Overview: Remote access to novel and effective therapies for children with cerebral palsy (CP) is needed to advance mobility and function, as well as respond to transportation and financial challenges during the current pandemic and beyond. Non-invasive brain stimulation, specifically transcranial direct current stimulation (tDCS) is a portable, tolerable, and low-cost non-invasive neuromodulation technique which augments the brain's activity and has shown the potential to improve the impact of rehabilitation in children with CP. Built upon a previous pilot, this new research project will determine the ability of a child-caregiver team to setup and conduct an active tDCS session with remote guidance and caregiver supervision, integrating feedback from both the child and caregiver on tolerance and interest in future at-home rehabilitation.

Abstract: Remote access to novel and effective therapies for children with cerebral palsy (CP) is needed to advance mobility and function, as well as respond to transportation and financial challenges during the current pandemic and beyond. Non-invasive brain stimulation (NIBS), particularly transcranial direct current stimulation (tDCS), provides an approach for modulation of neuroplasticity that is safe, inexpensive, and portable with the potential to improve the impact of rehabilitation in children with CP. Furthermore, rehabilitation approaches combined with tDCS have shown promise to improve motor function recovery and quality of life after stroke in adults. Integrating the application of NIBS may allow for enhanced rehabilitation during the highly-neuroplastic period of childhood and NIBS has demonstrated promising outcomes in increasing the rate and extent of recovery. The Gillick Pediatric Neuromodulation laboratory has pioneered the development of combined pediatric rehabilitation interventions and tDCS to improve motor function. Our studies have shown that in children with CP the use of tDCS is safe, feasible, and successful at modifying motor performance when in combination with other physical therapy interventions. Advancing the reach of teleneuromodulation in pediatric rehabilitation it is crucial to extend accessibility of this affordable and potentially impactful intervention. However, prior to the COVID-19 pandemic, there were no studies remotely performing tDCS for pediatric populations. During the pandemic Stay-at-Home mandate, we completed a novel feasibility investigation of performing remote mock (sham) tDCS by a child-caregiver pair. We found that remote mock tDCS was safe and feasible in the home setting without compromising the efficiency, quality, and comfort of administration. Children and their families were able to follow remote instructions without compromising the quality of tDCS device placement and comfort. Our new project will advance the pilot work by investigating the use of active (real) tDCS with aa child-caregiver team with real-time remote guidance. Specifically, we will the child's feedback regarding tolerance of 20 continuous minutes of active stimulation supervised in real time by caregivers and the remote team, and the enthusiasm of the child-caregiver teams towards future at-home tDCS rehabilitation interventions.