

**GETTING FROM PSY-PHY (PSYCHOPHYSIOLOGY)  
TO MEDICAL POLICY VIA MUSIC AND NEUROFEEDBACK  
FOR ADHD CHILDREN**

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Abstract

Within the backdrop of a societal healthcare paradigm swing, this study of EEG neurofeedback with music therapy protocols added an experimental group (NF-MUS) to an existing Philadelphia Office for Mental Health multi-site study of two traditional neurofeedback (NF) protocols. Thirty-eight subjects completed the pre- and post-intervention assessment comprised of the Stroop, Toni-3, NEPSY Attention/Executive core domain score, Conners CPT and ADHD Parent and Teacher Rating Scales Revised (S). NF-MUS subjects also received pre- and post-quantitative EEG (QEEG) topographical brain-mapping. NF-MUS utilized a Theta/Beta protocol variation, incorporating brain-triggered musical tones assigned to Theta amplitude in key with background musical selections.

Individual results within the NF-MUS group showed improvement on NEPSY core domain scores and improvement individually on the Stroop Color and Word tests, but showed mixed results on the combined Stroop Color/Word test. Three out of four NF-MUS subjects improved their TONI quotient. CPT results were mixed, with some individuals displaying dramatic improvement on the CPT's ADHD index score. A paired-samples T-test showed no significant differences between pre- and post-Toni-3 scores or Stroop Color/Word scores. Significant improvement was found for the Stroop Color and Stroop Word scores individually and for the NEPSY Executive Function/Attention subscale index scores.

Between-group analysis showed the NF-MUS group significantly superior to the other NF groups and control subjects on three measures: the NEPSY audio subtest ( $p = .01$ ); the Conners Parent Rating Scale ADHD index ( $p = .015$ ); and, the Conners Parent Survey Cognitive subscale ( $p = .043$ ).

Differences in QEEG brain maps ranged from very little change pre- and post-intervention to noticeable normalization patterns. NF-MUS subjects decreased their Theta/Beta ratio ( $p=.004$ ) and increased their SMR ( $p=.012$ ) as hypothesized. Theta reduction alone, however, was not significant ( $p=.189$ ).

These results indicate that a brain-triggered musical component to neurofeedback protocols may yield superior remediation of ADHD symptoms than standard neurofeedback protocols. Acceptance of these results and incorporation of findings into clinical practice, however, is unlikely until further investigation corroborates these results, and medical community attitudes continue to shift in the direction of holistic therapies.

Dr. Eric Miller is a psychotherapist, certified biofeedback therapist and board-certified music therapist with experience in inpatient, outpatient, corporate and educational settings. He instructs in capacity of adjunct faculty and guest lectures at such institutions as Antioch University, Bryn Mawr College, Harcum College, Allegheny University (formerly Hahnemann) and at the Naropa Institute. He is a published author and presents internationally on music & healing. Dr. Miller was appointed Executive Director of Music for People in 1997 and has served as President of Expressive Therapy Concepts since 1993. He also directs the Association for Integrative Medicine and the Biofeedback Network.



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