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The influences of environmental enrichment, cognitive enhancement, and physical exercise on brain development: Can we alter the developmental trajectory of ADHD?

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Abstract

Attention-deficit/Hyperactivity Disorder (ADHD) is characterized by a pervasive pattern of developmentally inappropriate inattentive, impulsive and hyperactive behaviors that typically begin during the preschool years and often persist into adulthood. The most effective and widely used treatments for ADHD are medication and behavior modification. These empirically-supported interventions are generally successful in reducing ADHD symptoms, but treatment effects are rarely maintained beyond the active intervention. Because ADHD is now generally thought of as a chronic disorder that is often present well into adolescence and early adulthood, the need for continued treatment throughout the lifetime is both costly and problematic for a number of logistical reasons. Therefore, it would be highly beneficial if treatments would have lasting effects that remain after the intervention is terminated. This review examines the burgeoning literature on the underlying neural determinants of ADHD along with research demonstrating powerful influences of environmental factors on brain development and functioning. Based upon these largely distinct scientific literatures, we propose an approach that employs directed play and physical exercise to promote brain growth which, in turn, could lead to the development of potentially more enduring treatments for the disorder.

Research highlights

- ▶ The behavioral manifestations of ADHD are the result of deficient neural networks.
- ▶ Neurodevelopment can be positively affected by appropriate environmental influences.
- ▶ Effective environmental stimulation will be best achieved within a social context.
- ▶ Intrinsically rewarding (i.e., fun) treatment will facilitate persistence over time.
- ▶ Play that places demands on cognitive skills may be effective for treating ADHD.