Executive Function Training for Children with Attention Deficit Hyperactivity Disorder.

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Abstract

BACKGROUND:
Accumulating evidence indicates that attention deficit hyperactivity disorder (ADHD) is associated with core deficits in executive function (EF) which predicts poorer academic and occupational functioning. This makes early intervention targeting EF impairments important to prevent long-term negative outcomes. Cognitive training is a potential ADHD treatment target. The present study aimed to explore the efficacy, feasibility, and acceptability of a cognitive training program (targeting child's multiple EF components and involving parent support in daily life), as a nonpharmacological intervention for children with ADHD.

METHODS:
Forty-four school-age children with ADHD and their parents participated in 12 sessions of EF training (last for 12 weeks) and 88 healthy controls (HC) were also recruited. Training effects were explored using both neuropsychological tests (Stroop color-word test, Rey-Osterrieth complex figure test, trail making test, tower of Hanoi, and false-belief task) and reports of daily life (ADHD rating scale-IV, Conners' parent rating scale, and behavior rating inventory of executive function [BRIEF]) by analysis of paired sample t-test and Wilcoxon signed-rank test. The differences on EF performances between children with ADHD after training and HC were explored using multivariate analysis.

RESULTS:
The results (before vs. after EF training) showed that after intervention, the children with ADHD presented better performances of EF both in neuropsychological tests (word interference of Stroop: 36.1 ± 14.6 vs. 27.1 ± 11.1, t = 4.731, P < 0.001; shift time of TMT: 194.9 ± 115.4 vs. 124.8 ± 72.4, Z = -4.639, P < 0.001; false-belief task: χ² = 6.932, P = 0.008) and reports of daily life (global executive composite of BRIEF: 148.9 ± 17.5 vs. 127.8 ± 17.5, t = 6.433, P < 0.001). The performances on EF tasks for children with ADHD after EF training could match with the level of HC children. The ADHD symptoms (ADHD rating scale total score: 32.4 ± 8.9 vs. 22.9 ± 8.2, t = 6.331, P < 0.001) and behavioural problems of the children as reported by parents also reduced significantly after the intervention. Participants reported that the EF training program was feasible to administer and acceptable.

CONCLUSIONS:
The EF training program was feasible and acceptable to children with ADHD and parents. Although replication with a larger sample and an active control group are needed, EF training program with multiple EF focus and parent involving in real-life activities could be a potentially promising intervention associated with significant EF (near transfer) and ADHD symptoms improvement (far transfer).