

Attention Research Update Reviews the Study on ADHD Treatment

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**** ATTENTION RESEARCH UPDATE ****

**** July 2014 - Effective Neurofeedback Treatment for ADHD in Only 12 Sessions? ****

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Dear Colleague,

I hope that you are doing well.

This issue of Attention Research Update reviews a recently published study whose results suggest that neurofeedback training may yield significant benefits to youth with ADHD in as little as 5 hours of training conducted over 12 sessions. This is an encouraging initial finding as, if confirmed, it would substantially reduce the expense and time associated with neurofeedback treatment, and increase the viability of this approach for many families.

I hope you enjoy today's issue.

Sincerely,

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**** Effective Neurofeedback Treatment for ADHD in Only 12 Sessions? ****

Neurofeedback - also known as EEG Biofeedback - is treatment for ADHD in which individuals learn to produce and maintain a pattern of EEG activity that is consistent with a focused, attentive state. This is done by collecting EEG data from individuals as they focus on stimuli presented on a computer screen. Their ability to control the stimuli, for example, keeping the smile on a smiley face or keeping a video playing, is contingent on maintaining an EEG state consistent with focused attention. Overtime, individuals learn to do this during the training; neurofeedback proponents argue that this generalizes to real world situations and results in better attention during academic and related tasks.

I have reviewed multiple neurofeedback studies in prior issues of Attention Research Update and recently reviewed 2 studies that yielded exceptionally positive findings. Results from these suggested that neurofeedback may yield comparable benefits for children with ADHD as those provided by medication treatment. You can find my review of these studies at www.helpforadd.com/2014/april.htm

Despite growing evidence that neurofeedback provides meaningful benefits to many individuals with ADHD, an important concern remains the time and expense of the treatment. A typical course of neurofeedback treatment often involves 30-40 sessions; this was the case in the studies noted above. This is a time consuming an expensive proposition, particularly since neurofeedback is

rarely covered by health insurance.

Thus, developing a neurofeedback treatment protocol that yielded clinical benefits in fewer sessions would be an important development for the field. A study recently published in the journal *Clinical EEG and Neuroscience* suggests that this may be possible [Hillard et al., (2013). Neurofeedback training aimed to improved focused attention and alertness in children with ADHD: A study of relative power of EEG rhythms using custome-made software application. *Clinical EEG and Neuroscience*, 44, 193-202].

Participants were 18 children and adolescents with ADHD - average age 13.6 years; 6 females. Diagnoses were made using a structured psychiatric interview along with parent and teacher rating scales. Participants completed 12 weekly neurofeedback sessions of 25 minutes per session. The training protocol and equipment was developed by Peak Achievement; the goal was to enhance Focus throughout the session will maintaining an adequate level of Alertness. (Note - The Peak Achievement system is described at <http://peakachievement.com>. Peak Achievement was a sponsor of Attention Research Update approximately 7 years ago but I have no current relationship with the company.)

Sessions were completed using different segments of documentary films. Feedback that an individual's EEG state deviated from the desired parameters was conveyed by changing the screen brightness and size of the video and/or slowing down/stopping the video. Thus, participants were continually informed about whether they were maintaining EEG activity consistent with a Focused and Alert state. EEG data was collected throughout each session so that changes within and across sessions could be determined.

Measures - Behavioral ratings from parents were collected before and after treatment using the Aberrant Behavior Checklist which assessed hyperactivity, lethargy (indicative of a day-dreamy, unfocused state), and hyperactivity. Objective assessments of attention were collected pre- and post- treatment using a computerized test of attention called the IVA+Plus. As noted above, EEG data was also collected throughout training so that changes associated with training could be computed.

Results

Behavior ratings - A comparison of parents' pre- vs. post-behavior ratings indicated significant reductions in irritability, lethargy, and hyperactivity.

Computerized attention measure - The IVA+Plus showed significant gains in measures of visual attention that were of large magnitude. Gains in auditory attention approached, but did not quite reach, statistical significance.

EEG changes - Significant changes were found in a range of different EEG parameters. Particularly noteworthy was a significant decrease in participants theta/beta ratio; as noted in a prior issue of Attention Research Update, the theta/beta ratio has been found to be a reliable indicator of ADHD, with higher ratios more likely to be found in diagnosed individuals (see www.helpforadd.com/2013/september.htm). A steady decline was observed in this ratio over the course of the 12 training sessions. Parallel changes from minute to minute within each individual session were also observed.

Summary and Implications

The most encouraging implication of this study is that neurofeedback treatment for ADHD can yield significant benefits in far fewer sessions than has typically been required. In this study, behavior improvements, gains in a computerized measure of attention, and corresponding EEG changes were all observed after only 12 25 minute training sessions, i.e., only about 5 total hours of training. Whether this is because of the specific training protocol used in this study, i.e., the Peak Achievement training system, or could be attained with other training protocols, is unclear. (Note - You can find additional information on this protocol at <http://peakachievement.com/professional/BrainwaveBasicsforPeakAchievementTraining.htm>).

It is important to emphasize that this was not a randomized controlled trial - in fact, there was not even a control group. Thus, reliable conclusions about the clinical efficacy of this approach cannot be made from this study alone. For instance, parent rating may have improved because of expectations about treatment benefits rather than actual changes in children's behavior. However, the computerized measure of attention would not be subject to such expectancy effects. And, documenting that EEG parameters changed in ways that are consistent with improved focus and attention also strengthens the study.

In addition to the absence of a control group, there are several other limitations to this study that should be noted. First, the rating scale used in this study is not a widely used measure in the assessment of ADHD and does not include all

ADHD symptoms. Thus, including a more conventional rating scale for ADHD, e.g., the Conners, the ADHD Rating Scale, the Vanderbilt Assessment Scale, would have been helpful. Second, no data was collected from children's teachers; finding improvements in teacher ratings of participants' attention would also have strengthened the results. Thus, we do not learn whether the treatment was associated with functional improvements at school, an essential target for ADHD treatment.

Third, it would have been a nice addition if the authors reported on the strength of the association between EEG changes and changes in behavior ratings and computerized attention results. If a significant relationship were found, it would more clearly link EEG changes that occurred during training to the improvements in the behavior ratings and computerized assessment of attention that was observed.

Finally, although the documentation of EEG changes was a strong feature of the study, all EEG data was collected during training itself. If similar changes in the theta/beta ratio were documented outside of the specific training context, it would indicate that neurofeedback induced EEG changes are not confined to when participants are actively engaged in training. This would provide a basis for explaining why improvements in focus and attention in real world contexts, e.g., while doing school work, may occur. Of course, documenting that such changes and benefits persist over time would be another critical factor in evaluating the real-world utility of neurofeedback, particularly because the benefits associated with current evidence-based treatments - medication and behavior therapy - are not typically associated with lasting gains.

These limitations aside, it is encouraging to see initial evidence that neurofeedback may yield significant benefits to youth with ADHD in fewer sessions than has previously been documented. If supported by subsequent work, it would clearly make neurofeedback a more affordable and viable treatment option for many families.

Thanks again for your ongoing interest in the newsletter. I hope you enjoyed the above article and found it to be useful to you. If you haven't yet tried DefiniPoint's online system for obtaining behavior rating scale data, I encourage to become familiar with the benefits of this new system by watching a [3-minute video](#) on their program.

Sincerely,

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