Improvements in Upper Limb Function Following Combinatorial Training and Transcutaneous Spinal Cord Stimulation with Electrode Array

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Objective

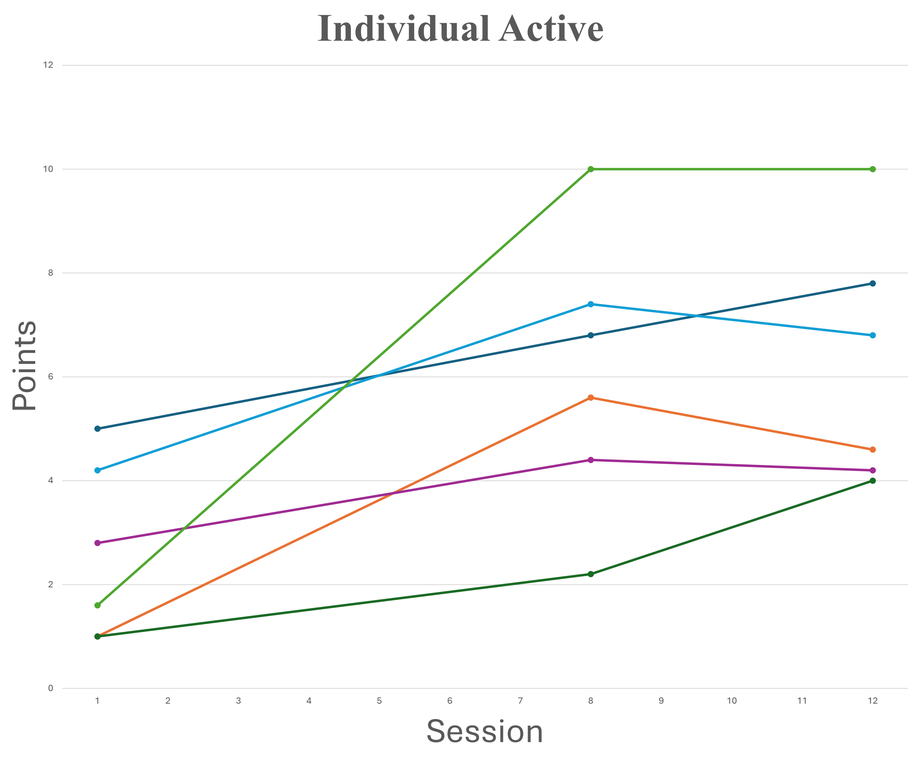
To determine the utility, safety, and feasibility of transcutaneous spinal cord stimulation (TSS) delivered via a 16-electrode array to target upper extremity function and functional independence in adults with tetraplegia.

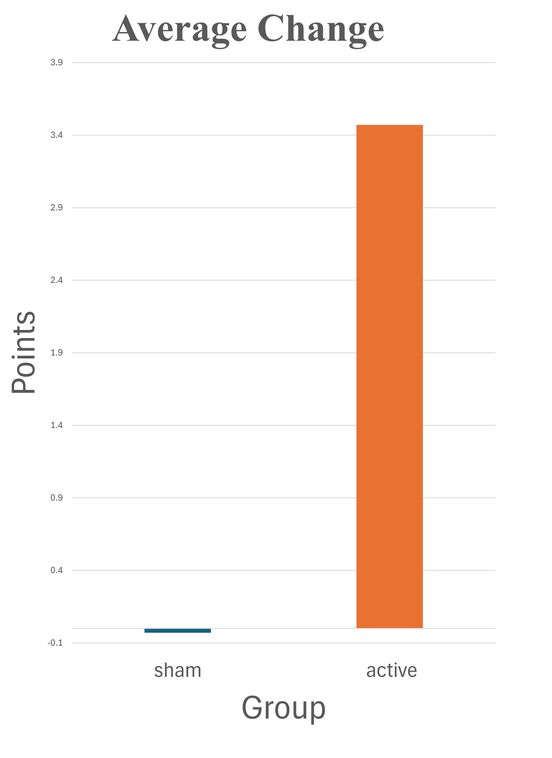
Background

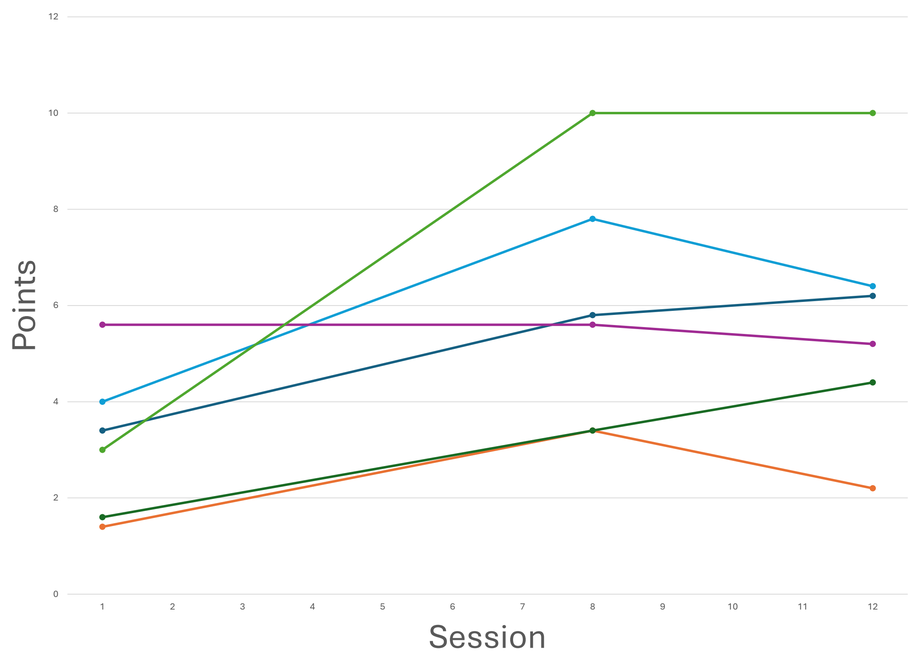
TSS, a noninvasive neuromodulation technique, is used to increase central excitability and unmask latent voluntary function. Currently, commercially available TSS devices limit therapists to a single electrode and parameter configuration. This study evaluated the utility of a new multi-electrode stimulation system to optimize TSS for improved upper extremity function and overall independence.

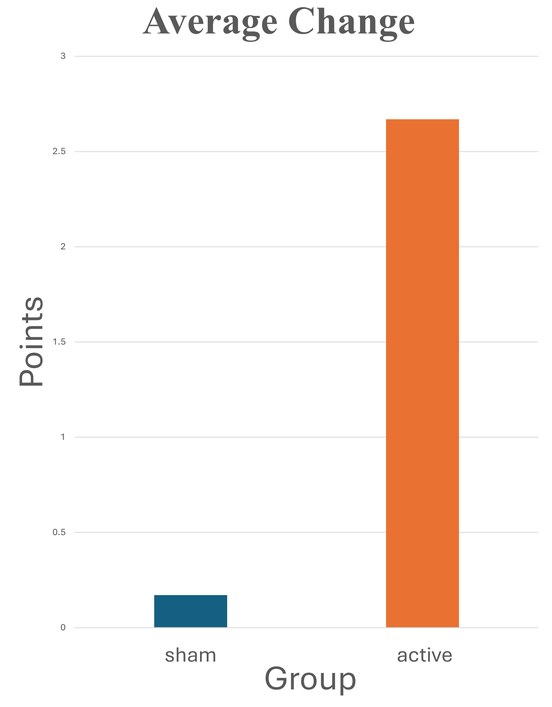
Methods

Ten participants with chronic tetraplegia, C2-C5, AIS B, C, and D are presented here as part of a multicenter randomized controlled trial. The participants were randomized evenly into the active and sham protocol. Participants completed 24 intervention sessions with three assessment visits. Each session included 60 minutes of intervention, with the stimulation group receiving 45-60 minutes of TSS. Interventions included high intensity activities, focused and functional strengthening, massed practice, and robotic facilitation.









Satisfaction and perceived functional performance improve at a greater magnitude with training and TSS via electrode array compared to training alone

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