Author Year Country Research Design Score Total Sample Size	Methods	Outcome
Overground Training in Combination With tDCS		
Evans et al. 2022 USA RCT PEDro = 10 Level 1 N = 26	**Population:** 25 participants with chronic motor-incomplete SCI; 18 males and 7 females; mean age 48.6 years; level of injury C4 (n = 9), C5 (n = 7), C6 (n = 2), C7 (n = 4), T6 (n = 1), and T8 (n = 2); AIS C (n = 2) and AIS D (n = 23); and mean time since injury 85.85 months. **Treatment:** Participants were randomly allocated to one of two groups: • MST+tDCS$_{sham}$ group (n = 14). • MST+tDCS group (n = 11). Interventions were carried out during 3 consecutive days and consisted of: • Motor Skill Training (MST): Each of the six motor task activities was performed in consecutive order and repeated four times as a circuit. Participants were asked to complete as many repetitions as possible in 60 s with the intent to maintain a moderate exercise intensity (40–60% HRR). The MST activities were intended to promote rapid volitional activation and deactivation of lower extremity muscles. • tDCS was delivered via two electrodes for 20 min, which was delivered concurrently with MST. **Outcome Measures:** Overground walking speed (10MWT); spatiotemporal gait characteristics (cadence and stride length), peak trailing limb angle and intralimb	1. AEs included cases of mild-to-moderate headache following tDCS and delayed onset muscle soreness following MST. 2. Analyses revealed a significant effect of the MST circuit, with improvements in walking speed, cadence, bilateral stride length, stronger limb trailing limb angle, weaker limb intralimb coordination, BBS, and FES-I observed in both groups. 3. No differences in outcomes were observed between groups.

	coordination (this kinematic data was obtained during each 10MWT using a 3D inertial measurement unit motion capture system). Outcomes were assessed at baseline on Day-1 and 24-h post-intervention on Day-5. To examine within-day (online) and between-day (offline) effects of intervention on outcome measures associated with walking, a subset of selected outcomes was assessed pre- (D2pre, D3pre, D4pre) and post-intervention (D2post, D3post, D4post) on each intervention day.	
Evans & Field-Fote 2022 USA RCT PEDro = 10 Level 1 N = 26	**Population:** 25 participants with chronic motor-incomplete SCI; 18 males and 7 females; mean age 48.6 years; level of injury C3-C8 (n = 22) and T1-T10 (n =3); AIS C (n = 2) and AIS D (n = 23); and mean time since injury 85.85 months. **Treatment:** Participants were randomly allocated to one of two groups: • MST + $tDCS_{sham}$ group (n = 14). • MST + tDCS group (n = 11). Intervention protocol was the same as Evans et al. (2022). **Outcome Measures:** Overground walking speed (10MWT); total walking distance (measured by 2MWT); and spatiotemporal gait characteristics (cadence, stride length, step length, and step symmetry index) were assessed at baseline (day 1) and 24 hours after the last day of intervention (day 5).	1. AEs included cases of mild-to-moderate headache following tDCS, and delayed onset muscle soreness and skin irritation following MST. 2. There was a significant effect of TIME on walking speed, $p < 0.001$; but without GROUP nor TIME × GROUP interaction. 3. There was a significant effect of TIME on walking distance, $p < 0.001$, but without GROUP nor TIME x Group interaction. 4. There was a significant effect of TIME on cadence, $p < 0.001$, stronger limb stride length, $p < 0.001$, and weaker limb stride length, $p < 0.001$; but without effects of GROUP or TIME × GROUP interaction. Additionally, no changes in symmetry index were observed.

[Klamruen et al. 2024](#) Thailand RCT PEDro = 8 Level 1 N = 34	**Population:** 34 participants with SCI and the ability to walk at least 15 m independently (with or without a walking device): • Anodal Group (n=17): Mean (SD) age: 41.88 (13.50) years; 13M, 4F; etiology: Traumatic (n=13) and non-traumatic (n=4); ASIA: ASIA C (n=7) and ASIA D (n=10); level of injury: Tetraplegia (n=8) and paraplegia (n=9); and median (IQR Q1-Q3) time since injury: 17.0 (8.0-22.50) months. • Sham Group (n=17): Mean (SD) age: 48.41 (13.36) years; 12M, 5F; Etiology: Traumatic (n=12) and non-traumatic (n=5); ASIA: ASIA C (n=5) and ASIA D (n=12); Level of injury: Tetraplegia (n=9) and paraplegia (n=8); and Median (IQR Q1-Q3) time since injury: 12.0 (12.0-16.0) months. **Treatment:** Participants were randomly assigned into one of the following two groups: • Anodal Group (n=17): Anodal tDCS was administered over the vertex (lower-limb motor area) at an intensity of 2 mA for 20 min while sitting. • Sham Group (n=17): Participants received the delivered current only for the first 30 seconds before it was automatically terminated, and the electrodes remained on the participant's head for 20 minutes. After tDCS, all participants underwent OGT at a moderate intensity (RPE level of 5). The total gait training time was 40 minutes. The intervention program was administered for 5 consecutive days. **Outcome Measures:** 10MWT (at self-selected and fast speeds); spatiotemporal gait parameters	1. No serious AEs of tDCS were observed. The anodal group reported itching (42% of participants) and tingling (44% of participants) sensations only during the stimulation period. The sham group reported itching sensations a moment after starting stimulation, which disappeared after a few (1-2) minutes of stimulation. 2. 10MWT: a. For fast speed, within-group differences were shown for the anodal ($P < .001$) and sham ($P = .001$) groups. The mean (95% CI) between-group differences in change scores favored the anodal group at POST (0.10 m/s (0.02 to 0.17), $P = .006$), 1M (0.11 m/s (0.03 to 0.19), $P=.002$), and 2M (0.11 m/s (0.03 to 0.20), $P = .001$). b. For self-selected speed, the median (95% CI) between-group differences in change scores favored the anodal group at POST (0.10 m/s, (0.06 to 0.14), $P < .001$) and 2M (0.09 m/s, 95% CI (0.01 to 0.19), $P = .049$). 3. Stride length, stride duration, and cadence: a. For stride length, the median (95% CI) between-group differences in change scores favored the anodal group at POST (0.07 m, (0.01 to 0.14), $P = .041$). b. For stride duration, changes over time in the anodal ($P = .005$) and sham ($P = .030$) groups were shown; however, no between-group differences were found for all time points. c. For cadence, changes over time in the anodal ($P = .020$) and sham ($P = .004$) groups were shown; however, no between-group differences were found for all time points.

	using the inertial wireless sensor device (the BTS G-WALK) attached to the fifth lumbar spinous process with a belt for assessing cadence, stride length, and stride duration; TUG test, FTSTS test; and WHOQOL-BREF were assessed at pre-intervention (PRE), immediately post the 5 sessions on the same day (POST), at 1-month follow-up (1M), and at 2-month follow-up (2M).	4. For FTSTS test, changes over time in the anodal (P = .002) and sham (P = .040) groups were shown; however, no between-group differences were found for all time points. 5. Subgroup analysis: a. The subgroup analysis of time since injury showed that in participants with post-injury >12 months, the anodal group had greater improvements in fast speed, self-selected speed, and stride length than the sham group. For fast speed, the median (95% CI) between-group differences in change scores favored the anodal group at POST (0.06 m/s, (0.01 to 0.25), P=.043), 1M (0.13 m/s, (0.01 to 0.24), P = .028), and 2M (0.13 m/s, (0.01 to 0.24), P = .028). For self-selected speed, the median differences (95% CI) favored the anodal group at POST (0.10 m/s, (0.04 to 0.15), P = .001) and 2M (0.12 m/s, (0.01 to 0.25), P = .043). For stride length, the median (95% CI) between-group differences in change scores favored the anodal group at POST (0.08 m (0.02 to 0.20), P = .006). However, in participants with post-injury <12 months, the median (95% CI) between-group differences in self-selected speed favored the anodal group only at POST (0.10 m/s, (0.04 to 0.18), P = .004). b. The subgroup analysis by injury level showed that in participants with tetraplegia, the anodal group showed greater improvements in fast and self-selected speed than the sham group. For fast speed, the median (95% CI) between-group differences in change scores favored the

		anodal group at POST (0.14 m/s (0.03 to 0.26), P = .006), 1M (0.16 m/s (0.04 to 0.29), P = .011), and 2M (0.14 m/s (0.05 to 0.25), P = .036). For self-selected speed, the median differences (95% CI) favored the anodal group at POST (0.15 m/s (0.04 to 0.18), P = .002) and 2M (0.13 m/s (0.01 to 0.31), P = .027). However, in participants with paraplegia, the median (95% CI) between-group differences in self-selected speed favored the anodal group only at POST (0.08 m/s (0.05 to 0.12), P < .001). No significant between-group differences were observed for the other outcome measures.
BWSTT in Combination With tDCS in Patients With Acute – Subacute SCI		
Kumru et al. 2016b Spain RCT PEDro = 8 Level 1 N = 24	**Population:** 24 patients with incomplete motor SCI who were candidates for Lokomat®; 16 males and 8 females; mean age 51.3 years; AIS C (n = 20) and AIS D (n = 4); level of injury C1 (n = 1), C3 (n = 2), C4 (n = 8), C5 (n = 1); C7 (n = 2), C8 (n = 1), T3 (n = 3), T4 (n = 1), T5 (n = 1), T6 (n = 1), T10 (n = 1), T11 (n = 1), and T12 (n = 1); and mean time since injury 4.1 months. **Treatment:** All participants received standard care (5 h of therapy a day, 5 days per week) for SCI rehabilitation. Participants also received 20-min tDCS sessions (5 days per week for 4 weeks) during the Lokomat gait rehabilitation session; and they were randomly divided into: • Anodal tDCS (n = 12): The anode was placed over the leg motor cortex (vertex) and the cathode over the non-dominant supraorbital area. • Sham tDCS (n = 12). Lokomat® gait training sessions were performed 5 days per week, 30 min per day for 8 weeks.	1. All patients tolerated the study without complications. 2. At baseline, two of the 12 patients with SCI could perform 10MWT and five patients during follow-up period in both groups. 3. Gait velocity, cadence, step length, and WISCI II were not different between anodal vs. sham tDCS group neither after four weeks of tDCS, nor during follow-up (p > 0.1 for all comparison). 4. LEMS was 20.5 ± 9.2 at baseline and improved to 23.9 ± 9.0 after last anodal tDCS (p < 0.03) and in sham tDCS it was 18.7 ± 10.3 at baseline and also improved to 22.8 ± 11.4 after last session (p < 0.03). However, after four weeks of tDCS changes score were not significant between groups (3.4 ± 4.4 for anodal tDCS; 4.1 ± 3.2 for sham) (p = 0.68).

	Outcome Measures: LEMS, 10MWT (time, step length and cadence), and WISCI II were assessed at baseline, after 4 weeks of training (at the last session of tDCS), and after 8 weeks of training (follow-up 4 weeks after cessation of tDCS).	
BWSTT in Combination with tDCS in Patients With Chronic SCI		
Simis et al. 2021 Brazil RCT PEDro = 9 Level 1 N = 43	**Population:** 43 participants with incomplete SCI; 33 males and 10 females; median (IQR) age 38 (28-45) years; injury level paraplegic (n = 28) and tetraplegic (n = 15); AIS C (n = 20) and AIS D (n = 23); and median (IQR) time since injury 16 (6.5-23.5) months. **Treatment:** Participants were randomly allocated to receive 30 sessions of active (n = 21) or sham (n = 22) tDCS immediately before RAGT with Lokomat. All participants received 20-min tDCS sessions; 30-min sessions of Lokomat training; and their normal rehabilitation program. • During RAGT sessions, the participant body weight, guidance force and training speed were progressively incremented depending on each participant. • tDCS was performed using a monophasic current device with the anode placed over the primary motor cortex region and the cathode placed over the supraorbital region, contralateral to the anode. **Outcome Measures:** WISCI II; BBS; 10MWT; 6MWT; and Lower Extremity Isokinetic Dynamometry were assessed before the beginning of the intervention (baseline), after 15 sessions (intermediate), after 30 sessions (post-treatment) and three months after treatment (follow-up).	1. All the participants tolerated tDCS sessions, without unexpected AEs. One participant did not tolerate Lokomat training due to pain related to the straps of the BWS mechanism and was excluded from the study. 2. At post-treatment, there was a statistically significant difference in the percentage of participants that improved in WISCI II (33% in the sham group vs. 70% in the active group) ($p = 0.046$); and in the follow-up, there was also statistically significant difference in the changes for the two groups ($p = 0.046$). 3. Regardless of intervention group, statistical improvement existed between baseline and the other periods as measured by 10MWT and 6MWT. 4. Regarding the improvement in the 10MWT, and 6MWT, there was no statistical difference between groups for the tested periods.

[Raithatha et al. 2016](#) USA RCT PEDro = 9 Level 1 N = 15	**Population:** 15 participants with traumatic SCI; 10 males and 5 females; mean (range) age 47.5 (24 – 67) years; level of injury C4 (n = 1), C5 (n = 1), C5-C6 (n = 1), C6 (n = 5), C8 (n = 1), T2 (n = 1), T6 (n = 2), T12 (n = 1), and L1 (n = 2); AIS B (n = 1), AIS C (n = 11) and AIS D (n = 3); and mean (range) time since injury 7.9 (1 – 39) years. **Treatment:** All participants attended to 36 sessions (3/week for 12 weeks) of tDCS immediately before LT with a robot-assisted gait orthosis (LT-RGO). They were randomly allocated into 2 groups: • Active anodal tDCS paired with LT-RGO (active group, n = 9). • Sham tDCS paired with LT-RGO (control group, n = 6). tDCS*:* Each participant in the active tDCS group received 20 min of tDCS. *LT-RGO:* The Lokomat was used with a novel approach to LT-RGO (with progressively decreased treadmill speed and guidance force in order to minimize momentum and thereby avoid eliciting passive movement). **Outcome Measures:** Muscle strength (assessed by MMT) of hips (flexion, extension, abduction, adduction, internal and external rotation), knees (flexion, extension), ankles (dorsiflexion, plantarflexion), great toes (flexion, extension), and toes (flexion, extension); 10MWT; 6MWT; were assessed at baseline, post-intervention, and 1-month follow-up timepoints.	1. There were no AEs during the intervention period. 2. Within-group changes from baseline to post- intervention indicated overall improvement on all outcome measures for both groups. Statistically significant improvement was evident on MMT (both lower extremities) in the active tDCS group and for the left lower extremity in the sham tDCS group. Within-group changes from baseline to 1-month follow-up indicated significant improvement on MMT (both lower extremities), 10MWT, and 6MWT only for the active tDCS group. 3. Between-groups comparison of changes from baseline to post-intervention revealed that the active group improved significantly more than the sham group on MMT (right lower extremity). However, the sham tDCS group improved significantly more than the active tDCS group on 6MWT. Between-groups comparison of changes from baseline to 1-month follow-up revealed significantly greater improvements in MMT (right lower extremity) for the active tDCS group.