Tables

Supplementary Table 1 Excluded randomised controlled trials found from search strategy and reason.

No	Excluded randomised controlled trials found from search strategy	Reason
1.	Backward walking training to improve mobility in acute stroke: A pilot study [1]	Poster
2.	Effect of retro and forward walking on quadriceps muscle strength, pain, function, and mobility in patients with knee osteoarthritis: a protocol for a randomized controlled trial [2]	Protocol
3.	Effect of backward walking treadmill training on walking capacity after stroke: a randomized clinical trial [3]	Protocol
4.	Effectiveness of backward walking treadmill training in lower extremity function after stroke [4]	Chinese Language
5.	Forward and backward locomotion in individuals with dizziness [5]	Not gait impairment condition
6.	Warm-up reduces delayed onset muscle soreness but cool-down does not: a randomised controlled trial [6]	Healthy subjects

Supplementary Table 2. Summary of included studies (n = 21)

Experimental group vs control group	Study/condition	Design	Participants	Intervention	Outcome measures
1. BW with CPT *vs* CPT	**Rathi et al** [31] **(2017)** **Low back pain**	RCT	Exp: n= 15 Mean age 36.73 Con: n = 15 Mean age 34	Exp = Backward walking (BW) 10 min/session, 5 sessions/day x 4 weeks with conventional physiotherapy treatment (CPT) 10 min Con = CPT 10 min CPT = Heat therapy and strengthening exercises	NPRS Core muscle strength Follow-up = 4 weeks
	Rangey et al [27] **(2017)** **Knee osteoarthritis**	Quasi Exp study	Exp: n = 10 (4M, 6F) Mean age 53.4 ± 8.9 Con : n = 10 (1M, 9F) Mean age 49.0 ± 7.2	Exp = BW with CPT 20 min/session, 2 sessions/day x 2 weeks Con 1 = CPT 10 min/day x 2 weeks CPT = Heat therapy, strengthening and stretching exercises.	VAS WOMAC Follow-up = 2 weeks
	Wadhwa et al [24] **(2016)** **Knee osteoarthritis**	RCT	Exp: n = 17 (7 M, 10 F) Mean age 65.65 ± 4.26 Con: n = 15(6 M, 9 F) Mean age 67.59 ± 4.78	Exp = BW 10 min/session, 3 weeks with CPT Con = CPT 5 sessions hold/2 sessions of rest, 10 repetitions, 3 days/week for 3 weeks CPT = Heat therapy and strengthening exercises	NPRS WOMAC Follow-up = 3 weeks
	Anadkat et al [32] **(2015)** **Knee osteoarthritis**	RCT	Exp: n = 20 (8M, 12F) Mean age 51.30 ± 6.48 Con: n = 20 (11M, 9F) Mean age 49.95 ± 6.93	Exp = BW 10 min/session, 5 days/week (3 weeks) with CPT 20 min/day Con = CPT 20 min/day	VAS WOMAC Follow-up = 3 weeks

			CPT = Heat therapy, strengthening and stretching exercises	
Manisha et al [25] (2015) Knee osteoarthritis	RCT	Exp: n = 15 Con: n = 15 Age = 40 – 60	Exp = BW 10 min/session, 4 weeks with CPT Con = CPT 4 weeks CPT = Heat therapy and strengthening exercises	Step test WOMAC Follow-up = 4 weeks
Rathi et al [23] (2014) Knee osteoarthritis	RCT	Exp: n = 10 Mean age 53.9 ± 5.7 Con: n = 10 Mean age 53.2 ± 8.24	Exp = BW 10 min/session, 3 days/week (2 weeks) with CPT 20 min/day Con = CPT 20 min/day CPT = Heat therapy, strengthening and stretching exercises	NPRS Reduced WOMAC Quadriceps strength Follow–up = 2 weeks
Gondhalekar et al [9] (2013) Knee osteoarthritis	RCT	Exp: n = 15 (8M) Con: n = 15 (7M) Mean age 63.43 ± 6.202	Exp = BW 10 min/session, 3 sessions/day x 3weeks with CPT Con = CPT 20 min/session, 2 sessions/day x 3 weeks CPT = Heat therapy and strengthening exercises.	VAS WOMAC Concentric strength of hip abductors and extensors, Follow-up = 3 weeks
Khyatee et al [30] (2013) Knee pain	RCT	Exp: n = 15 (9M, 6F) Mean age 38.8 ± 8.55 Con: n = 15 (7M, 8F) Mean age 36.6 ± 9.47	Exp = BW 2 to 2.5 km/hr for 5 min, 10 days with CPT Con = CPT 10 repetitions, 3 sets/day, 10 days CPT = Strengthening exercises	VAS Quadriceps strength Follow-up = 10 days

2. BW with CPT including other gait training *vs* **CPT including other gait training**	**Yong Kim et al** [28] **(2017)** **Stroke**	RCT	Exp: n = 17 Mean age 63.35 ± 7.27 Con: n = 17 Mean age 63.33 ± 11.60	Exp = BW with CPT 30 min, 3x/week, 3 weeks Con = CPT 30 min, 3x/week, 3 weeks CPT = functional mobility and strengthening exercises included with other gait training	Gait velocity Cadence Stride length Follow-up = 3 weeks
	El Aziz et al [38] **(2017)** **Juvenile rheumatoid arthritis**	RCT	Exp: n = 15 (18G, 12B) Mean age 7.06 ± 1.24 Con : n = 15 Mean age 7.38 ± 1.18	Exp = BW 20 min, 3 sessions/week, 12 weeks with CPT 60 min 3 sessions/week, 12 weeks Con = CPT 60 min 3 sessions/week, 12 weeks CPT = stretching and strengthening exercises included with other gait training	Berg balance scale Overall stability Follow-up = 12 weeks
	El Basatiny et al [39] **(2014)** **Cerebral palsy**	RCT	Exp: n = 15 (14G, 16B) Mean age 11.98 ± 1.21 Con: n = 15 Mean age 12.51 ± 1.27	Exp = BW 25 min, 3 sessions/week, 12 weeks with CPT 60 min 3 sessions/week, 12 weeks Con = CPT 60 min 3 sessions/week, 12 weeks CPT = training for postural stability stretching and strengthening exercises included with other gait training	Overall stability Follow-up = 12 weeks
	Khadilkar et al [29] **(2011)** **Anterior cruciate ligament injury**	RCT	Exp: n = 15 Mean age 25.48 ± 4.43 Con: n = 15 Mean age 25.88 ± 3.47	Exp = BW 10 min/day with CPT Con = CPT 20 min/day, 4 weeks CPT = strengthening exercises included with other gait training	Quadriceps and hamstring strength Step length Stride length Cadence

					Follow-up = 4 weeks
	Takami et al [11] **(2010) Stroke**	RCT	Exp: n = 12 (6M), Mean age 66.1 ± 6.3, Hemiplegic side (right 7) Con: n = 12 (5M), Mean age 66.9 ± 10.6, Hemiplegic side (right 10)	Exp = Partial body weight supported BW training on treadmill with CPT Con = Partial body weight supported forward walking (FW) training on treadmill with CPT 30 min of CPT and 10 min of walking training - either backward or forward; total 40 min, 6 x/week (3weeks) CPT = functional mobility and strengthening exercises, included with gait training	Berg balance scale Velocity Cadence Step length Follow–up = 3 weeks
	Yang et al [2] **(2005) Stroke**	RCT	Exp: n = 13 (10M) Mean age 63.38 ± 7.7 Hemiplegic side (right 8) Con: n = 12 (9M) Mean age 63.42 ± 11.06 Hemiplegic side (right 8)	Exp = BW training for 30 min with CPT for 40 min, 3x/week (3 weeks). Con = CPT 40 min; 3x/week (3 weeks). CPT = functional mobility and strengthening exercises, included with other gait training	Velocity Cadence Stride length Follow–up = 3 weeks
3. BW with CPT *vs* **CPT with other gait /physiotherapy training**	**Rose et al** [40] **(2018) Stroke**	RCT	Exp: n = 10 (4M, 4F) Mean age 53.8 ± 12.1 Hemiplegic side (right 3, left 5) Con: n = 8 (2M, 6F) Mean age 66.6 ± 7.3 Hemiplegic side (right 3, left 5)	Exp = BW with CPT Con = CPT with standing balance training CPT = other physiotherapy training	Berg balance scale Follow-up = 12 weeks

	Abdel aziem and El Basatiny [37] (2016) Cerebral palsy	RCT	Exp: n = 15 (14G, 16B) Mean age 11.63 ± 1.40 Con: n = 15 Mean age 11.46 ± 1.43	Exp = BW 25 min, 3 sessions/week, 12 weeks with CPT 60 min3 sessions/week, 12 weeks Con = CPT 60 min, 3 sessions/week, 12 weeks CPT = training for postural stability stretching and strengthening exercises, included with other gait training	Step length Walking velocity Cadence Follow-up = 12 weeks
	Walusiak et al [36] (2008) Senile osteoporosis	RCT	Exp: n = 20 (F) Mean age 72.5 ± 5.62 Con: n = 17 (F) Mean age 72.7 ± 6.08	Exp = BW with CPT 10 min/session, 5 sessions/day x 3 weeks Con = CPT with gait training (FW) 10 min/session, 5 sessions/day x 3 weeks CPT = balance, strengthening and stretching exercises	Quadriceps strength Follow-up = 3 weeks
4. BW *vs* other gait training	Grobbelaar et al [26] (2017) Parkinson's disease	RCT	Exp: n = 16 Mean age 72 ± 6 Con: n = 15 Mean age 70 ± 11	Exp = BW Con = gait training (Forward walking) 45-60min, 3 sessions/week, 8 weeks	Gait speed Cadence Stride length Double limb support Follow–up = 8 weeks
	Kim et al [35] (2017) Stroke	RCT	Exp: n = 15 (11M, 4F), Mean age 48.27 ± 16.05, Hemiplegic side (right 5) Con: n = 15 (7M, 8F), Mean age 50.73 ± 13.50, Hemiplegic side (right 7)	Exp = Progressive body weight supported treadmill BW training 30min/day, 5x/week, 8 weeks Con = Progressive body weight supported treadmill FW training	Step length Stride length Single limb support Double limb support Step time Cadence

					Follow-up = 8 weeks
	Kim et al [34] (2014) Stroke	RCT	Exp: n = 12 (8M), Mean age 51.00 ± 14.60, Hemiplegic side (right 6) Con: n = 12 (8M), Mean age 52.75 ± 9.21, Hemiplegic side (right 6)	Exp = Progressive body weight supported treadmill BW training 30min/day, 6 weeks Con = Progressive body weight supported treadmill FW training	Step length Single limb support Step time Follow–up = 6 weeks
5. BW *vs* no intervention	**Zhang et al [33] (2014) Diabetic peripheral neuropathy**	RCT	Exp: n = 30 (16M), Mean age 52.7 ± 6.5 Con: n = 30 (16M), Mean age 52.7 ± 6.2	Exp = BW Con = No intervention	Plantar pressure Follow–up =12 weeks

Exp = experimental group, Con = control group, M = male, F = female, n = number of participants, RCT = randomized control studies, BW = backward walking, FW = forward walking, CPT = conventional physiotherapy treatment, VAS = visual analogue scale, NPRS = numerical pain rating scale, WOMAC = Western Ontario and McMaster Universities Arthritis Index.

Supplementary Table 3. PEDro scale scores for included studies (n =21)

Based on intervention	Study/condition	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	Total (0-10)
1. BW with CPT *vs* CPT	**Rathi et al [31] (2017) LBP**	Y	N	Y	N	N	N	Y	N	Y	Y	5
	Rangey et al [27] (2017) OA knee	N	N	N	N	N	N	N	N	Y	Y	2
	Wadhwa et al [24] (2016) OA knee	Y	N	Y	N	N	N	Y	N	Y	Y	5
	Anadkat et al [32] (2015) OA knee	Y	Y	Y	N	N	N	Y	N	Y	Y	6
	Manisha et al [25] (2015) OA knee	Y	N	Y	N	N	N	Y	N	Y	Y	5
	Rathi et al [23] (2014) OA knee	Y	N	Y	N	N	N	Y	N	Y	Y	5
	Gondhalekar et al [9] (2013) OA knee	Y	N	Y	N	N	N	Y	N	Y	Y	5
	Khyatee et al [30] (2013) Knee pain	Y	N	Y	N	N	N	Y	N	Y	Y	5
2. BW with CPT including other gait training *vs* CPT including other gait training	**Yong Kim et al [28] (2017) Stroke**	Y	Y	Y	N	N	Y	N	N	Y	Y	6
	El Aziz et al [38] (2017) JRA	Y	Y	Y	N	N	N	Y	Y	Y	Y	7
	El Basatiny et al [39] (2014) CP	Y	Y	Y	N	N	Y	Y	N	N	Y	6
	Khadilkar et al [29] (2011) ACL	Y	N	Y	N	N	N	Y	N	Y	Y	5
	Takami et al [11] (2010) Stroke	Y	N	Y	N	N	N	N	N	Y	Y	4
	Yang et al [2] (2005) Stroke	Y	Y	Y	N	N	N	Y	N	Y	Y	6
3. BW with CPT *vs* CPT with other gait / physiotherapy training	**Rose et al [40] (2018) Stroke**	Y	N	Y	N	N	Y	N	N	Y	Y	5
	Abdel aziem and El Basatiny [37] (2016) CP	Y	Y	Y	N	N	Y	Y	N	Y	Y	7

|		1	2	3	4	5	6	7	8	9	10	
	Walusiak et al [36] (2008) Senile osteoporosis	Y	N	Y	N	N	N	Y	N	Y	Y	5
4. BW *vs* other gait training	**Grobbelaar et al [26] (2017) PD**	Y	Y	Y	Y	N	N	Y	N	Y	Y	7
	Kim et al [35] (2017) Stroke	Y	Y	Y	Y	Y	N	Y	N	Y	Y	8
	Kim et al [34] (2014) Stroke	Y	N	Y	N	N	N	N	N	Y	Y	4
5. BW *vs* no intervention	**Zhang et al [33] (2014) DPN**	Y	N	Y	N	N	N	Y	Y	Y	Y	6

Y = yes; N = no; LBP = low back pain; OA = osteoarthritis; ACL = anterior cruciate ligament; PD = Parkinson's disease; CP = cerebral palsy; JRA = juvenile rheumatoid arthritis; DPN = diabetic peripheral neuropathy.

1. Random allocation, 2. Concealed allocation, 3. Baseline comparability, 4. Blind subjects, 5. Blind therapist, 6. Blind assessor, 7. Adequate follow-up, 8. Intention to treat, 9. Between-group comparison, 10. Point estimate and variability.

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Description:

ID      Search      Hits
#1      walking:ti,ab,kw   (Word variations have been searched)    16075
#2      gait  5720
#3      backward    1101
#4      retro       239
#5      #3 and #1   119
#6      #3 and #2   95
#7      #4 and #1   8
#8      #4 and #2   6
#9      #5 or #6 or #7 or #8    162
#10     randomized controlled trial:pt      446152
#11     controlled clinical trial:pt        426735
#12     randomized:ti,ab,kw     521534
#13     placebo:ti,ab     192876
#14     randomly:ti,ab    169394
#15     trial:ti    210354
#16     #10 or #11 or #12 or #13 or #14 or #15   864497
#17     animals not humans      1310
#18     #16 not #17       863621
#19     #9 and #18 in Trials    118
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Supplementary Figure 1. Search strategy (eg: Cochrane library)
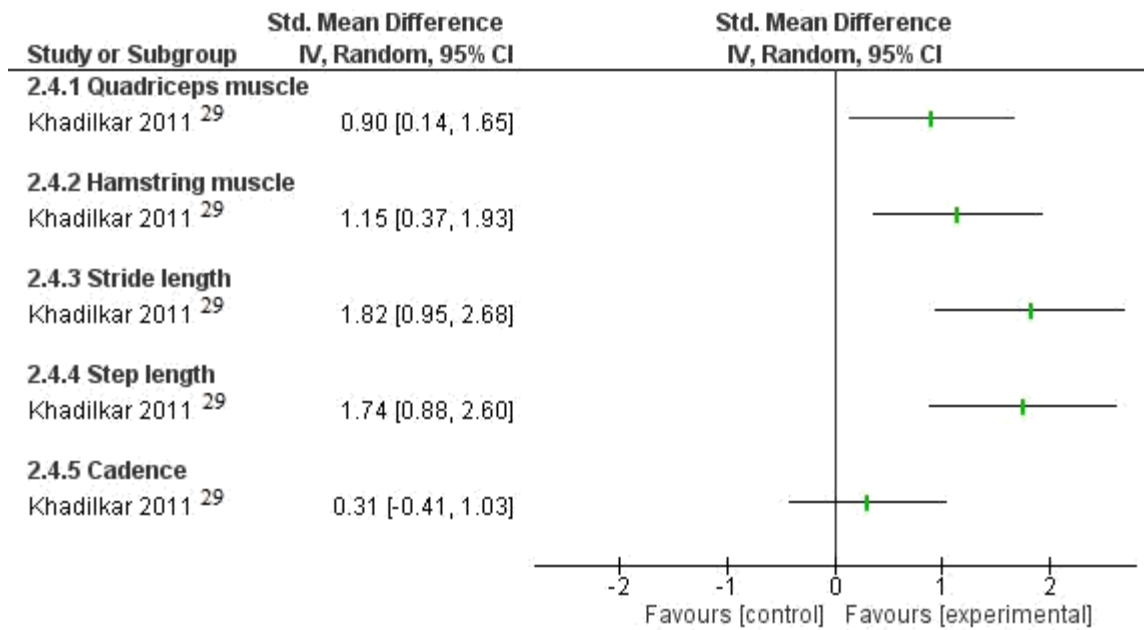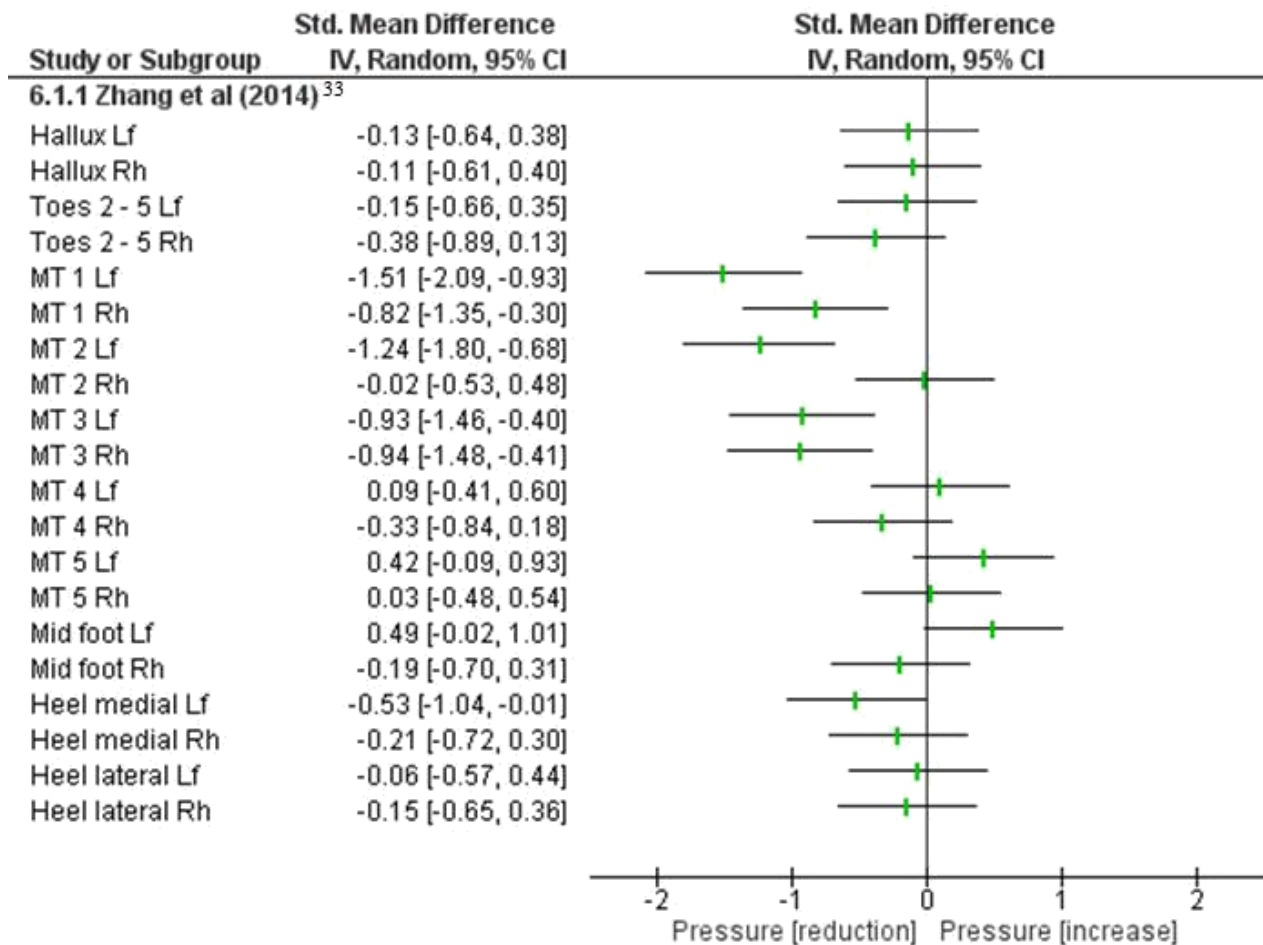
Supplementary Figure 2. Standardized Mean Difference (95% confidence interval) calculated from the one study for patients with anterior cruciate ligament injury who underwent backward walking with conventional physiotherapy treatment including other gait training *vs* conventional physiotherapy treatment including other gait training for muscular strength and gait parameters.
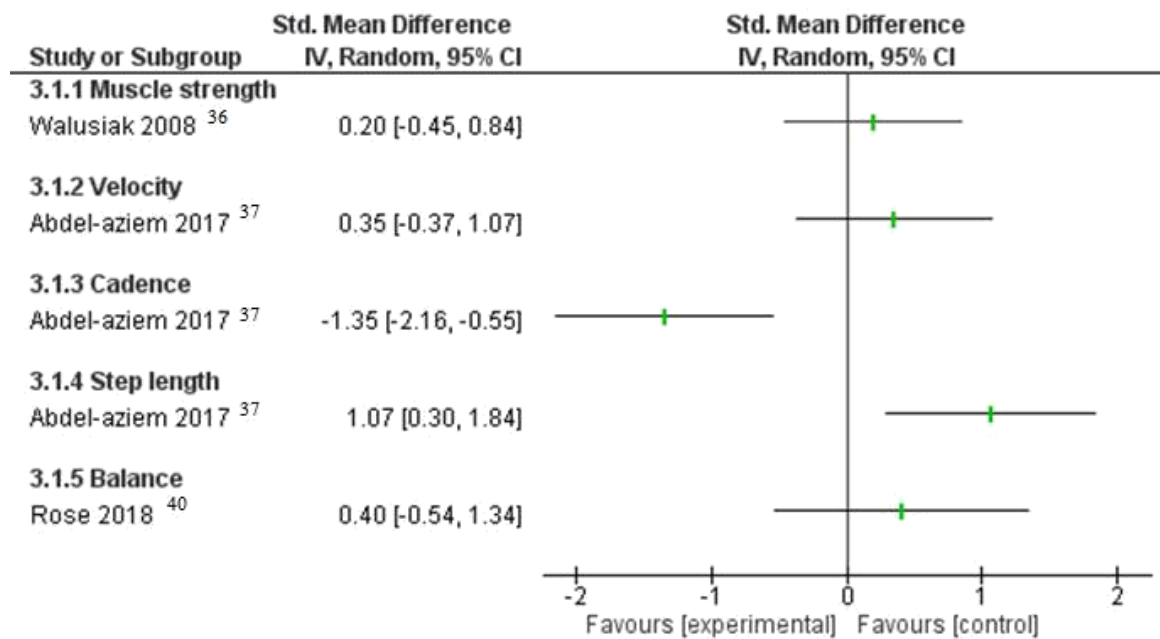
Supplementary Figure 3. Standardized Mean Difference (95% confidence interval) calculated for patients suffering from senile osteoporosis, cerebral palsy and stroke who underwent backward walking with conventional physiotherapy treatment *versus* conventional physiotherapy treatment with other gait/physiotherapy training. One study for muscle strength, one study for velocity, cadence and step length, and one study for balance.
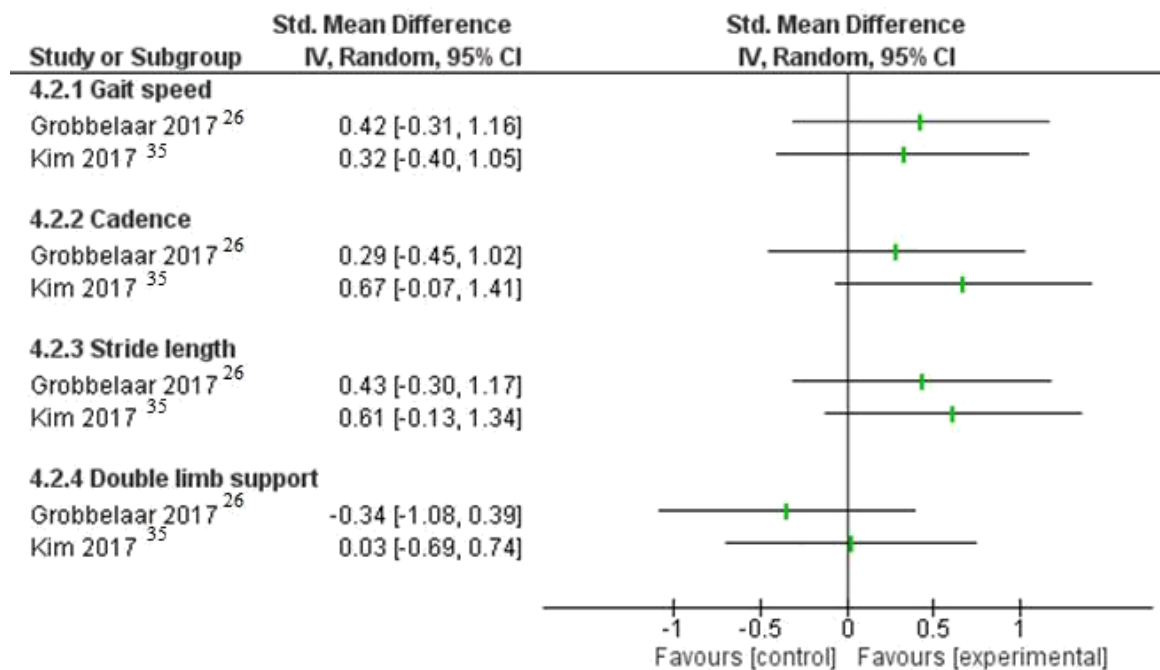
Supplementary Figure 4. Standardized Mean Difference (95% confidence interval) calculated from the two studies of patients with Parkinson's disease and who suffered stroke and who underwent backward walking *vs* other gait training for improving gait parameters

Study or Subgroup	Std. Mean Difference IV, Random, 95% CI	Std. Mean Difference IV, Random, 95% CI
6.1.1 Zhang et al (2014) [33]		
Hallux Lf	-0.13 [-0.64, 0.38]	
Hallux Rh	-0.11 [-0.61, 0.40]	
Toes 2 - 5 Lf	-0.15 [-0.66, 0.35]	
Toes 2 - 5 Rh	-0.38 [-0.89, 0.13]	
MT 1 Lf	-1.51 [-2.09, -0.93]	
MT 1 Rh	-0.82 [-1.35, -0.30]	
MT 2 Lf	-1.24 [-1.80, -0.68]	
MT 2 Rh	-0.02 [-0.53, 0.48]	
MT 3 Lf	-0.93 [-1.46, -0.40]	
MT 3 Rh	-0.94 [-1.48, -0.41]	
MT 4 Lf	0.09 [-0.41, 0.60]	
MT 4 Rh	-0.33 [-0.84, 0.18]	
MT 5 Lf	0.42 [-0.09, 0.93]	
MT 5 Rh	0.03 [-0.48, 0.54]	
Mid foot Lf	0.49 [-0.02, 1.01]	
Mid foot Rh	-0.19 [-0.70, 0.31]	
Heel medial Lf	-0.53 [-1.04, -0.01]	
Heel medial Rh	-0.21 [-0.72, 0.30]	
Heel lateral Lf	-0.06 [-0.57, 0.44]	
Heel lateral Rh	-0.15 [-0.65, 0.36]	

Pressure [reduction]   Pressure [increase]

Supplementary Figure 5. Standardized Mean Difference (95% CI) calculated from the one study for patients with diabetic peripheral neuropathy who underwent backward walking *vs* no intervention to relieve plantar pressure.

References:

1. Rose D, De Mark L. Backward walking training to improve mobility in acute stroke: A pilot study. *Arch Phys Med Rehabil* 2013; 94: e36.

2. Alghadir A, Anwer S. Effect of retro and forward walking on quadriceps muscle strength, pain, function, and mobility in patients with knee osteoarthritis: a protocol for a randomized controlled trial. *BMC Musculoskelet Disord* 2016; 17: 161.

3. Michaelsen SM, Ovando AC, Romaguera F, et al. Effect of backward walking treadmill training on walking capacity after stroke: a randomized clinical trial. *Int J Stroke* 2014; 9: 529–532.

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