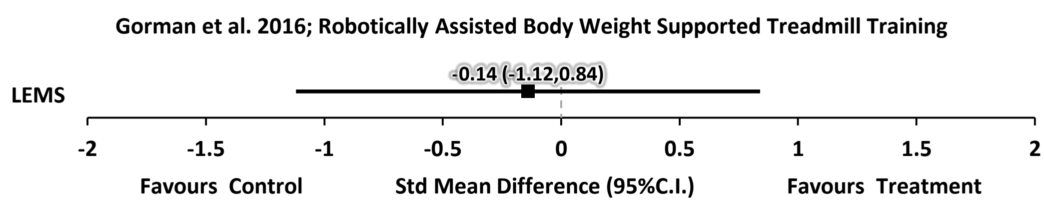
Author Year; Country Score Research Design Total Sample Size	Methods	Outcomes
Alexeeva et al. 2011; USA PEDro = 7 RCT Level 1 N = 35	**Population:** 35 SCI patients (30 male, 5 female, >1 year; AIS 16–70 yrs; injury to at or rostral to the T10; able to rise to standing position with moderate assistance or less, and independently advance at least one leg. **Treatment:** Patients were randomized to 3 groups (body-weight-supported (BWS) walking on a fixed track vs. BWS walking on a treadmill vs. comprehensive physical therapy). The BWS groups used 30% BWS. Patients participated in a 13 week (1 hr/day, 3 d/wk) program. **Outcome measures:** performance values, heart rate, pre- and post-training maximal 10-m walking speed, balance, muscle strength, fitness (VO_2peak), and quality of life.	1. Participants in the BWS walking on a fixed track group achieved the highest average heart rate during training, whereas those in physical therapy had the lowest average heart rate. 2. In all three groups there was a clinically important post-training increase in average normalized VO_2peak (~12% in each group); however, these differences did not achieve statistical significance.
Gorman et al. 2016 USA RCT Level 1 PEDro = 6 N=18	**Population**: 18 individuals chronic motor incomplete spinal cord injury between C4 and L2; >1 y post injury **Treatment**: Participants were randomized to Robotic-Assisted Body-Weight Supported Treadmill Training (RABWSTT) or a home stretching program (HSP) 3 times per week for 3 months. Those in the home stretching group were crossed over to three months of RABWSTT following completion of the initial three month phase. **Outcome Measures:** Peak VO2 was measured during both robotic treadmill walking and arm cycle ergometry: twice at baseline, once at six weeks (mid-training) and twice at three months (post-training). Peak VO2 values were normalized for body mass.	1. The RABWSTT group improved peak VO2 by 12.3% during robotic treadmill walking (20.2 ± 7.4 to 22.7 ± 7.5 ml/kg/min, P = 0.018) Peak VO2 during robotic treadmill walking and arm ergometry showed statistically significant differences.
Effect Sizes: Forest plot of standardized mean differences (SMD ± 95%C.I.) as calculated from pre- and post-intervention data  		
Millar et al. 2009; Canada PEDro = 6 RCT with crossover Level 1 N = 7	**Population:** 7 SCI participants (6 male, 1 female, mean age 37.1 ± 7.7 yrs), with C5-T10 level injury, AIS A-C, 5.0 ± 4.4 yrs post-injury **Treatment:** Each participant underwent both body-weight supported treadmill training (BWSTT) and head-up tilt training (HUTT) in random order, for 3 times a week for 4 weeks, separated by a 4 week detraining period. **Outcome Measures:** Heart rate variability; heart rate complexity (what does this capture?); fractal scaling distance score (the correlation of the time between heart beats).	1. No significant difference in heart rate variability after either BWSTT or HUTT training. 2. There was increased sample heart rate complexity after BWSTT, whereas HUTT had no effect. 3. 3. BWSTT, but not HUTT, reduced the fractal scaling distance score in participants.

Fenuta et al. 2014 Canada Prospective Controlled Trial Level 2 N= 14	**Population**: 7 males with incomplete spinal cord injury; mean age= 42.6 ± 4.29y; years post injury= 4.0 ± 0.62y; 7 able bodied males; mean age= 42.7 ± 5.40y; **Treatment**: Steady state locomotion using the same body weight support (BWS) percent was compared in 7 males with incomplete SCI and matched noninjured controls using the Lokomat, Manual Treadmill, and ZeroG. Participants completed walking trials in a randomized order using the Andago GmbH treadmill system or overground ZeroG. EMG electrodes were placed on tibialis anterior, rectus femoris, biceps femoris, and medial gastrocnemius muscles of both legs. **Outcome Measures:** Peak VO2 testing, Heartrate (HR), Lower limb EMG,	1. A strong positive correlation () was found between the flexion: extension strength ratio at the hip in participants with SCI and the amount of BWS required to complete the overground walking session; the higher the flexion: extension ratio, the more support that was required. 2. Lokomat sessions resulted in significantly lower MET values when compared to the Manual Treadmill or ZeroG sessions. 3. For individuals with SCI, average muscle activation tended to be higher for both treadmill conditions compared to the ZeroG session, which could be attributed to increases in TA and BF activity.
de Carvalho et al. 2006; Brazil Prospective Controlled Trial Level 2 N = 21	**Population:** 21 male participants (C4 to C8), all complete with tetraplegia, mean age 32 ± 8 yrs. 11 assigned to the gait group and 10 controls. **Treatment:** BWST training (30%–50%) with neuromuscular electrical stimulation 20 min/day, 2 days/week for 6 months. Control group performed conventional physiotherapy. **Outcome Measures:** blood pressure, oxygen uptake, carbon dioxide production, minute ventilation (volume of gas entering lungs), and heart rate.	1. Gait training (six months) resulted in significant increases in oxygen consumption (36%), minute ventilation (31%), and systolic blood pressure (5%) during the gait phase. In the control group, there were significant increases in resting oxygen consumption and carbon dioxide production (31 and 16%, respectively). 2. Gait training resulted in an increased aerobic capacity due to yielding higher metabolic and cardiovascular stress.
Jeffries et al. 2015 USA Cohort Study Level 2 N=8	**Population:** 8 non-ambulatory individuals with chronic motor complete SCI (7 males, 1 female, T5-T12) and 8 healthy able-bodied (AB) controls. **Treatment:** SCI group- Standing and stepping exercises over a treadmill in a body weight support (BWS) system with manual assistance of lower body kinematics. Weight support was provided by an overhead lift at high (>50% BWS) or low levels (20-35% BWS). AB participants did normal stepping over a treadmill and standing. **Outcome measures:** Oxygen Consumption (VO2) and heart rate during stepping and standing with BWS. VO2 and heart rate responses were assessed in relation to level of BWS.	1. Significant main effect of task on VO2 for SCI and AB groups. There was a significant increase in VO2 with stepping compared with sitting and standing. There was also a significant increase in VO2 when weight support was decreased during stepping. 2. Significant main effect of task on heart rate levels for both SCI and AB groups. There was a significant increase in heart rate with stepping compared with seated and standing. 3. The SCI group also had significant increases in heart rate from seated to standing 4. No difference in heart rate when weight support was decreased during stepping for both groups.
Stevens and Morgan 2015 USA Pre-post Level 4 N=11	**Population:** 11 adults with incomplete SCI (7 males, 4 females, mean age 48). 6 adults with injuries at or above T5 and 5 adults with injury below T5. **Treatment:** 8 weeks of Underwater Treadmill Training (UTT) (3 sessions per week, 3 walking trials per session) incorporating individually determined walking speeds, personalized levels of body weight unloading, and gradual, alternating increases in speed and duration. In weeks 2,4,6, and 8, walking speed was increased by 10%, 20%, 30% and 40% over baseline. **Outcome Measures:** Heart rate	1. None of the interaction tests involving injury level were statistically significant. When averaged over injury level, the interaction between training period and day was significant. 2. Pairwise comparisons revealed that from day 1 to day 6, heart rate fell by 7%, 14% and 17% during training periods 1, 2, 3. All participants exhibited significant decreases in daily submaximal exercise (walking) heart rate for each 2-week period.

Turiel et al. 2011; Italy Pre-post Level 4 N = 14	**Population:** 14 participants (10 males, 4 females; mean age 50.6 ± 17.1 yrs; 2-10 yrs post-injury; 9 paraplegia) with lost sensorimotor function caused by incomplete SCI. **Treatment:** BWSTT assisted with robotic driven gait orthosis for 60 min sessions, 5 d/wk, 6 wk, with 30-50% of body weight supported (reduced as tolerated). **Outcome Measures:** Left ventricular function, coronary blood flow reserve (via dipyrsidamole stress echo), plasma asymmetric dimethylarginine (ADMA) (marker of vascular abnormalities observed in cardiovascular disease and ageing), and plasma inflammatory markers.	1. Significant improvement in the left ventricular diastolic function (i.e., a reduction in isovolumic relaxation time and deceleration time was observed following the training. 2. Significant Increase in coronary reserve flow and reduced plasma ADMA levels was observed in the follow up. 3. Significant reduction in the inflammatory status (C-reactive protein and erythrocyte sedimentation rate).
Jack et al. 2009; UK Pre-post Level 4 N = 2	**Population:** Participant A: female, T9 level injury, age 41 yrs, 2 yrs post-injury; Participant B; male, T6 level injury, age 40, 14.5 yrs post-injury **Treatment:** Body-weight supported treadmill training (BWSTT), three 30-min sessions per week for 16 weeks (participant A) or 20 weeks (participant B) **Outcome Measures:** Measures of cardiopulmonary fitness: oxygen uptake (VO_2); peak heart rate; dynamic O_2 cost	1. Both participants' VO_2 increased after exercise, 8.2 to 10.2 $mL{\cdot}kg^{-1}{\cdot}min^{-1}$ for participant A; for participant B, VO_2 increased from 13.8 to 18.2 $mL{\cdot}kg^{-1}{\cdot}min^{-1}$ at week 17, after which the VO_2 dropped back to 13.9 $mL{\cdot}kg^{-1}{\cdot}min^{-1}$. 2. Peak heart rate increased for both participants after exercise (89 to 119 bmp for participant A, 134 to 157 bpm for participant B). 3. The dynamic O_2 cost decreased for both participants (115 to 29.03 $mL{\cdot}min^{-1}{\cdot}W^{-1}$ for participant A, 66.57 to 4.52 $mL{\cdot}min^{-1}{\cdot}W^{-1}$ for participant B).
Soyupek et. al. 2009; Turkey Pre-Post Level 4 N = 8	**Population:** 8 incomplete SCI participants, 6 male and 2 female, injury level C6-L1, mean age 40. 8 ±13.9 yrs (range 26-66 yrs) **Treatment:** Body weight supported treadmill training (BWSTT), for 5 times per week for 6 weeks; length of training sessions ranged from 10 to 30 min **Outcome Measures:** Heart rate and blood pressure; Forced expiratory volume in 1 second (FEV1), forced vital capacity (maximum amount of air that can be expelled after maximum inhalation), inspiratory capacity, maximum inspiratory and expiratory pressure	1. The heart rate was significantly lower post-training compared to baseline 2. There were significant improvements of the forced vital capacity and inspiratory capacity in participants post-training compared to baseline 3. There were no significant difference in other parameters between pre- and post-training
de Carvalho and Cliquet 2005; Brazil Pre-post Level 4 N = 12	**Population:** 12 male participants (C4 tp C7) all complete with tetraplegia; Mean age = 33.8 y; Median time post-injury = 77.58 months **Treatment:** Body weight supported treadmill training (30–50%) with neuromuscular electrical stimulation 20 min/day, 2 days/week for 3 months. **Outcome Measures:** BP and HR.	1. After training, mean systolic blood pressure increased (94 ± 5 mmHg to 100 ± 9 mmHg) at rest and during gait exercise (105 ± 5 to 110 mmHg). 2. There were no significant changes in post-exercise blood pressure after training.
Ditor et al. 2005a; Canada Pre-post Level 4 N = 8	**Population :** 8 participants (6 males, 2 females), AIS B-C, C4-C5, incomplete, mean age 27.6 yrs, mean 9.6 yrs post-injury. **Treatment:** Progressive, body weight-supported treadmill training, 3 day/week for 6 months. **Outcome Measures:** HR and BP variability, LF/HF ratio (low to high heart beat frequency and is indicative of balanced sympathetic/parasympathetic tone and reduced risk for cardiovascular-related mortality).	1. Significant decrease in resting HR (10.0%) after training. 2. No changes in resting systolic, diastolic, or mean arterial BP after training. 3. Significant reduction in the resting LF/HF ratio after training. 4. There were no significant effects of training on HR and/or blood pressure variability during an orthostatic challenge (60° head up tilt).
Ditor et al. 2005b; Canada Pre-post	**Population:** 6 participants (4 male, 2 female), AIS A and B, C4-T12, mean age 37.7 yrs, mean 6.7 yrs post-injury, motor complete.	1. No changes in femoral or carotid artery cross sectional area, blood flow, or resistance post-training

Level 4 N = 6	**Treatment:** Body weight supported treadmill training, 15 min/day (3 bouts of 5 min), 3 days/week for 4 months. **Outcome Measures:** BP, HR, HR variability, BP variability, arterial diameters and mean blood velocities, and arterial blood flow.	2. An improvement in femoral artery compliance. 3. No change in resting BP, mean arterial blood pressure, resting HR or heart rate and blood pressure variability after training. 4. 3/6 patients had changes in heart rate and blood pressure variability reflective of increased vagal predominance.

Note: AIS = ASIA Impairment Scale; BP = blood pressure; d = day; hr = hour; HR = heart rate; SCI = spinal cord injury; wk = week; yrs = year. BWSTT = body-weight supported treadmill training.