# A School-Based SLP's Guide to Executive Functions

Reed Senter, M.S. CCC-SLP
Virginia Commonwealth University

# Disclosures

Reed Senter is a doctoral student and graduate assistant at Virginia Commonwealth University. He has no relevant financial disclosures.

Reed currently serves as the SHAV Vice President for Governmental and Professional Affairs. He has no additional non-financial disclosures.

# Learner Outcomes

Participants will be able to:

- Define “Executive Function” and its various components, and describe how it impacts behavior regulation and language development in school-age children
- Implement interventions and strategies to support students with executive dysfunction in direct therapy
- Collaborate with classroom teachers to provide accommodations to students based on their academic needs

# What are executive functions?

# Executive Functions

- Plan
- Organize
- Do (execute)

Used for goal-directed behavior; also when goals conflict

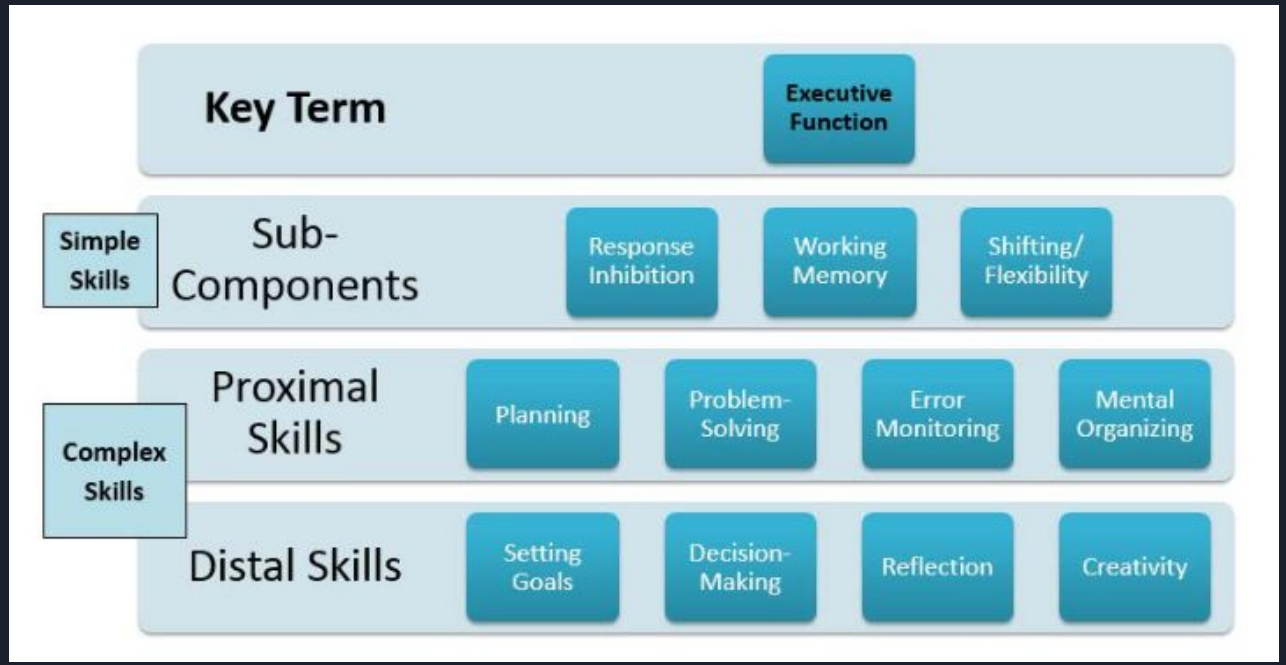
# EF Components

"Traditional model" (see Baddeley, Miyake)

- Working Memory
- Inhibition
- Shifting

And sometimes…

- Attentional Control




Jones et al., 2016

# Executive Functions:
# The “Smart but Scattered” model

(Dawson & Guare, 2009)

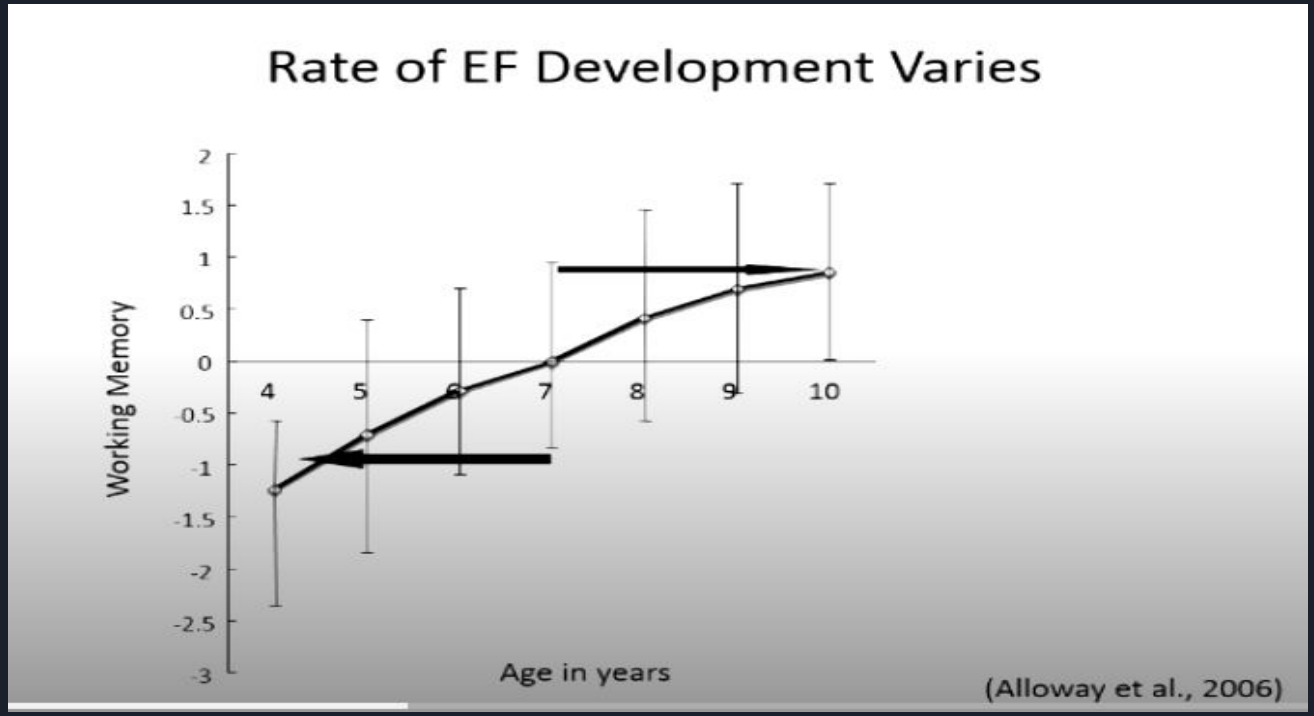
- Response Inhibition
- Working Memory
- Emotional Control
- Sustained Attention
- Task Initiation
- Planning/Prioritization
- Organization
- Time Management
- Goal-Directed Persistence
- Flexibility
- Metacognition

- “Hot” EFs
- “Cold” EFs

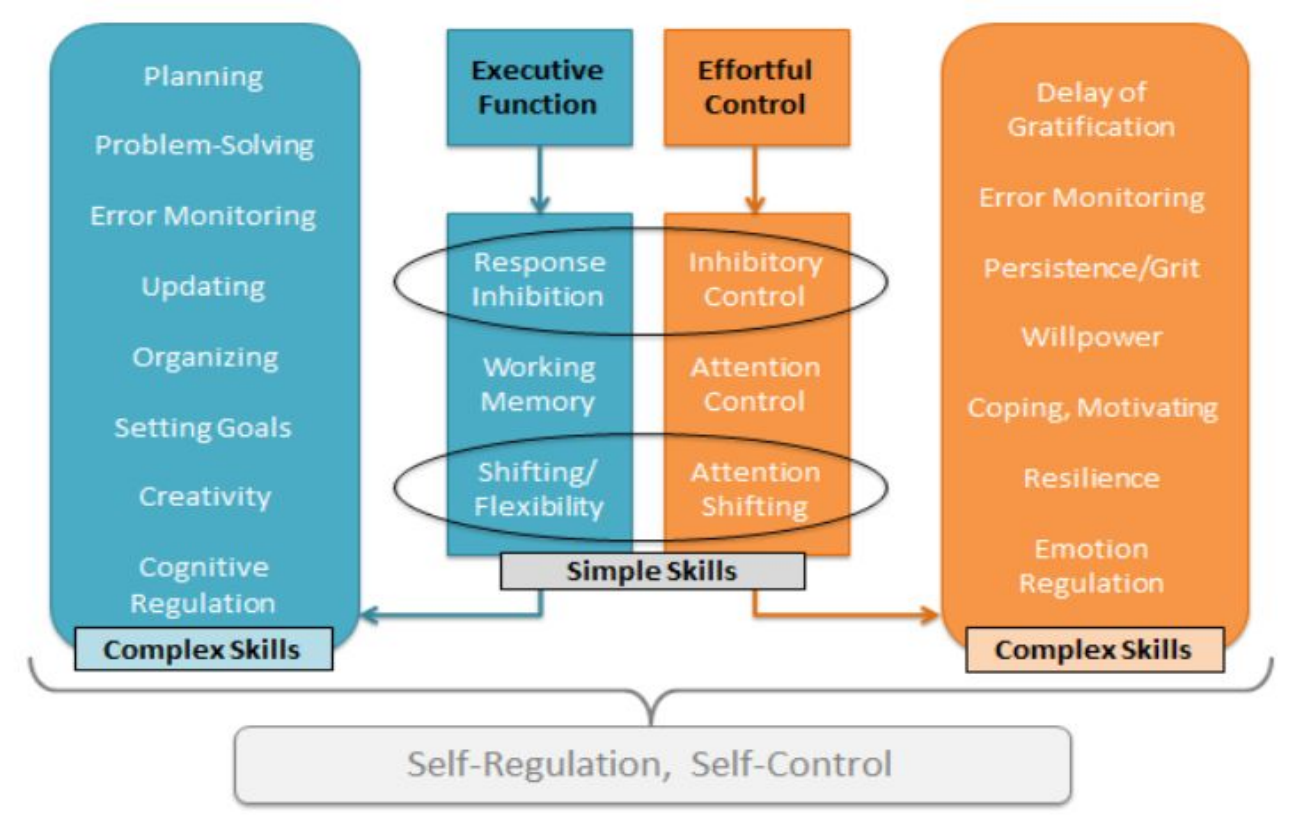
# EF Development

- Roughly follows this progression of skills; start developing in first few months, continue through ~25 years

- Response Inhibition
- Working Memory
- Emotional Control
- Sustained Attention
- Task Initiation
- Planning/Prioritization
- Organization
- Time Management
- Goal-Directed Persistence
- Flexibility
- Metacognition



# Executive Function & Behavior




Jones et al., 2016

# Executive Function and Language

| EF domain | Difference between SLI and typically-developing | Source |
|---|---|---|
| Working Memory (phonological) | -1.27 SDs | Graf Estes et al., 2007 |
| Working Memory (visuospatial) | -0.63 SDs | Vugs et al., 2013 |
| Inhibitory control | -0.56 SDs | Pauls & Archibald, 2016 |
| Flexibility | -0.27 SDs | Pauls & Archibald, 2016 |

# How can SLPs support students with EF deficits?

# Intervention Approaches

| | |
|---|---|
| Pharmacology | **X** - Effective, but out of our control |
| Computerized programs | **X** - Questionable effectiveness, generalization |
| Neurofeedback | **X** - Unrealistic equipment requirements |
| Metacognitive / Cognitive-behavioral | **YES** - Older children and adolescents benefit more, but young children can improve attention, working memory, flexibility |
| Combination approaches | *May* lead to superior outcomes |

Riccio & Gomes, 2013

# Interventions, cont.

- Strong support for movement-based mindfulness (e.g., t'ai chi, taekwondo)
- Promising school programs:
  - Attention Academy
  - Chicago School Readiness Program
  - MindUP
  - Montessori
  - PATHS
  - Tools of the Mind

- Key components:
  - Rapport with trainer
  - Entertaining training activity
  - Meaningful and relevant activity

Diamond & Ling, 2019

# Interventions, cont.

What DOESN'T work?

- "WM training exercises"
- Computerized Working Memory Training
- Memorizing strings of numbers forwards and backwards

# Principles of Intervention

(Singer & Bashir, 1999)

## 1) Getting started

- Assessment: identify strengths and needs
- Discuss with student: self-identified strengths and needs; role of setting, context, demands
- Review: results of assessment. Help student recognize benefits of intervention

# Principles of Intervention
(Singer & Bashir, 1999)

## 2) Establish intervention framework

- Understand processes, guide strategies, create new habits
- Base intervention on teaching self-reflection (self-monitoring, self-evaluation)
- Address language underpinnings of metacognitive function
- Address self-efficacy and motivation

# Principles of Intervention
(Singer & Bashir, 1999)

## 3) Select & implement components of intervention

- Address language, EF, self-regulation, strategic learning
- Understand context-specific strategies
- Support students to take risks, adapt their own strategies
- Help reflect on growth, needs, goals

# Design an Intervention

Dawson & Guare, 2010

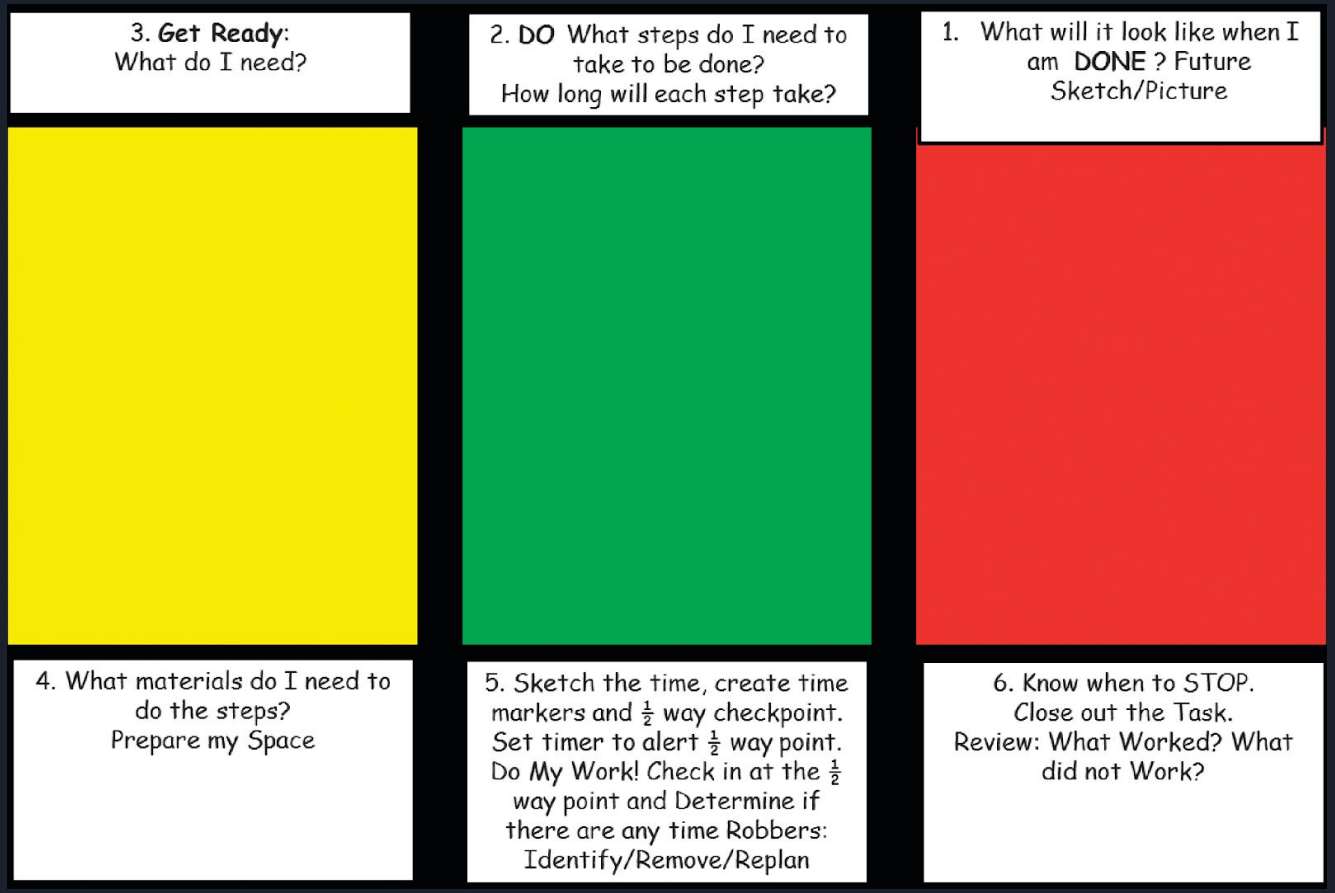
- Identify *one* EF that would improve performance
- Provide explicit instruction of strategies

1) Teach
2) Modify
3) Monitor
4) Fade

# Principles for Instruction

- Teach self-assist strategies
  - Use of self-talk scripts (Barkley, 2013 / Dawson & Guare, 2010)
    - See the future / What's my problem?
    - Say the future / What's my plan?
    - Feel the future / Am I following the plan?
    - Make the future / How did it go?
  - Use language to support development
    - Have children repeat, paraphrase, tell a friend
    - Consider written prompts

# Model Intervention - Sarah Ward's "Get Ready, Do, Done"



# Working Memory

Chunking / Mnemonics

- Mature WM capacity holds 5-7 items; child's WM holds fewer (2-4?)
- Chunking allows more items to be stored by "encoding" them together
  - Numbers: *193982831*
  - Words: *Elephant purple bicycle tulip dance pizza truck*
- Easier to remember "like" items
  - Phonology: *cheese*, *chicken*, *chalk* is easier than *milk*, *turkey*, *pencil*
  - Semantics: *cow*, *chicken*, *horse* is easier than *turnip*, *python*, *bottle*

# Working Memory

Visualization

- Similar to chunking
  - Words: *Elephant purple bicycle tulip dance pizza truck*
- Recruits nonverbal working memory (may be relative strength)
- “Mime-It” - mimetic ideational information processing
- Combine with language self-talk - “see the future, say the future…”

Sarah Ward

How can we collaborate with teachers to support students with EF deficits in the classroom?

# Executive Functions

- Leaky bucket analogy of EFs
  - “Holes”
    - Fatigue/hunger
    - Distraction
    - Negative self-talk
  - “Plugs”
    - Off-loading cognitive demands
    - Limit difficulty, quantity, variety

# Offloading Cognitive Demands

Improve supports:

- Use language to promote awareness
- Visual activity schedules
- Graphic organizers
- Agendas, planners, to-do lists
- Time visualization
- “Help” cards and other nonverbal signals

# Offloading Cognitive Demands

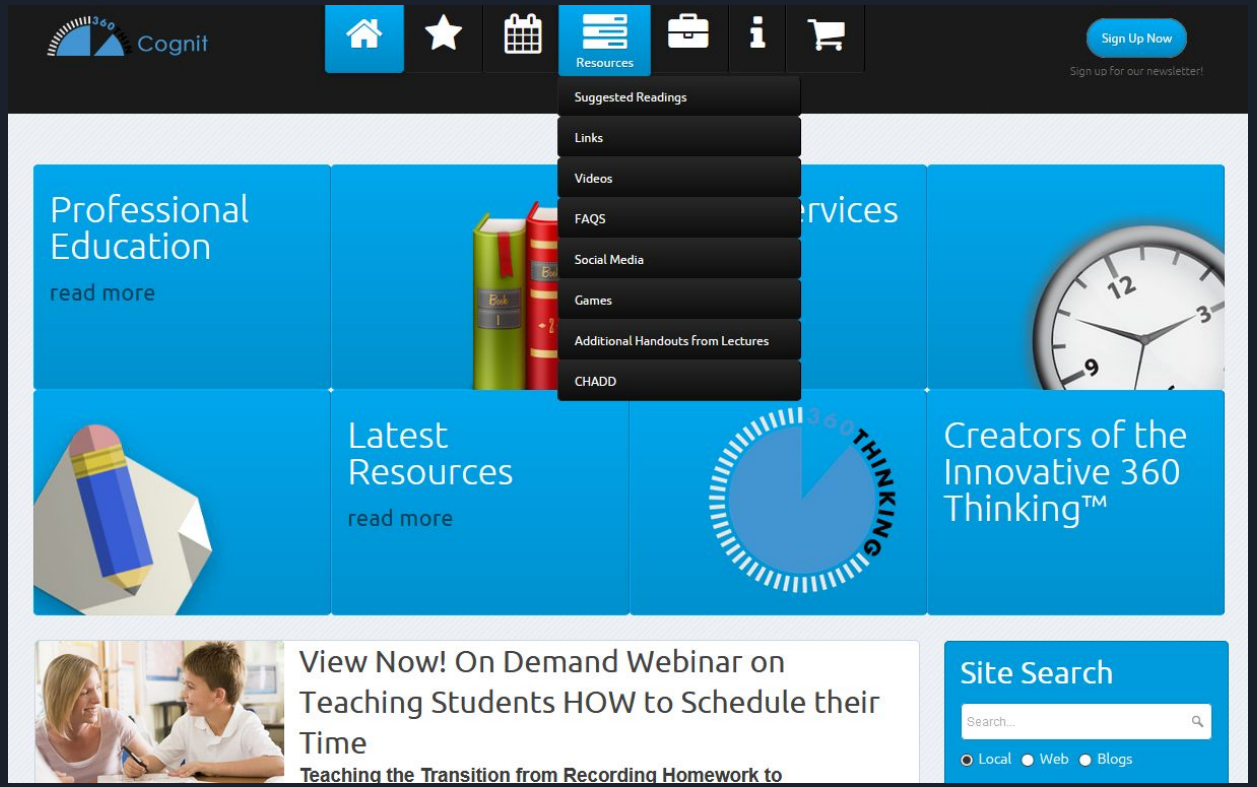
Reduce demands:

- Linguistic
- Organizational
- Balance content, time, EF demands

# Resources

Sarah Ward's team:

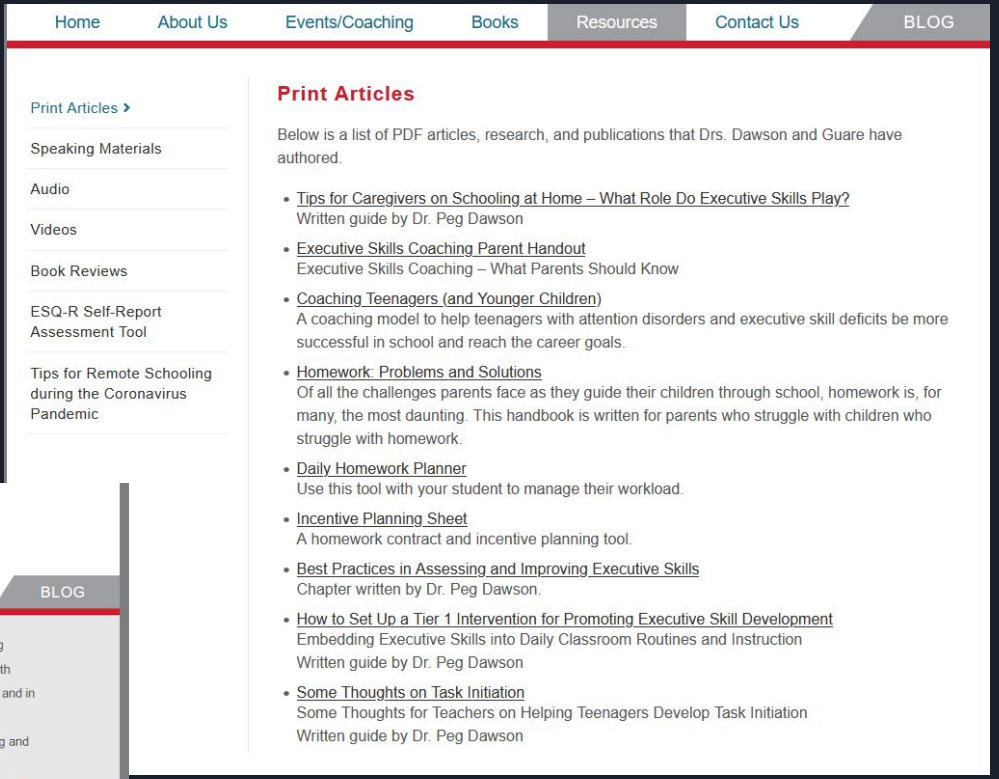
https://efpractice.com/

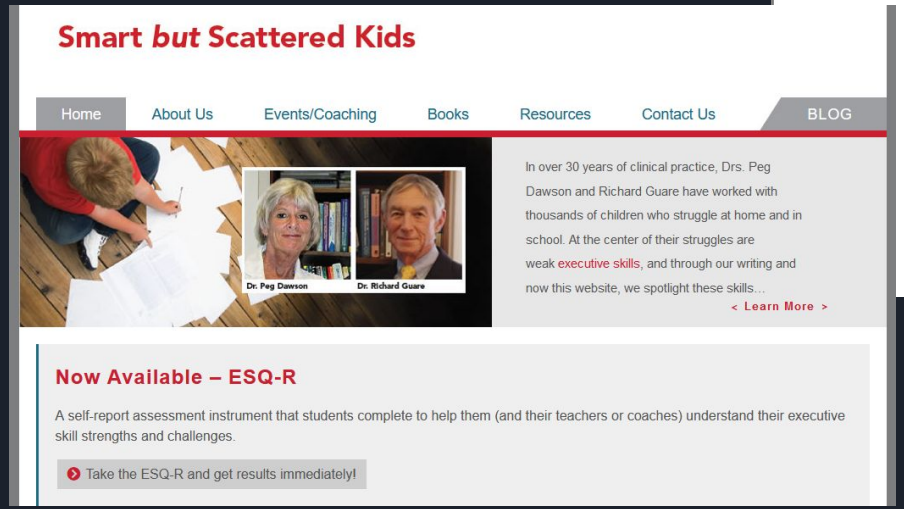


# Resources

Peg Dawson & Richard Guare:

https://www.smartbutscatteredkids.com/



# Resources

Bonnie Singer and Anthony Bashir:

https://www.architectsforlearning.com/schools-teachers/resources/

# Resources

https://developingchild.harvard.edu/resources/activities-guide-enhancing-and-practicing-executive-function-skills-with-children-from-infancy-to-adolescence/

## Content in This Guide



Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence

An activities guide for building executive function

Download PDF

Activities for 6- to 18-month-olds

Download PDF

Activities for 18- to 36-month-olds

Download PDF

# References


Alloway, T. P., Gathercole, S. E., & Pickering, S. J. (2006). Verbal and visuospatial short-term and working memory in children: Are they separable?. *Child development*, *77*(6), 1698-1716.

Dawson, P., & Guare, R. (2009). *Smart but scattered: The revolutionary" executive skills" approach to helping kids reach their potential*. Guilford Press.

Diamond, A., & Ling, D. S. (2019). Review of the evidence on, and fundamental questions about, efforts to improve executive functions, including working memory. *Cognitive and Working Memory Training: Perspectives from Psychology, Neuroscience, and Human Development*.

Jones, S. M., Bailey, R., Barnes, S. P., & Partee, A. (2016). *Executive Function Mapping Project: Untangling the Terms and Skills Related to Executive Function and Self-regulation in Early Childhood* (OPRE Report # 2016-88). Office of Planning, Research, and Evaluation.

Riccio, C. A., & Gomes, H. (2013). Interventions for executive function deficits in children and adolescents. *Applied Neuropsychology: Child*, *2*, 133–140.

Singer, B. D., & Bashir, A. S. (1999). What are executive functions and self-regulation and what do they have to do with language-learning disorders?. *Language, speech, and hearing services in schools*, *30*(3), 265-273.

Ward, S., & Jacobsen, K. (2014). A clinical model for developing executive function skills. *Perspectives on Language Learning and Education*, *21*(2), 72–84.

# Thank you!

Reed Senter
senterr@vcu.edu