

# Healthy Body, Healthy Mind?



## The Effectiveness of Physical Activity to Treat ADHD in Children

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### KEYWORDS

- Physical activity • Exercise • Attention-deficit/hyperactivity disorder • ADHD
- Children • Intervention • Treatment • Evidence-based

### KEY POINTS

- Structured physical activity has the potential to be an effective treatment of ADHD in children.
- Incontrovertible data from animal studies indicate that exercise enhances brain development and behavioral functioning.
- Studies suggest that, acutely, physical activity may lead to gains in neuropsychological functioning, including processing speed and some executive functions.
- After long-term (ie,  $\geq 5$  weeks) moderate–vigorous exercise interventions, research suggests that children's ADHD-related behaviors may be less severe and improvements in performance on measures of neuropsychological function may be observed.
- Physical activity may offer benefits over and above psychostimulant use.
- The current literature is predominated with small, unblinded pilot studies. The field needs methodologically robust, blinded, randomized controlled trials to determine the efficacy of physical activity as a treatment of children's ADHD.

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Abbreviations	
ADHD	Attention-deficit/hyperactivity disorder
ASER	Acoustic startle eyeblink response
ASQ	Conners Abbreviated Symptom Questionnaire
BDNF	Brain-derived neurotrophic factor
BMI	Body mass index
Bpm	Beats per minute
CBCL	Child Behavior Checklist
CPT-II	Conners Continuous Performance Test, Second Edition
DA	Dopamine
HR	Heart rate
HRmax	Maximum heart rate
LD	Learning disorder
MPH	Methylphenidate
MVPA	Moderate–vigorous physical activity
RCT	Randomized controlled trial
RPE	Ratings of perceived exertion
SSRS	Social Skills Rating System
VO <sub>2</sub>	Oxygen consumption per unit time
VO <sub>2max</sub>	Maximum oxygen consumption
WCST	Wisconsin Card Sorting Test
WISC-R	Wechsler Intelligence Scale for Children-Revised
YSR	Youth Self Report

## INTRODUCTION/BACKGROUND

### *Target of Treatment*

Emerging research suggests considerable potential for enhanced physical activity, in particular regular moderately intensive aerobic exercise, to be beneficial to the core inattentive and hyperactive/impulsive symptoms of ADHD, an array of neuropsychological deficits associated with the disorder, and perhaps academic difficulties. In addition, improved physical health and fitness that results from such exercise programs may increase status with peers and, in turn, improve peer relations.

### *Need for Treatment*

At present, there are 2 well-established evidence-based treatment strategies for childhood ADHD: medication and behavior modification. As such, one may ask, why is anything else needed? Current evidence-based interventions, however, although providing symptomatic relief to many patients, have several significant limitations, making them far from a panacea.

Recent estimates from the Centers for Disease Control and Prevention indicate that as many as 6.1% (3.5 million) of American youth between the ages of 4 and 17 years are being treated with medication for ADHD.<sup>1</sup> This reflects both the high prevalence of ADHD in the population and that, relative to other interventions, medication, in particular psychostimulants, are generally safe and provide the greatest symptomatic relief.<sup>2,3</sup> Yet, treatment with medication has several well-known limitations, including that some children do not respond or experience side effects precluding their use; many parents and children are not comfortable with medication as an ongoing intervention for children; a substantial portion of individuals have only a partial response to treatment, leaving them still highly symptomatic; and despite that ADHD is considered a chronic disorder, a majority of individuals prescribed medication stop taking it within the first year,<sup>4,5</sup> and once medication is terminated, symptoms typically return the next day. In addition, despite its efficacy for treating inattention, impulsiveness,

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