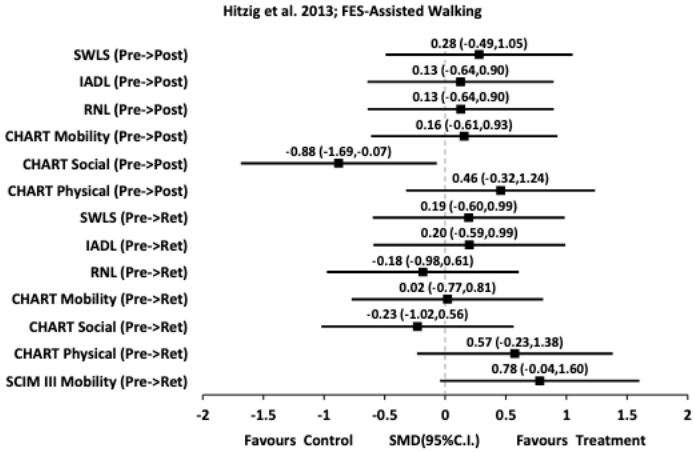
Author Year Country Research Design Score Total Sample Size	Methods	Outcome
Field-Fote & Roach 2011 USA RCT PEDro = 8 Level 1 N = 64	**Population:** Patients with chronic SCI at least 1-year post-injury, mean ages between 38 and 45 of each group; TM group (14 males, 3 females), TS group (14 males, 4 females), OG group (11 males, 4 females), LR group (12 males, 2 females). **Treatment:** Training 5 days/week for 12 weeks with: treadmill-based training with manual assistance (TM), treadmill-based training with stimulation (TS), overground training with stimulation (OG), or treadmill-based training with robotic assistance (LR). **Outcome Measures:** Walking speed (over 10m), distance walked in 2 min, LEMS.	1. There was a significant time effect of training on walking speed: walking speed significantly increased for the OG group (0.19(0.21) to 0.28(0.28) m/s; Effect Size=0.43), TS group (0.18(0.18) to 0.23(0.18) m/s; ER=0.28). 2. There was a significant effect of training on walking distance: walking distance significantly increased for the OG group (24.0(35.3) to 38.3(46.1) m; ES=0.40) and the TS group (20.6(23.1) to 24.4(24.3) m; ES=0.16), but not for the TM (22.1(21.4) to 23.0(21.1) m; ES=0.04) or the LR group (16.8(11.3) to 17.9(11.9); ES = 0.11). 3. There was a significant time x group interaction, with the increase in the OG group's walking distance being significantly greater than the TS, TM and LR groups. 4. Effect sizes for speed and distance were largest with OG (d=0.43 and d=0.40, respectively). Effect sizes for speed were the same for TM and TS (d=0.28); there was no effect for LR. The effect size for distance was greater with TS (d=0.16) than with TM or LR, for which there was no effect.
Hitzig et al. 2013 Canada Parallel-group RCT PEDro = 7 Level 1	**Population:** 34 participants with SCI. For the FES group (n=17, 14M 3F); mean (SD) age= 56.6(14); DOI = 8.75 (9.7); 6 AIS C, 11 AIS D. For the control group (n=17, 12M 5F); mean (SD) age=54.1(16.5); DOI= 10.3 (11.1); 7 AIS C, 10 AIS D.	1. The FES group had a significant increase in SCIM mobility subscores (mean (SD)= 17.27 (7.2) to 21.33 (7.6)) compared to the exercise group (mean (SD) = 19.9 (17.1) to 17.36 (5.5)) from baseline to 1-yr follow-up.

<table>
<tr><td>N = 34</td><td>Treatment: Participants were randomized to intervention (FES) or control group. The FES group received FES stimulation while ambulating on a BWS treadmill. Control group exercise program consisted of 20-25 min of resistance and 20-25 min of aerobic training.
Outcome Measures: SCIM; SWLS; IADL; Craig Handicap Assessment Report Technique; RNL.</td><td>2. No significant between-group differences were detected for other outcomes.
3. Both FES and control group reported positive gains in wellbeing from trial participation.</td></tr>
<tr><td></td><td colspan="2">Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%C.I.) as calculated from pre- to post-intervention data and pre-intervention to retention/follow-up data.
 
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<tr><td>Kressler et al. 2013
USA
Single-blind RCT
PEDro = 7
Level 1
N = 62</td><td>Population: 62 participants with SCI; AIS C or D; injury at T10 or higher.
Treatment: Participants trained 5 days/wk for 12 wks. Groups were treadmill-based LT with manual assistance, transcutaneous electrical nerve stimulation (TENS), and a driven gait orthosis and overground LT with ES.
Outcome Measures: Oxygen uptake, walking velocity and economy, substrate utilization during participant-selected “slow”, “moderate” and “maximal” walking speeds.</td><td>1. All groups increased velocity but to varying degrees: Driven gait orthosis = 0.01(0.18) Ln[m/s]; treadmill-based LT with manual assistance = 0.07(0.29) Ln[m/s]; TENS = 0.33(0.45) Ln[m/s]; overground LT = 0.52(0.61) Ln[m/s].
2. Only the TENS and overground LT groups had significant improvement over driven gait orthosis LT. Overground LT was also significantly higher than treadmill-based LT with manual assistance (p=.015).
3. Changes in walking economy were only significant for TENS (0.26(0.33) Ln[L/m], p=.014) and overground LT (0.44(0.62) Ln[L/m], p=.025).</td></tr>
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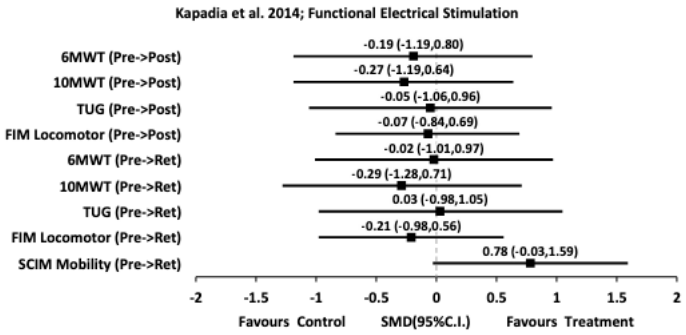
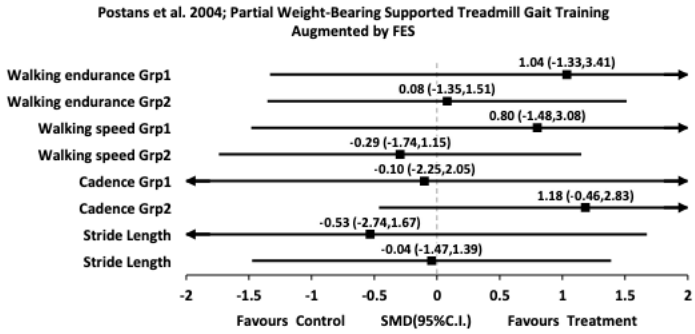
Noojijen et al. 2009 USA RCT PEDro = 7 Level 1 N = 51	**Population:** All participants had motor-incomplete spinal cord injuries and were at least 1-year post injury; Group 1: mean age = 38.15; T11-C3; Group 2: mean age = 39.47; T9-C4; Group 3: mean age = 41.64; T6-C4; Group 4: mean age = 44.33; L2-C6. **Treatment**: 12-week training period. All BWSTT: Group 1 = treadmill with manual assistance; Group 2 = treadmill with peroneal nerve stimulation; Group 3 = overground with peroneal nerve simulation; Group 4 = treadmill with assistance from Lokomat. **Outcome Measures**: Cadence, step length, stride length, symmetry index, intralimb coordination, timing of knee extension onset within the hip cycle; all compared to non-disabled controls.	1. BWSLT led to improvements in gait quality regardless of training condition. There were smaller improvements in the Lokomat group, possibly due to less active engagement/more passive movement. 2. Training significantly improved: cadence, step length and stride of both the stronger and weaker legs. After training, participants were also able to take more steps per min. 3. Post hoc analyses revealed overground training plus stimulation had a significantly larger gain than Lokomat group.
Kapadia et al. 2014 Canada RCT PEDro = 5 Level 2 N = 27	**Population**: 27 participants; traumatic (>18 months) and incomplete chronic spinal cord lesions between C2 and T12, AIS C and D. **Treatment**: 45 min of therapy per session, 3 days per week, for 16 weeks (48 sessions in total). Outcome measures were assessed at baseline, 4 months, 6 months, and 12 months post baseline. **Outcome Measures:** Gait Measures- 6MWT, 10MWT, Assistive Device Score, Walking Mobility Scale; Functional Measures- SCIM, FIM; Spasticity Measure- Modified Ashworth Scale, Pendulum Test.	1. SCIM mobility sub-score significantly improved over time for the intervention group ($p<.01$) but not for the control group (baseline/12 months: 17.27/21.33 vs. 19.09/17.36, respectively). 2. On all other outcome measures the intervention and control groups had similar improvements. 3. Walking speed and endurance during ambulation all improved upon completion of therapy and the majority of participants retained these gains at long-term follow-ups.
	Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%C.I.) as calculated from pre- to post-intervention data and pre-intervention to retention/follow-up data.	

		
Field-Fote et al. 2005 USA RCT PEDro = 4 Level 2 N = 27	**Population:** 27 males and females; age 21-64 yrs; all participants had an incomplete SCI; C3-T10 lesion level; >1 yr post-injury. **Treatment:** Randomized to 4 gait training strategies, 45-50 min, 5x/wk, 12 wks: 1) manual BWSTT (n=7); 2) BWSTT + FES (common peroneal nerve) (n=7); 3) BWS overground + FES (n=7); 4) BWS Lokomat (robotic gait device) (n=6). **Outcome Measures**: Walking speed over 6 m (short bout) and 24.4 m (long-bout).	1. Overall, training was associated with a 55% increase [range = -59% to +417%] in short-bout walking speed and a 37% increase [range = -38% to +203%] in long-bout speed. 2. There were no significant differences between groups (i.e., types of locomotor training), however, post-hoc t-tests reveal that there were differences in pre- to post-training short-bout walking speed in both the TS group (P=.02) and in the OG group (P=.008), while differences were not observed in the TM or the LR groups. 3. Tendency for initially slower walkers (<0.1m/s) to show greater improvement (106%) compared to initially faster walkers (17%).
Postans et al. 2004 Scotland RCT w/crossover PEDro = 3 Level 2 N initial = 14 N final = 10	**Population:** 14 males and females; ages 19-57 yrs; all participants had an incomplete SCI; C4-T9 lesion level; mean 12.2±5.9 weeks post-injury. **Treatment:** Crossover design: Intervention - Partial weight-bearing supported treadmill gait training augmented by FES for up to 25 min a day, 5 days a week for 4 weeks; Control - 4-week period of standard physiotherapy. Patients were randomly assigned to either an AB (4 weeks control then 4 weeks	1. Between the intervention and control periods for the BA group, there was a significant difference in walking endurance (in meters; Mean: 60.10, CL: 9.2 to 110.9, P=.030) as well as for walking speed (in m/s; Mean: 0.22, CL: 0.05 to 0.37, P= .019). 2. Between the intervention and control periods for the AB group, there was a significant difference in

	intervention) or BA (4 weeks intervention then 4 weeks control) group. **Outcome Measures:** Overground and treadmill walking endurance and speed.	walking endurance (in meters; Mean: 72.20, CL: 39.8 to 104.6, P=.003) as well as for walking speed (in m/s; Mean: 0.23, CL: 0.13 to 0.33, P=.004).
	Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%C.I.) as calculated from pre- and post-intervention data.  *Cross-over study, where participants acted as their own controls. Grp1: control-intervention. Grp 2: intervention-control **Overground measurements only ***SMD 95%CI calculated from 95%CI of changes in mean outcome values	
Triolo et al. 2012 USA Longitudinal Level 2 N = 15	**Population:** 15 participants with thoracic or low cervical level SCI (14M 1F); 10 AIS A, 4 AIS B, 1 AIS C; Mean (SD) DOI: 72.6(71.87) months. **Treatment:** Participants received the 8-channel neuroprosthesis and completed rehabilitation with the device. This study follows the patients from discharge to follow-up ranging from 6-19 months after discharge (with exception of one participant at 56 months). **Outcome Measures:** Neuroprosthesis usage, maximum standing time, BWS, knee strength, knee fatigue index, BWS, electrode stability, and component survivability.	1. Levels of maximum standing time, BWS, knee strength, and knee fatigue index were not statistically different from discharge to follow-up. 2. Neuroprosthesis usage was consistent with participants choosing to use the system on approximately half of the days during each monitoring period. Although the number of hours using the neuroprosthesis remained constant, participants shifted their usage to more functional standing vs. more maintenance exercise, suggesting that the participants incorporated the neuroprosthesis into their lives. 3. Safety and reliability of the system were demonstrated by electrode stability and a higher component stability rate (>90%).
Crosbie et al. 2009	**Population:** 4 males with complete (ASIA A) SCI; age 38-62 years; level of	1. All participants increased ambulation capacity with

Australia Pre-post Level 4 N = 4	injury: thoracic (T4, n = 2; T7, n = 1; T10-11, n = 1); 2-13 years post injury. **Treatment:** Each participant prepared for ambulation training using at least eight weeks of FES-induced semi-recumbent cycling. The program consisted of 18 interval training sessions, conducted three times per week for six weeks. Each session involved treadmill walking for a target duration at a speed as great as could be tolerated, followed by a similar duration seated recovery, repeated until muscle fatigue precluded further walking. Participants progressed from an initial duration of 2 min, repeated three times, up to a maximum of 5 min repeated up to seven times over the course of gait training. Participants ambulated on a treadmill, using a wheeled walking frame for balance only, while wearing a protective overhead chest harness designed to prevent a fall, but offering no BWS. Ambulation was produced through stimulation applied via surface electrodes placed over the motor points of the primary bilateral antigravity muscles (quadriceps femoris and gluteus maximus), and via stimulation of the common peroneal nerve to elicit a flexor withdrawal reflex. The gait cycle consisted of contralateral flexion and extension activation. The stimulator applied biphasic pulses at a frequency of 25 Hz, at a pulse width of 150 ms and an initial current intensity of 140 mA (pulse peak, constant current). **Outcome Measures:** Participants walking continuously to onset of muscle fatigue (as indicated by knee buckle after stimulation had reached a maximum level) before and after the training program.	training, but while the first three participants tripled or quadrupled their walking distance, participant D's distance increase was more modest. 2. Walking duration increased in a similar fashion to distance traveled; however, the increased walking speed attained over the course of the training meant that the increase in walking duration was between 40% and 200%.

Hesse et al. 2004 Germany Pre-post Level 4 N = 4	**Population:** 3 males; age 45-62 yrs; all participants had a diagnosis of AIS C or AIS D; C5-T8 lesion level; 8-18 months post-injury. **Treatment:** Electromechanical gait trainer + FES to quadriceps and hamstrings: 20-25 min, 5x/wk, 5 wks. **Outcome Measures:** Gait velocity and endurance.	1. Gait ability improved in all patients; 3 could walk independently over ground with aids. Overall gait speed and endurance more than doubled. 2. Study made no reports of significance levels or testing of results.
Field-Fote & Tepavac 2002 USA Pre-post Level 4 N = 14	**Population**: 14 males and females; age 18-50 yrs; all participants had a diagnosis of AIS C; C4-T7 lesion level. **Treatment:** BWSTT + common peroneal nerve FES: <90 min, 3x/wk, 12 wks. **Outcome Measures:** Over ground gait speed.	1. All participants showed an increase in walking speed. 2. Participants with slower walking speeds showed greater improvement. 3. Study made no mention of significance levels or testing of results.
Field-Fote 2001 USA Pre-post Level 4 N = 19	**Population:** 19 males and females; mean age 31.7±9.4 yrs; all participants had a diagnosis of AIS C either paraplegia or tetraplegia. **Treatment:** BWSTT + common peroneal nerve FES: <90 min, 3x/wk, 12 wks. **Outcome Measures:** LEMS, Gait speed.	1. Significant increase in walking speed (initial 0.12 ± 0.8m/s; final 0.21 ± 0.15m/s, p = .0008, median change of 77%). 2. LEMS had median increases of 3 points in both the FES-assisted leg and the non-stimulated leg. 3. Increase in AIS lower limb motor scores in 15 of 19 incomplete SCI (AIS C).