

PEDIATRICS[®]

In-School Neurofeedback Training for ADHD: Sustained Improvements From a Randomized Control Trial

1. [Naomi J. Steiner](#), MD^a,
2. [Elizabeth C. Frenette](#), MPH^a,
3. [Kirsten M. Rene](#), MA^a,
4. [Robert T. Brennan](#), EdD^b, and
5. [Ellen C. Perrin](#), MD^a

± Author Affiliations

1. ^a*The Floating Hospital for Children at Tufts Medical Center, Department of Pediatrics, Boston, Massachusetts; and*
2. ^b*Harvard School of Public Health, Boston, Massachusetts*

Abstract

OBJECTIVE: To evaluate sustained improvements 6 months after a 40-session, in-school computer attention training intervention using neurofeedback or cognitive training (CT) administered to 7- to 11-year-olds with attention-deficit/hyperactivity disorder (ADHD).

METHODS: One hundred four children were randomly assigned to receive neurofeedback, CT, or a control condition and were evaluated 6 months postintervention. A 3-point growth model assessed change over time across the conditions on the Conners 3-Parent Assessment Report (Conners 3-P), the Behavior Rating Inventory of Executive Function Parent Form (BRIEF), and a systematic double-blinded classroom observation (Behavioral Observation of Students in Schools). Analysis of variance assessed community-initiated changes in stimulant medication.

RESULTS: Parent response rates were 90% at the 6-month follow-up. Six months postintervention, neurofeedback participants maintained significant gains on Conners 3-P (Inattention effect size [ES] = 0.34, Executive Functioning ES = 0.25, Hyperactivity/Impulsivity ES = 0.23) and BRIEF subscales including the Global

Executive Composite (ES = 0.31), which remained significantly greater than gains found among children in CT and control conditions. Children in the CT condition showed delayed improvement over immediate postintervention ratings only on Conners 3-P Executive Functioning (ES = 0.18) and 2 BRIEF subscales. At the 6-month follow-up, neurofeedback participants maintained the same stimulant medication dosage, whereas participants in both CT and control conditions showed statistically and clinically significant increases (9 mg [$P = .002$] and 13 mg [$P < .001$], respectively).

CONCLUSIONS: Neurofeedback participants made more prompt and greater improvements in ADHD symptoms, which were sustained at the 6-month follow-up, than did CT participants or those in the control group. This finding suggests that neurofeedback is a promising attention training treatment for children with ADHD.

Full article can be found at:

<http://pediatrics.aappublications.org/content/early/2014/02/11/peds.2013-2059.full.pdf+html>