
Supporting Executive Function: Tools for Neurodivergent Learners


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OBJECTIVES

- To describe the primary components of executive function
- To discuss how difficulties with executive function affect academic performance, behavior and social functioning
- To describe the importance of interventions that target executive function
- To examine research on interventions shown to improve executive functioning



Executive functioning refers to the ability to apply specific abilities to problem-solving and, ultimately, achieving goals.

Primary Executive Functions

Inhibitory Control: the ability to inhibit thoughts and actions that are inappropriate for a situation, resist impulses, and stop one's behavior at the appropriate time



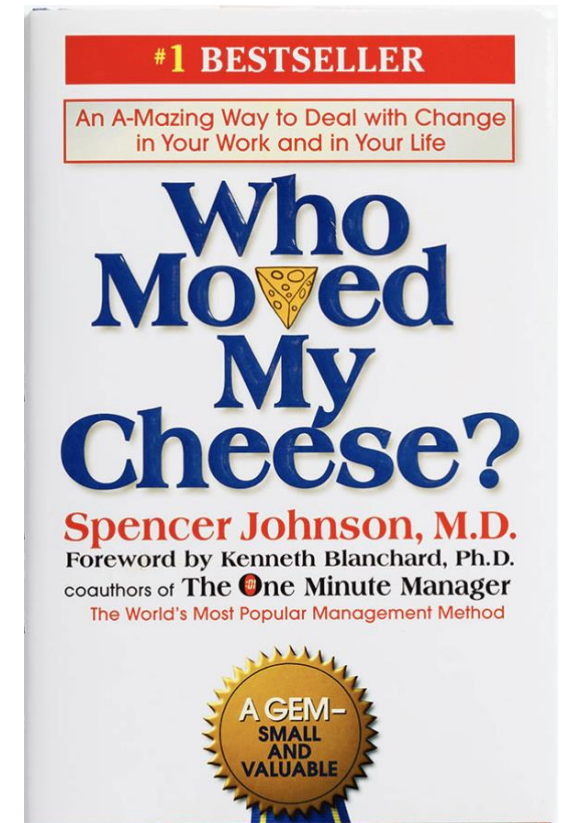
Primary Executive Functions

Working memory: the capacity to hold information in mind and manipulate it in order to complete a task, store the information or generate goals



Primary Executive Functions

Cognitive Flexibility: the ability to shift attention among distinct but related aspects of a task as well as adapt responses using new information



Other Executive Functions

- Task Initiation
- Attention control
- Planning
- Organizing
- Self-Regulation



Higher-Order Executive Functions

- Prioritizing
- Time management
- Problem-solving
- Reasoning
- Decision making
- Judgment
- Self-awareness

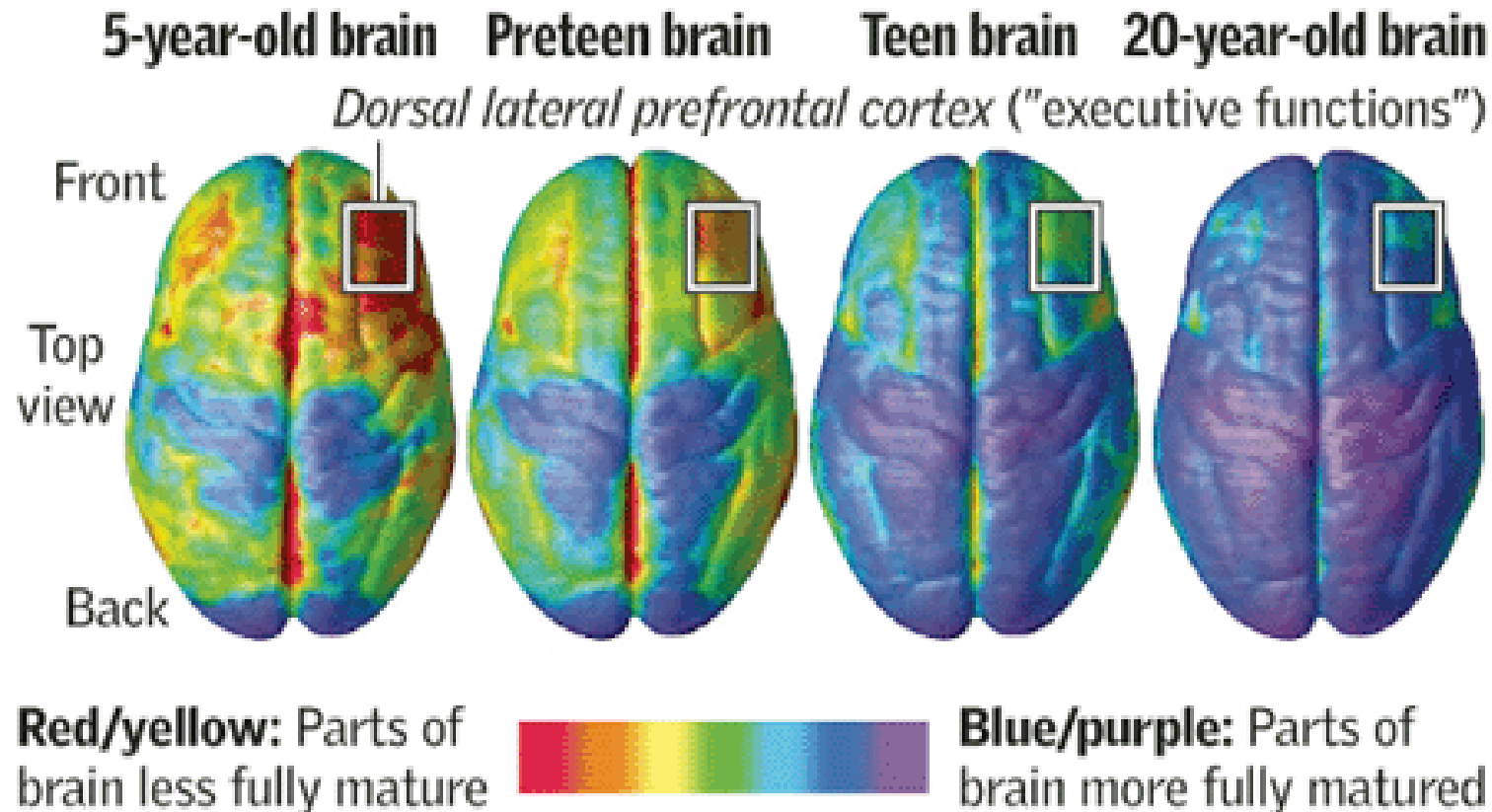


The Frontal Lobes



Judgment last to develop

The area of the brain that controls "executive functions" — including weighing long-term consequences and controlling impulses — is among the last to fully mature. Brain development from childhood to adulthood:



Sources: National Institute of Mental Health;
Paul Thompson, Ph.D., UCLA Laboratory of
Neuro Imaging

Thomas McKay | The Denver Post



For some EF develops much more slowly....

ADHD and Executive Functioning

- Up to 90 percent of kids with ADHD have executive function challenges, many of which last into adulthood.
- Significantly more children and adolescents with ADHD have EF difficulties than those who do not have ADHD.
- ADHD with EF deficits is associated with an increased risk for grade retention and significant impairments in academic functioning.

Autism Spectrum Disorder and Executive Functioning

- Meta-analysis showed consistent evidence of an overall moderate effect size of executive dysfunction in ASD.
- Individuals with a diagnosis of ASD performed on average significantly worse on EF in comparison with neurotypical controls.
- Recent trends in ASD research have focused on how over- and underconnectivity between brain networks predicts cognitive challenges and symptom severity.



Why Is It Important to Improve Executive Functions?

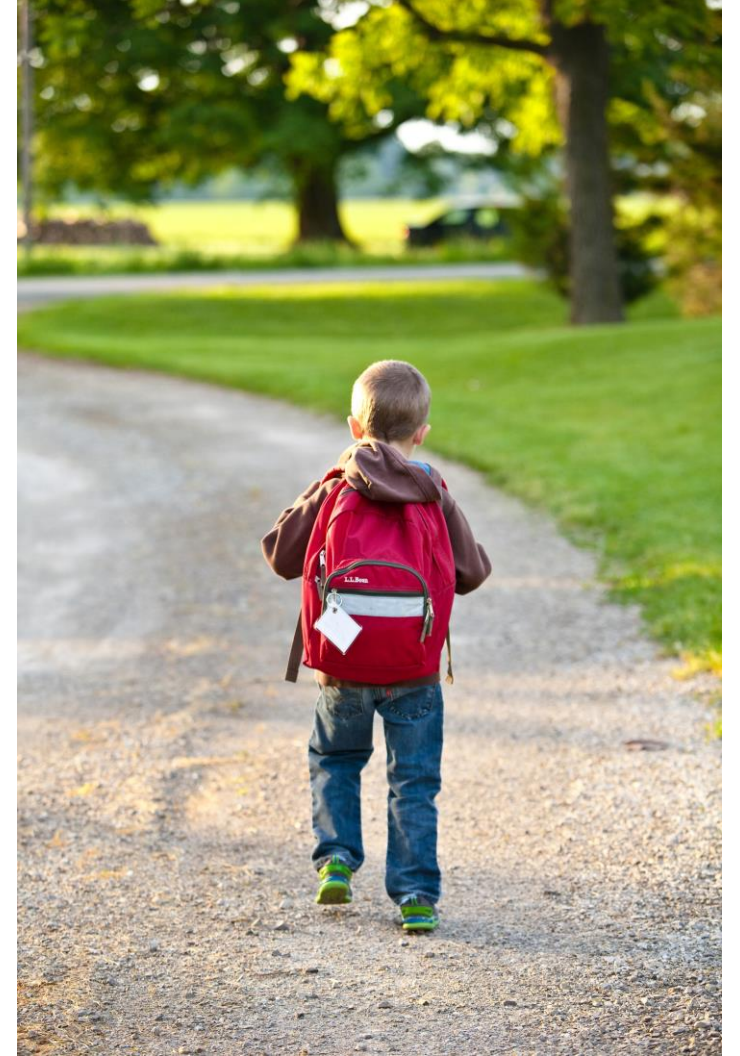
EF allow us to:

- wait before speaking or acting
- resist impulsively reacting
- stay focused despite distraction
- seeing tasks through to completion
- hold alternatives in mind
- look at a situation from multiple perspectives
- flexibly change course when needed
- seize opportunities when they unexpectedly arise

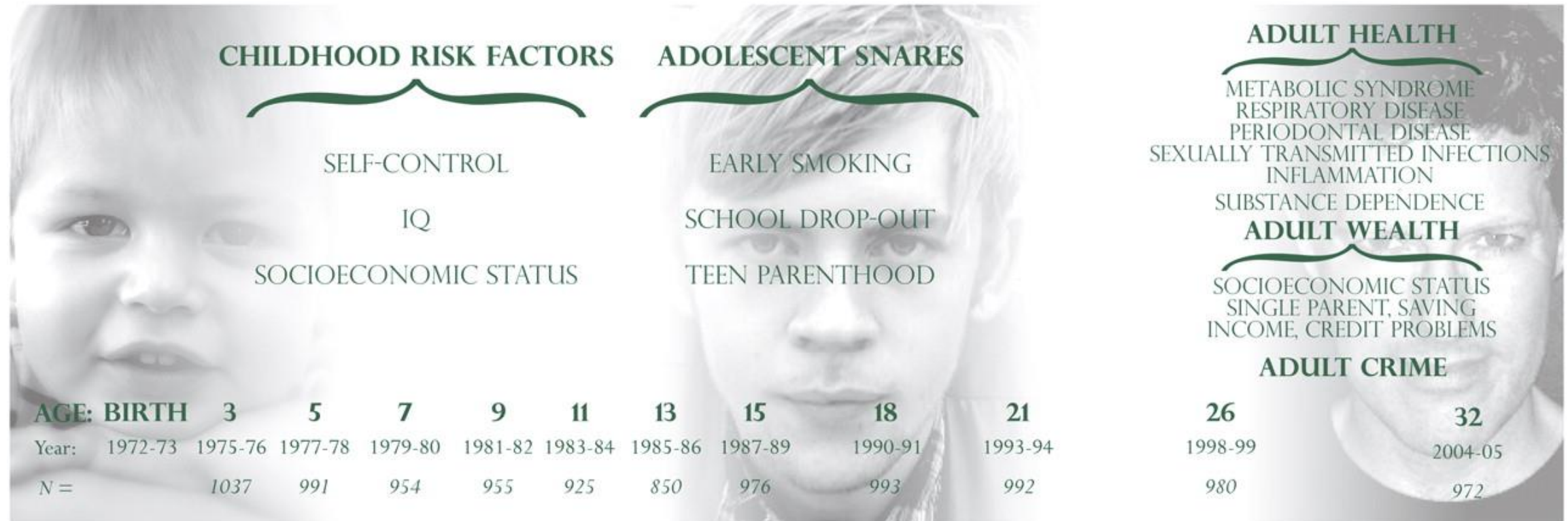


Kindergarten EF Skills

- Working memory, cognitive flexibility, and inhibitory control—positively and significantly predicted academic achievement in 2nd grade (Morgan et al, 2019).
- Why this matters: Young children experiencing learning difficulties in reading or mathematics are at risk of having far fewer educational and societal opportunities as they age.



Dunedin Multidisciplinary Health and Development Study



Terrie E. Moffitt et al. PNAS 2011;108:7:2693-2698

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PNAS



Where Research Leads, Opportunity Follows

Executive Functioning Interventions: A Review of the Evidence

- Diamond & Ling, 2019
- The largest, most extensive review thus far – 179 studies, 193 papers
- Multiple EF interventions at *all* ages
- Looked at **4** metrics

#1: Mindfulness Practice Involving Movement

- Chinese mind-body practices, Taekwondo, T'ai Chi, and Quadrato Motor Training)—yielded the strongest results for improving EFs.



#2: Promising School Programs


- Attention Academy, Chicago School Readiness Program (CSRP), MindUP, Montessori, PATHS, and Tools of the Mind.
- The only approach to come in first or second **on all four metrics**.
- Programs include scaffolding, training, practicing and challenging inhibitory control.
- School programs have produced much better results for improving inhibitory control than any other approach.



#3: Noncomputerized Cognitive Training

- Across all studies of noncomputerized cognitive training, 67% report at least suggestive evidence of EF benefits.
- Participants required to hold and manipulate information over short periods while also engaging in secondary tasks.
- Higher levels of in-person interaction vs. computerized training.

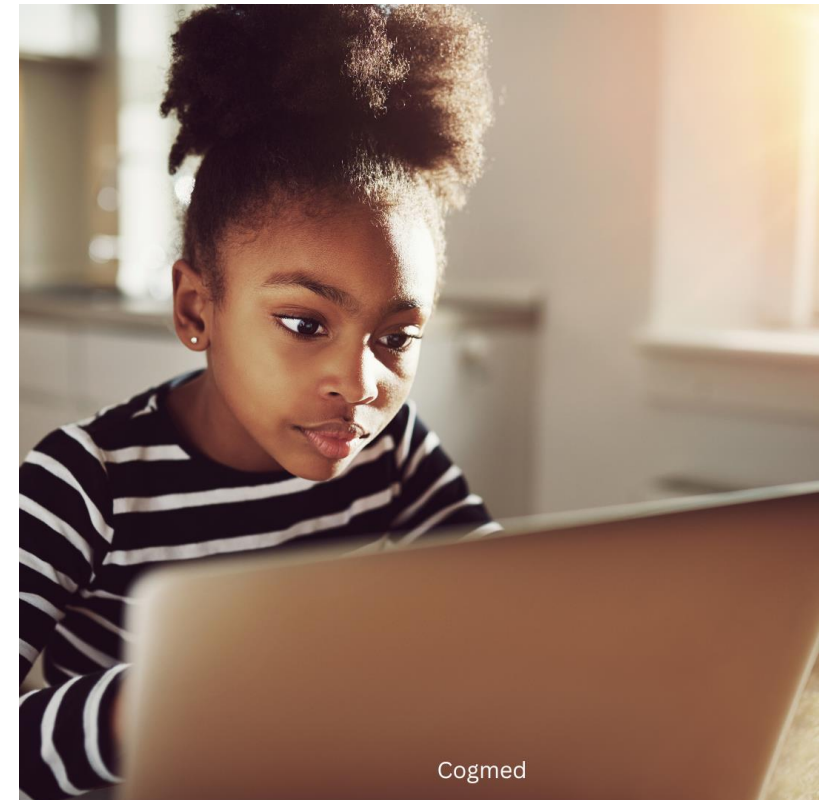




These three approaches > computerized training, perhaps because they involve more in-person trainer-trainee interaction.

#4: Cogmed

- No other computerized cognitive training approach shows results as good as those for Cogmed.
- Benefits to **working memory** from Cogmed have been shown to last for 3 to 6 months and even for 1 year.
- More studies are needed to see if Cogmed improves working memory and attention in school situations and in other arenas of life.



Other Interventions Shown to Aid Executive Function Development in Children 4 to 12 Years Old

- Sports: Sports might benefit EFs more than aerobic exercise alone because they challenge EFs and bring joy, pride, and social bonding.



Cognitive Behavioral Therapy

- CBT has been found to improve observed off-task and disruptive behavior in children.
- Cognitive Behavioral Parent Training is an evidence-based treatment for families of children with ADHD.



Mindfulness

- Mindfulness Training has been established as a useful tool for strengthening self-regulation and attention.
- New research suggests that integrating MT with behavioral parent training (BPT) is particularly effective.



Environment: Factors Associated with Better Executive Functioning

- Positive parenting (warmth, sensitivity)
- Parental limit setting
- Parental involvement
- Organization in the home
- Family routines
- Sleep



SUMMARY

- Executive functioning is essential to every aspect of life
- Executive functioning can be improved with
 - training and practice
 - developing strategies to compensate for EF weaknesses
 - addressing environmental factors that contribute to executive dysfunction
- Early EF training and school-based programs – an opportunity for reducing inequality





Executive functioning involves interconnected processes. Therefore, interventions must be as interconnected as the skills themselves and must address multiple dimensions.





THANK YOU!

HOW TO REACH ME

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