

## The First Trial of Transcranial Pulse Stimulation on Young Adolescents With Autism Spectrum Disorder in Hong Kong

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**Abstract :** Transcranial pulse stimulation (TPS) is a non-intrusive brain stimulation technology that has been proven effective in older adults with mild neurocognitive disorders and adults with major depressive disorder. Given these robust evidences, TPS might be an adjunct treatment options in neuropsychiatric disorders, for example, autism spectrum disorder (ASD) - which is a common neurodevelopmental disorder in children. This trial aimed to investigate the effects of TPS on right temporoparietal junction, a key node for social cognition for Autism Spectrum Disorder (ASD), and to examine the association between TPS, executive functions and social functions. Design: This trial adopted a two-armed (verum TPS group vs. sham TPS group), double-blinded, randomized, sham-controlled design. Sampling: 32 subjects aged between 12 and 17, diagnosed with ASD were recruited. All subjects were computerized randomized into either verum TPS group or the sham TPS group on a 1:1 ratio. All subjects undertook functional MRI before and after the TPS interventions. Intervention: Six 30-min TPS sessions were administered to subjects in 2 weeks' time on alternate days assessing neural connectivity changes. Baseline measurements and post-TPS evaluation of the ASD symptoms, executive functions, and social functions were conducted. Participants were followed up at 2-weeks, at 1-month and 3-month, assessing the short-and long-term sustainability of the TPS intervention. Data analysis: Generalized Estimating Equations with repeated measures were used to analyze the group and time difference. Missing data were managed by multiple imputations. The level of significance was set at  $p < 0.05$ . To our best knowledge, this is the first study evaluating the efficacy and safety of TPS among adolescents with ASD in Hong Kong and nationwide. Results emerging from this study will develop insight on whether TPS can be used as an adjunct treatment on ASD in neuroscience and clinical psychiatry. Clinical Trial Registration: ClinicalTrials.gov, identifier: NCT05408793.

**Keywords :** adolescents, autism spectrum disorder, neuromodulation, rct, transcranial pulse stimulation

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