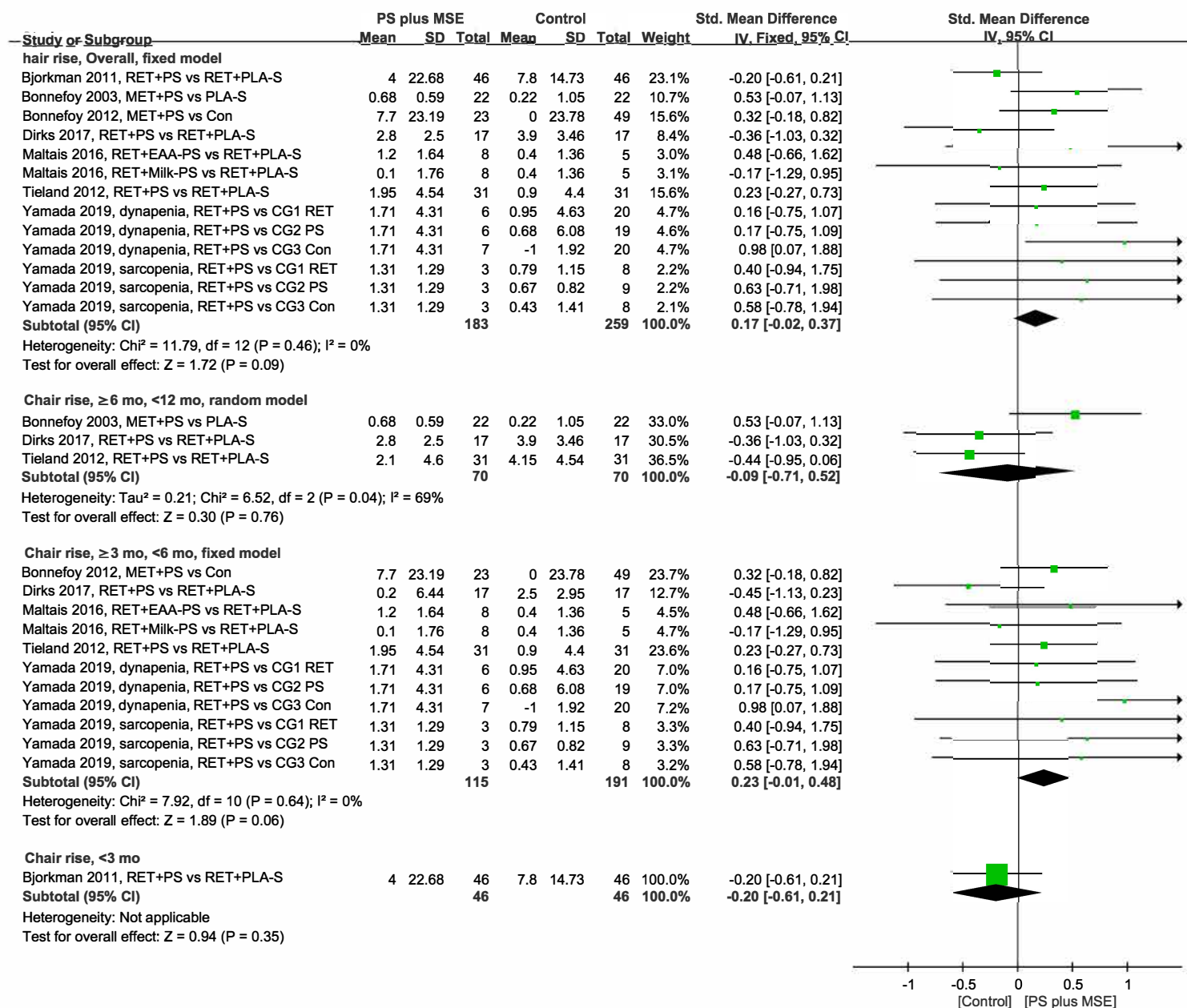


Figure S6. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on chair rise at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; lv = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training.

Figure S7

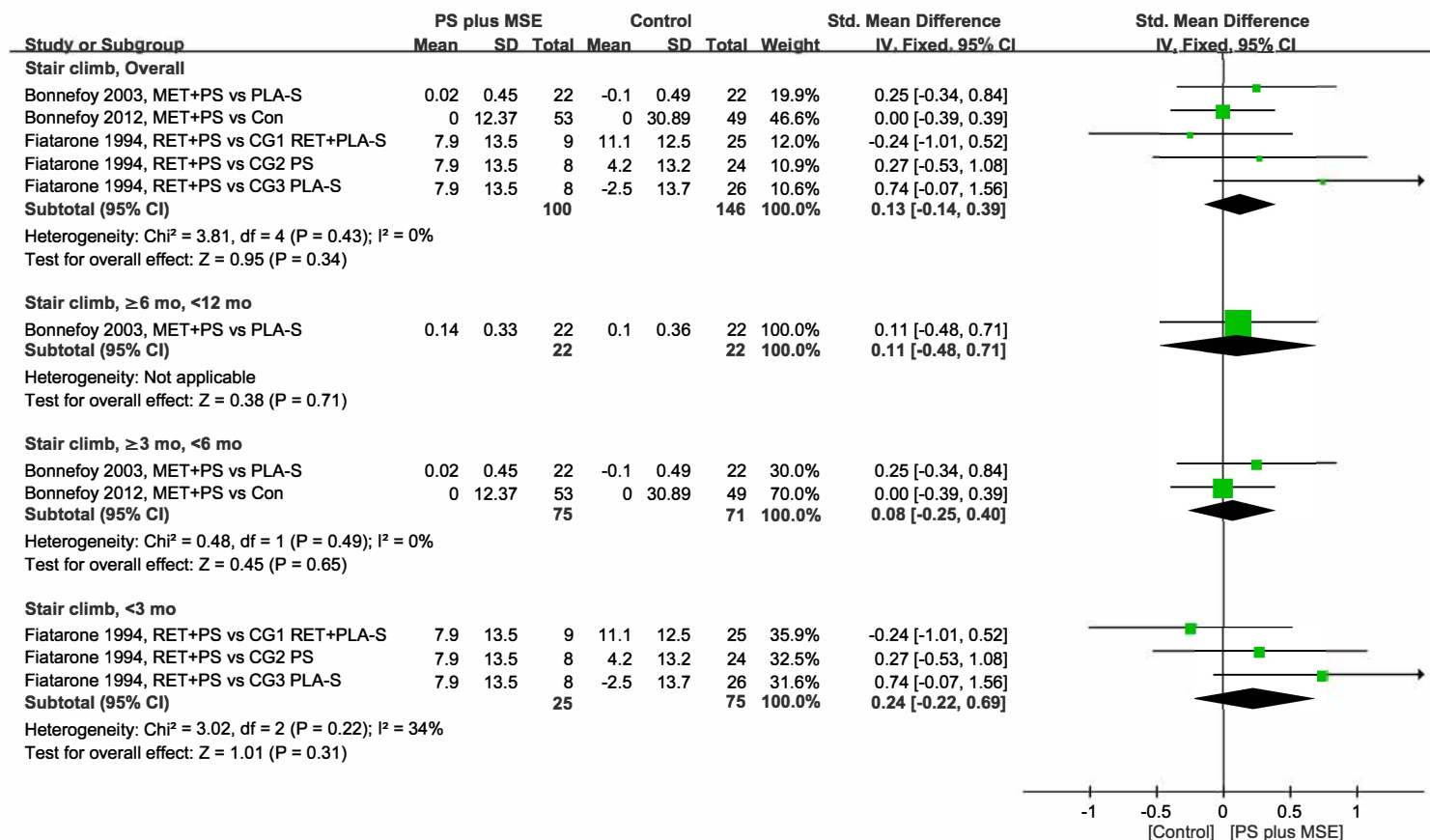


Figure S7. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on stair climb at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; IV = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training.

Figure S8

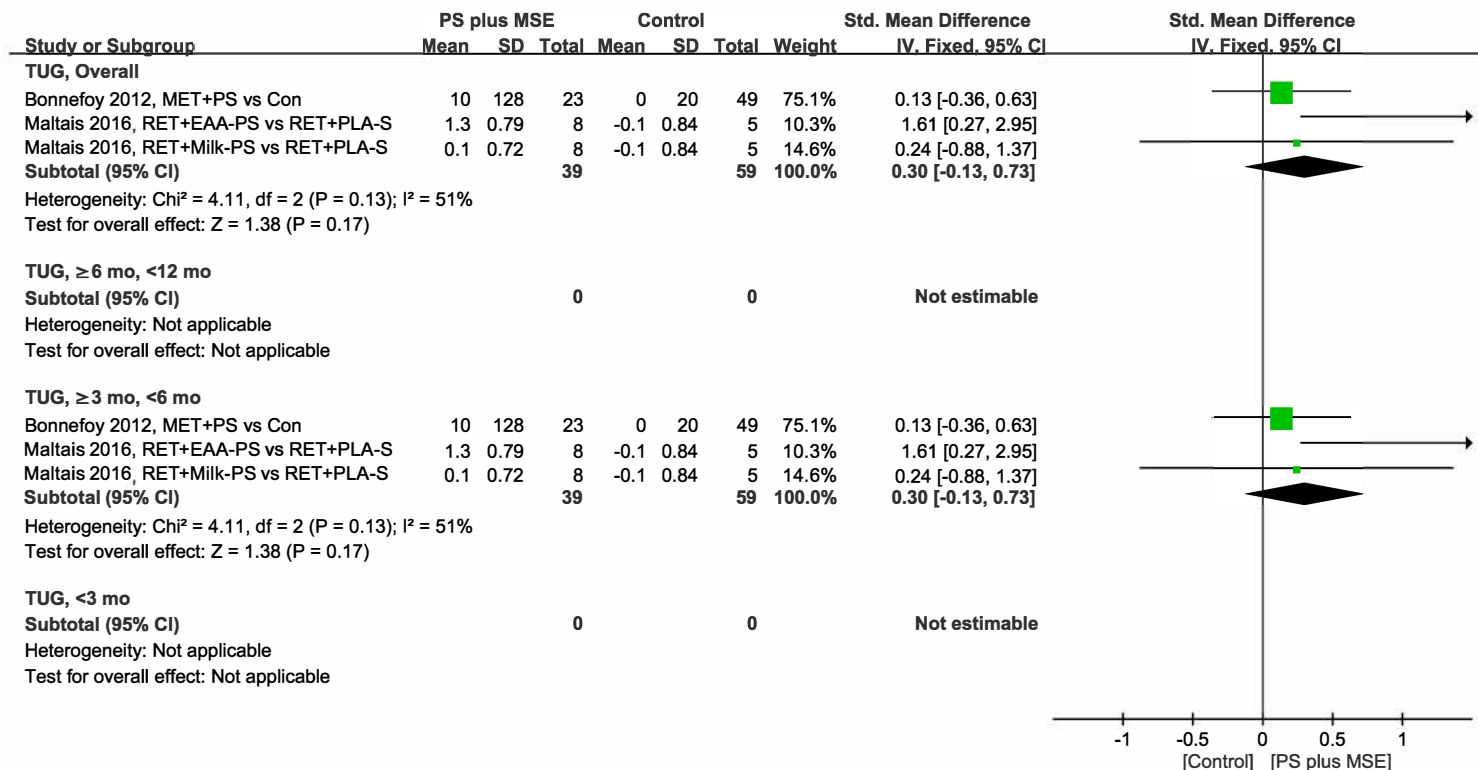


Figure S8. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on timed up-and-go (TUG) at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; IV = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training.

Figure S9

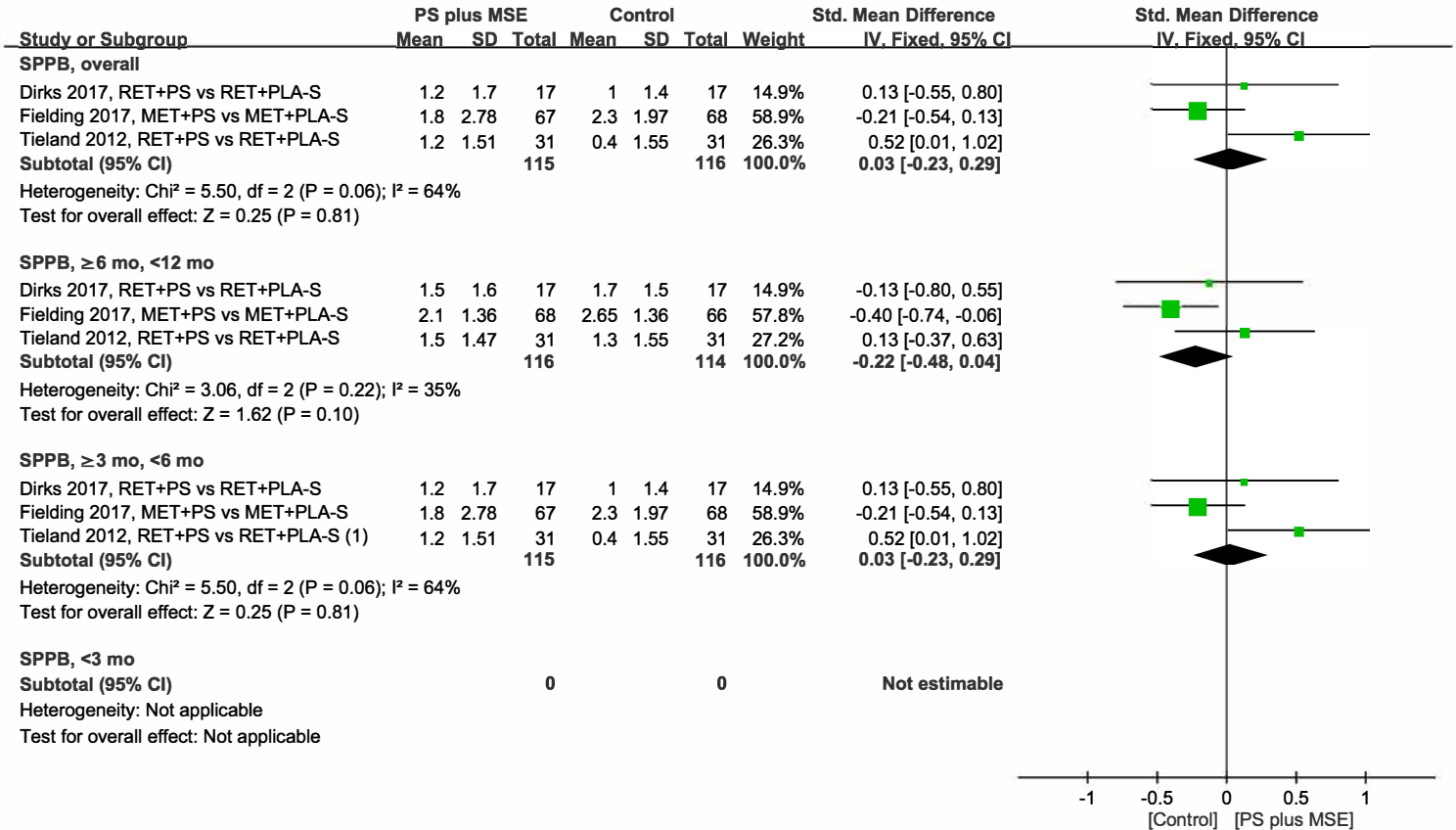


Figure S9. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on SPPB at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; IV = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training; SPPB = short physical performance battery.

Figure S10

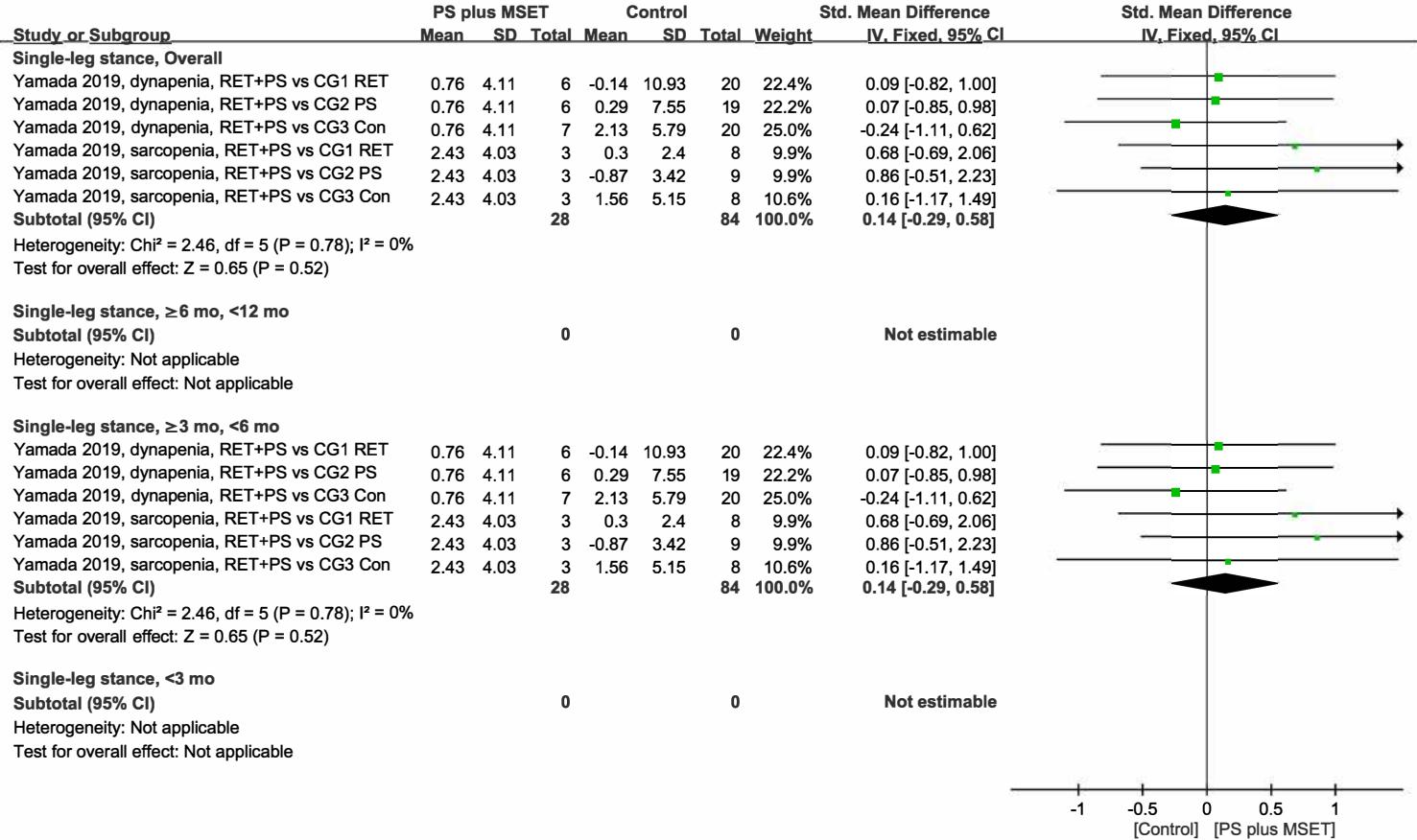


Figure S10. Forest plot summarizing effects of protein supplement (PS) plus muscle strength exercise training (MSE) on single leg stance at an overall duration and each follow-up time point. The horizontal line links the lower and upper limits of the 95% CI of this effect. The combined effects are plotted using black diamonds. 95% CI = 95% confidence interval; Std. = standard; IV = inverse variance; CG = control group; Con = control; MET = multicomponent exercise training; PLA-S, placebo supplement; RET = resistance exercise training.