NEURAL CORRELATES OF PERSONAL SPIRITUAL EXPERIENCE: AN EEG AND NON-INVASIVE ELECTRICAL BRAIN STIMULATION STUDY

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Background: Spiritual experiences (SE) — often reported in contemplative practice and sometimes in end-of-life contexts — are hypothesized to arise from state-dependent reconfiguration of self-referential posterior midline hubs and interoceptive/salience systems. Causal evidence is scarce, partly because most paradigms are correlational and lack temporal precision. High-definition transcranial electrical stimulation (tES) can modulate medial posterior midline cortex (mPMC) and insular circuitry, and EEG can detect rapid oscillatory/network dynamics that may scaffold SE phenomenology.

Aims: (i) Test whether posterior alpha-frequency tACS (8–12 Hz) alters alpha power and alpha-band connectivity within mPMC-centered and parieto–insular networks during script-driven imagery; (ii) Determine whether neural and brain–body indices predict trial-by-trial SE intensity, imagery vividness, valence, and dissociation.

Methods: We use a counterbalanced within-subject design, with participants completing two sessions (active posterior alpha tACS vs sham) on separate days. Thirty healthy right-handed adults are recruited. One week prior to stimulation, participants undergo baseline assessment including questionnaires on spirituality, religiosity, imagery vividness, dissociation, and suggestibility, along with a semi-structured interview to generate individualized guided imagery scripts (spiritual, neutral, negative).
Each session includes eyes-closed resting-state EEG, followed by 20 minutes of stimulation or sham. The guided imagery task is administered in the post-stimulation window with continuous EEG recording. Three imagery trials are presented per session, each comprising baseline, imagery induction, absorption, and washout phases. After each trial, participants rate SE intensity, valence, arousal, imagery vividness, and dissociation, while autonomic and interoceptive indices are concurrently recorded via ECG and electrodermal activity. EEG time–frequency and connectivity measures are extracted and related to subjective and physiological indices using mixed-effects models.

Preliminary Results: Data collection is ongoing.

Keywords: tACS, EEG, Insula, Posterior medial cortex, Spiritual experience

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