The Parent's Reading Library

Food, Nutrition & Neurodivergent Children

Section 12

Executive Function & Learning

Why this topic matters

Executive function is a group of important brain skills that help children pay attention, remember information, plan tasks, control impulses, solve problems and regulate their emotions. These skills are essential for learning at school, making friends and managing everyday life.

Many children with ADHD and other neurodevelopmental conditions experience challenges with executive function. Research suggests that healthy nutrition, regular physical activity, good sleep and supportive learning environments all contribute to healthy brain development and may help strengthen these important skills alongside appropriate medical, educational and therapeutic support.

1. ADHD and Academic Performance: Why Does ADHD Impact on Academic Performance and What Can Be Done?

Reference

Daley, D., & Birchwood, J. (2010). *ADHD and Academic Performance: Why Does ADHD Impact on Academic Performance and What Can Be Done?* **Child: Care, Health and Development, 36**(4), 455–464.

DOI

https://doi.org/10.1111/j.1365-2214.2009.01046.x

Plain English Summary

This review explains how ADHD can affect attention, working memory, organisation and behaviour, making learning more challenging for many children. The authors emphasise that early support at home and school can significantly improve educational outcomes.

2. Exercise Reduces ADHD Symptoms and Improves Neuropsychological Performance

Reference

Kamp, C. F., Sperlich, B., Holmberg, H.-C., et al. (2014). *Exercise reduces the symptoms of attention-deficit/hyperactivity disorder and improves social behaviour, motor skills, strength and neuropsychological parameters*. **Acta Paediatrica, 103**(7), 709–714.

Plain English Summary

This review found that regular exercise may improve attention, working memory and executive functioning in children with ADHD. Improvements were also seen in classroom behaviour and social interactions.

Note: Please verify the complete bibliographic details and DOI before publication.

3. Aerobic Exercise, Cognitive Performance and Brain Activity in Adolescents with ADHD

Reference

Chuang, L.-Y., Tsai, Y.-J., Chang, Y.-K., Huang, C.-J., Hung, T.-M., et al.

Aerobic Exercise, Cognitive Performance, and Brain Activity in Adolescents with Attention-Deficit/Hyperactivity Disorder.

Plain English Summary

Researchers found that moderate aerobic exercise improved attention and executive functioning immediately after exercise. Brain imaging also showed changes associated with improved cognitive performance.

Note: Please verify the final journal details and DOI before publication.

4. The Role of Nutrition in Children's Neurocognitive Development

Reference

Nyaradi, A., Li, J., Hickling, S., Whitehouse, A. J. O., & Oddy, W. H. (2013). *The role of nutrition in children's neurocognitive development, from pregnancy through childhood*. **Frontiers in Human Neuroscience, 7**, 97.

DOI

https://doi.org/10.3389/fnhum.2013.00097

Plain English Summary

This review explains how good nutrition supports the development of memory, attention, learning and executive functioning throughout childhood. The authors conclude that healthy dietary patterns provide the foundation for healthy brain development.

5. Physical Activity, Fitness, Cognitive Function and Academic Achievement in Children

Reference

Donnelly, J. E., Hillman, C. H., Castelli, D., et al. (2016). *Physical Activity, Fitness, Cognitive Function, and Academic Achievement in Children: A Systematic Review.* **Medicine & Science in Sports & Exercise, 48**(6), 1197–1222.

DOI

https://doi.org/10.1249/MSS.0000000000000901

Plain English Summary

This review found that regular physical activity supports attention, learning, memory and executive functioning. Importantly, increasing physical activity did not reduce academic achievement and often improved classroom performance.

6. Be Smart, Exercise Your Heart: Exercise Effects on Brain and Cognition

Reference

Hillman, C. H., Erickson, K. I., & Kramer, A. F. (2008). *Be Smart, Exercise Your Heart: Exercise Effects on Brain and Cognition*. **Nature Reviews Neuroscience, 9**(1), 58–65.

DOI

https://doi.org/10.1038/nrn2298

Plain English Summary

This landmark review explains how exercise improves blood flow to the brain, supports learning and encourages the growth of new brain connections. These biological changes contribute to better attention and cognitive performance.

7. Brain Foods: The Effects of Nutrients on Brain Function

Reference

Gómez-Pinilla, F. (2008). *Brain Foods: The Effects of Nutrients on Brain Function*. **Nature Reviews Neuroscience, 9**(7), 568–578.

DOI

https://doi.org/10.1038/nrn2421

Plain English Summary

This highly cited review explains how nutrition influences learning, memory and brain plasticity. The author concludes that healthy dietary patterns provide the nutrients needed for optimal brain function throughout life.

8. Healthy Dietary Patterns and Cognitive Performance During Adolescence

Reference

Nyaradi, A., Foster, J. K., Hickling, S., Li, J., Ambrosini, G. L., Jacques, A., & Oddy, W. H. (2014). *Prospective associations between dietary patterns and cognitive performance during adolescence*.

Plain English Summary

This Australian study found that healthier dietary patterns were associated with better cognitive performance during adolescence. The findings support the importance of nutritious eating habits for learning and brain development.

Note: Please verify the final journal citation and DOI before publication.

9. Executive Functions

Reference

Diamond, A. (2013). *Executive Functions*. **Annual Review of Psychology, 64**, 135–168.

DOI

https://doi.org/10.1146/annurev-psych-113011-143750

Plain English Summary

Professor Adele Diamond provides one of the most comprehensive reviews of executive function, explaining how attention, working memory, self-control and flexible thinking develop throughout childhood. The paper highlights why these skills are so important for school success and everyday life.

10. World Federation of ADHD International Consensus Statement

Reference

Faraone, S. V., Asherson, P., Banaschewski, T., et al. (2021). *The World Federation of ADHD International Consensus Statement: 208 Evidence-based Conclusions About the Disorder*. **Neuroscience & Biobehavioral Reviews, 128**, 789–818.

DOI

https://doi.org/10.1016/j.neubiorev.2021.01.022

Plain English Summary

This international consensus statement summarises the strongest scientific evidence on ADHD. It confirms that ADHD commonly affects executive functioning and supports a comprehensive approach that combines medical care, education, behavioural strategies and healthy lifestyle habits.

What this means for families

Executive function skills develop gradually throughout childhood and continue to mature into early adulthood. Children with ADHD often need additional support with organisation, planning, emotional regulation, working memory and maintaining attention.

Research consistently shows that no single strategy is enough. The best outcomes occur when healthy nutrition, regular physical activity, quality sleep, supportive teaching, behavioural strategies and appropriate healthcare work together. Every child develops at their own pace, and small improvements in daily routines can make a meaningful difference over time.

Evidence at a Glance

Overall evidence: ★★★★★ Strong

What research consistently shows

- Executive function is essential for learning, behaviour and everyday life.
- ADHD commonly affects attention, working memory, planning and self-regulation.
- Healthy nutrition, exercise and sleep all support brain development and cognitive function.
- Children benefit most from a comprehensive approach that combines healthy lifestyle habits with educational, behavioural and medical support.
- Building executive function skills takes time, consistency and encouragement from families, schools and healthcare professionals.