

The development of evidence based Music Therapy for Disorders of Consciousness: Comparing healthy neurophysiological responses to individuals in vegetative and minimally conscious states

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ABSTRACT

Disorders of consciousness (DOC) comprise a continuum of predominantly acquired conditions. Distinguishing between DOC categories of vegetative state (VS), where there are no indications of consciousness despite evidence of wakefulness, and minimally conscious state (MCS) where consciousness is limited, is a challenging process. With awareness often masked by perceptual or motor impairments, misdiagnosis rates remain high. Music therapy assessment holds the potential to elicit responses despite damage to verbal or visual processing faculties, although robust empirical studies are lacking. To underpin this work with objective scientific data, a multiple baseline within subjects study comparing EEG, heart rate variability, respiration and behavioral responses of 20 healthy controls with 12 patients diagnosed as VS and 9 as MCS was conducted. Controls and patients were presented with contrasting music conditions (live salient music & improvised music entrained to respiration), recordings of disliked music, white noise and silence. Neurophysiological and behavioral measures were recorded using a 32 channel XLTEK® video EEG system, with a piezoelectric respiratory belt, and analysed using MATLAB, EEGLAB and BrainVision Analyzer 2 software. One way repeated measures ANOVA analysis of respiration, and power spectra analysis of EEG data indicated a range of significant responses ($p \leq 0.05$) across controls corresponding to arousal and attention in response to live music, including concurrent increases in respiration rate with decreases in respiration variability. Similar findings within EEG data for controls and both VS and MCS cohorts, combined with significant findings for behavioral measures across the VS cohort, indicate music therapy is able to increase arousal levels for DOC patients, optimising the conditions for accurate assessment. Research is indicated to explore both the use of bio-markers of awareness and longer term effects upon neuroplasticity in response to music therapy within this population.

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