The Problem of Patient Heterogeneity and Lack of Proper Training in a Study of EEG Neurofeedback in Children

To The Editor: A recent article[1] reported results demonstrating that electroencephalographic (EEG) neurofeedback was not different from placebo neurofeedback in improving attention-deficit/hyperactivity disorder (ADHD) symptoms in children with ADHD. Thus, we would request the title and clinical points be changed to reflect the findings of the study in an accurate manner. The issues that support this modification are listed below in order of importance.

1. The percentage of reward (80%) utilized in this study precludes a significant learning effect in an operant conditioning paradigm. This article failed to demonstrate acquisition at the neural level for the stimulus being trained, which is the most basic principle of operant learning.[2–6] In both respondent and operant conditioning, an individual acquires a behavior that was not previously possessed.[7–9]
2. Importantly, pre-quantitative and post-quantitative EEG at the group level would have also been desired given the comorbidity[10] and medication issues in addition to reward parameters.[11] It would also be advantageous to examine the EEG changes in the placebo group as a result of the procedure to better understand the nature of self-regulation and its global effects. To this end, we have calculated the effect size for each of the study variables shown in Table 2 of the article. The effect sizes range from 0.63 to 0.36; the highest effect sizes are shown for the inattention symptoms at 0.63.
3. The current work includes patients with ADHD) with comorbid oppositional defiant disorder (ODD), anxiety, and learning disorders. Thus, approximately 39% of this study population may not have received proper training with known protocols utilized for treatment of ADHD, anxiety, ODD, or learning disorders;[12–14] such protocols with differential features to address these particular syndromes,[15–17] with or without comorbid ADHD, would be different from the SMR/theta protocols used in this study. These differences in protocols undoubtedly contributed to the lack of significantly different findings between groups and should have been considered in the differential grouping and analyses of the study data.
4. Although the reduction in symptoms occurred in both groups, psychometric measures were not utilized for diagnostic or classification purposes nor were they obtained to confirm or deny this outcome,[18] given that we clinicians would want to see improvement within the individual across treatment sessions.[19] Therefore we hypothesize that this classification system may have produced effects on the outcome of the study.[15–17] Further, data for 14 (8 neurofeedback and 6 placebo) of the total 41 patients had previously been analyzed and reported. As we have noted in this letter, there are standardized protocols that have worked well with ADHD across studies,[18,19] and may have added to the quality of the article.

Simply stated, it is not unreasonable to consider the effects of neurofeedback across a heterogenous sample of comorbidity, since this is highly likely to be encountered in the clinical setting. However, to report the findings of such a study in one disorder is misleading and unrepresentative of the data. Thus, the title and clinical points of this study fall under these confounding issues and should be adjusted accordingly.

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