

## Documents

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**Emotion brain network topology in healthy subjects following passive listening to different auditory stimuli** (2024) *PeerJ*, 12 (7), art. no. e17721, .

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### Abstract

A large body of research establishes the efficacy of musical intervention in many aspects of physical, cognitive, communication, social, and emotional rehabilitation. However, the underlying neural mechanisms for musical therapy remain elusive. This study aimed to investigate the potential neural correlates of musical therapy, focusing on the changes in the topology of emotion brain network. To this end, a Bayesian statistical approach and a cross-over experimental design were employed together with two resting-state magnetoencephalography (MEG) as controls. MEG recordings of 30 healthy subjects were acquired while listening to five auditory stimuli in random order. Two resting-state MEG recordings of each subject were obtained, one prior to the first stimulus (pre) and one after the final stimulus (post). Time series at the level of brain regions were estimated using depth-weighted minimum norm estimation (wMNE) source reconstruction method and the functional connectivity between these regions were computed. The resultant connectivity matrices were used to derive two topological network measures: transitivity and global efficiency which are important in gauging the functional segregation and integration of brain network respectively. The differences in these measures between pre- and post-stimuli resting MEG were set as the equivalence regions. We found that the network measures under all auditory stimuli were equivalent to the resting state network measures in all frequency bands, indicating that the topology of the functional brain network associated with emotional regulation in healthy subjects remains unchanged following these auditory stimuli. This suggests that changes in the emotion network topology may not be the underlying neural mechanism of musical therapy. Nonetheless, further studies are required to explore the neural mechanisms of musical interventions especially in the populations with neuropsychiatric disorders. Copyright 2024 Mohd Rashid et al.

### Author Keywords

Brain connectivity; Brain network topology; Emotion; MEG; Music therapy; Naturalistic auditory stimuli

### Index Keywords

active listening, adult, amygdala, angular gyrus, Article, auditory stimulation, Bayesian learning, brain region, brainstorming, calcarine sulcus, cognition, cohort analysis, crossover procedure, dorsomedial hypothalamic nucleus, electric potential, electrocardiogram, electrooculogram, emotion, emotion regulation, emotional network, female, functional connectivity, head injury, hearing impairment, human, human experiment, independent component analysis, inferior parietal lobule, interpersonal communication, magnetoencephalography, male, music therapy, nerve cell network, normal human, nucleus accumbens, passive listening, posterior cingulate, resting state network, social aspect, sound, superior parietal lobule, thalamus, time series analysis, vocal cord

### Manufacturers

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