Behavioral and Neural Enhancing Effects of a Summer Treatment Program in Children with Attention Deficit Hyperactivity Disorder

Akira Yasumura, Kotaro Yuge, Chiyomi Egami, Chizuru Anai, Akiko Mukasa, Yushiro Yamashita, Masumi Inagaki

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Abstract
Deficiency in executive functioning is a core symptom of attention deficit hyperactivity disorder (ADHD). The brain part responsible for executive functions is the prefrontal cortex (PFC). Although drug-based interventions can improve PFC activity, reports on PFC activity being improved by behavioral treatment are lacking. We evaluated whether a summer treatment program (STP) administering comprehensive behavioral treatment would increase PFC activity in children with ADHD. We examined behavioral and neural changes in 20 children before and after the STP, conducted over a 2-week period. We asked the parents/guardians to complete the Swanson, Nolan, and Pelham IV scale to assess severity of ADHD. The main task evaluating executive control was the reverse Stroop task. To examine changes in physiological indices, we used near-infrared spectroscopy to measure changes in PFC activity. Subjective assessments by parents/guardians indicated that ADHD symptoms improved significantly. There was also significant improvement in the number of correct responses and interference rates in the reverse Stroop task. Furthermore, postintervention PFC activity was significantly higher. These results suggest that the STP improved inhibitory control in executive function, which is considered as a key symptom of ADHD. The increase in PFC activity further suggests that the STP improves cognition through neural function.