STRATEGIES TO ENHANCE EXECUTIVE FUNCTIONING AT HOME AND IN THE CLASSROOM

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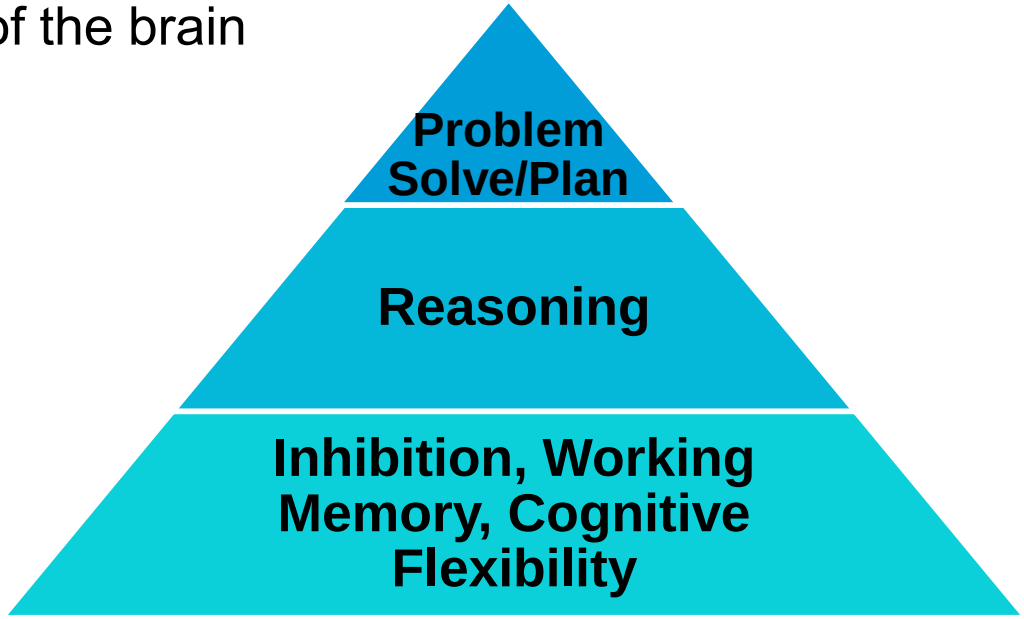
Overview

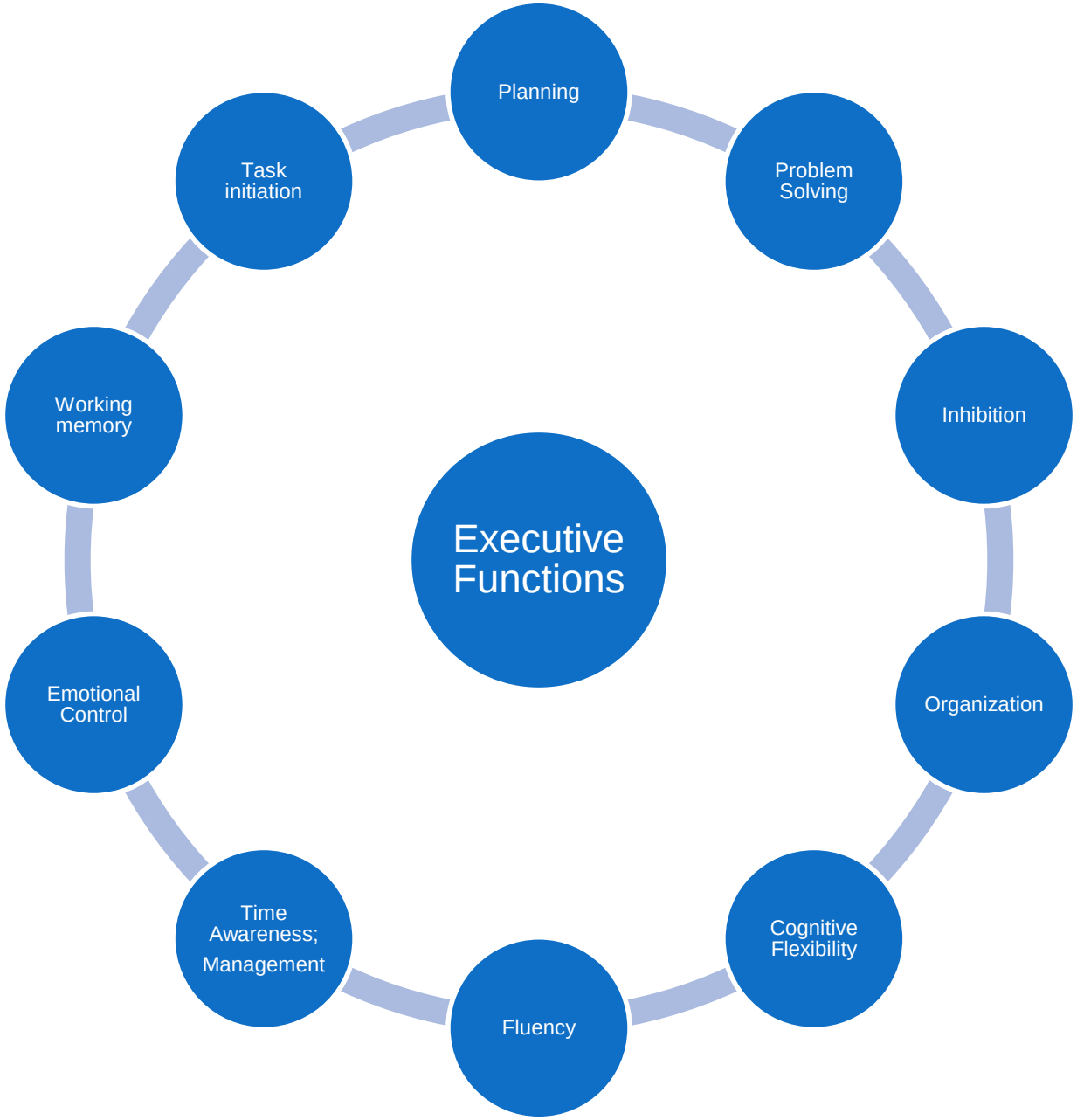
- Define executive functions (EF)
- Discuss the relationship between EF and mental health
- Describe why EFs are important
- Review the current trends for improving EF
- Introduce the thinkSMART™ program's concrete behavioral approaches to improving EF

What are executive functions (EFs)?

- Control functions needed for the brain to accomplish and maintain goal directed activities
  - “the process of doing”
  - Higher order problem solver
  - “driver” of the brain

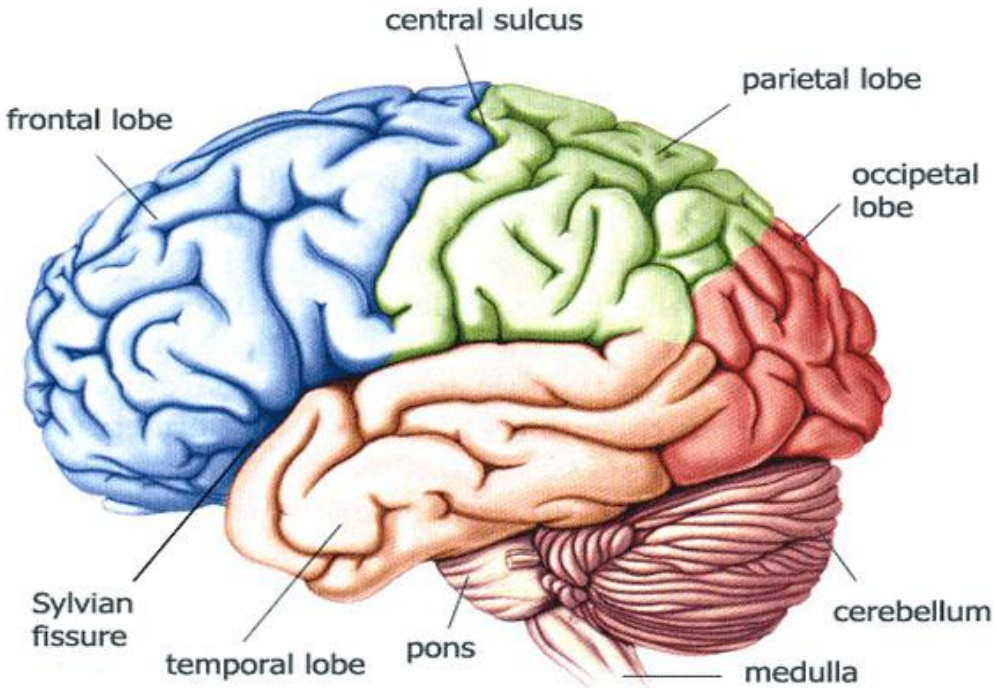


Schiltz, 2011; Diamond, 2013; Lundt et al., 2012; Diamond et al., 2012


Executive Functions
Planning
Problem Solving
Inhibition
Organization
Cognitive Flexibility
Fluency
Time Awareness; Management
Emotional Control
Working memory
Task initiation

EFs and the brain

- The frontal lobes!
  - Executive functions are controlled through various neural circuits within the prefrontal cortex (PFC)
- PFC comprises ~30% of the entire cortex!
- EFs continue to develop into early adulthood (e.g., age 21)
  - Important to intervene early!



When do EFs develop?

EFs begin to develop early!

- Ages 3-5
  - inhibition, working memory, cognitive flexibility, goal directed behaviors and planning
  - With WM online→problem solving improves
- Ages 4-5
  - Day-to-day EF skills emerge with metacognition, greater flexibility, and inhibitory self-control
  - Preschool age kids reliably show: inhibition, shifting, emotional control, working memory, and plan/organize
- Ages 6+
  - task initiation, organization of materials, self-monitoring
- What might deter appropriate development?

Senn, 2004; Isquith, Gioia, & Espy, 2004

EFs and mental health

- Addiction
- Attention Deficit Hyperactivity Disorder (ADHD)
- Conduct Disorder
- Depression
- Obsessive Compulsive Disorder
- Schizophrenia
- Anxiety
- Autism
- Learning Disorders
- Traumatic Brain Injury

- EFs suffer disproportionately to other brain areas in response to:
  - Sadness
  - Stress
  - Loneliness
  - Lack of physical fitness
  - Sleep deprivation

Baler & Volkow, 2006; von Hecker & Meiser, 2005; Diamond 2005; Fairchild et al, 2009; Taylor-Tavares et al, 2007; Cacioppo & Patrick, 2008; Hilman et all, 2008; Barnes et al, 2012

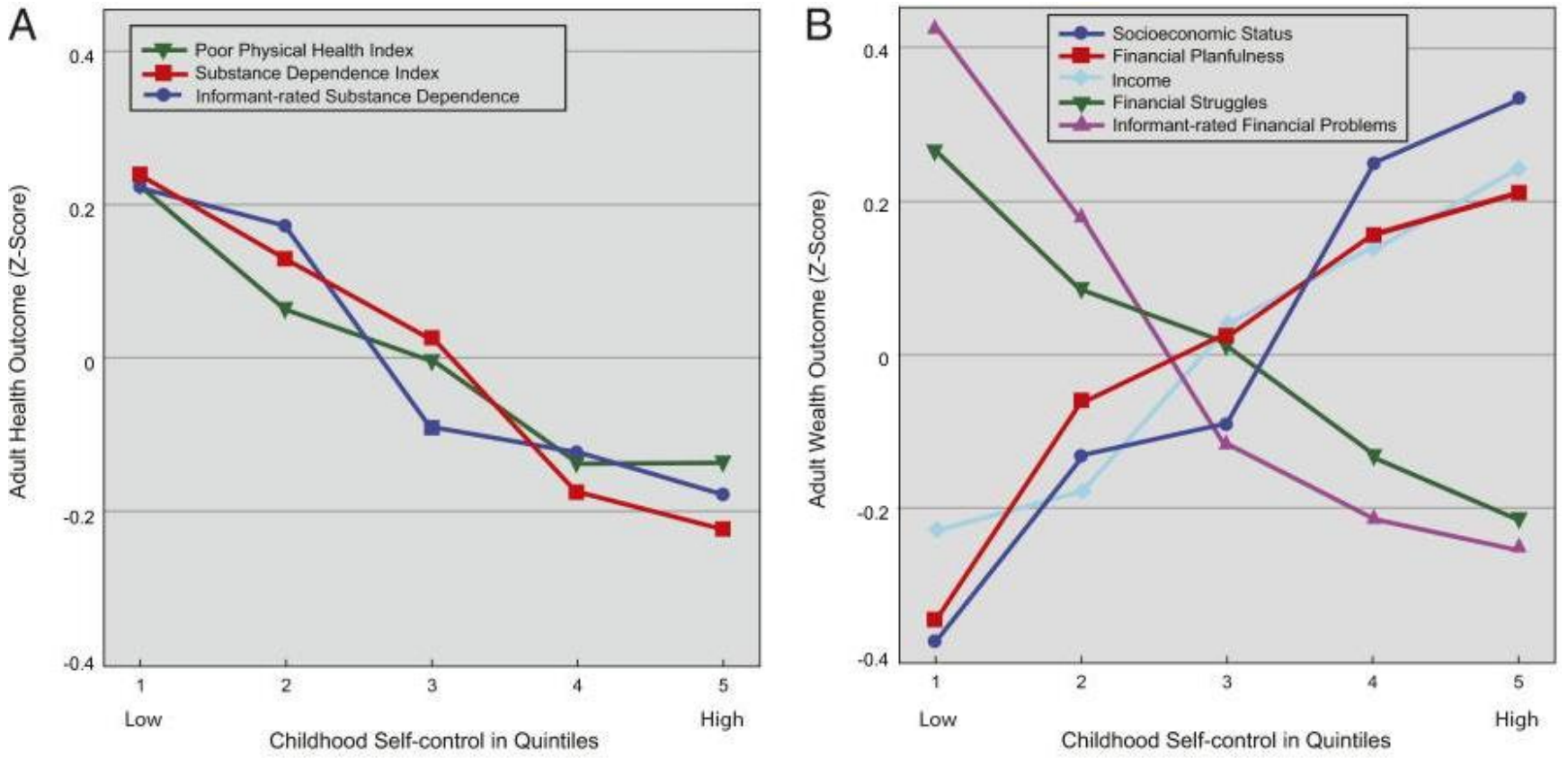
Why are EFs important?

- EFs in childhood predict EF in adulthood and worsen as people age

- Executive functioning has been associated with:
  - school and job success
  - Relationship success (marriage/friendships)
  - Mental and physical health
  - Quality of life
  - Self-reliance/Strong identity development

- In a 30-year follow-up, poor self-control as a child was associated with:
  - Worse health
  - Less monetary earnings
  - Less happiness
  - More crime

Diamond, 2011; Diamond, 2013 (for review); Moffitt et al, 2011; Galambos et al., 2005

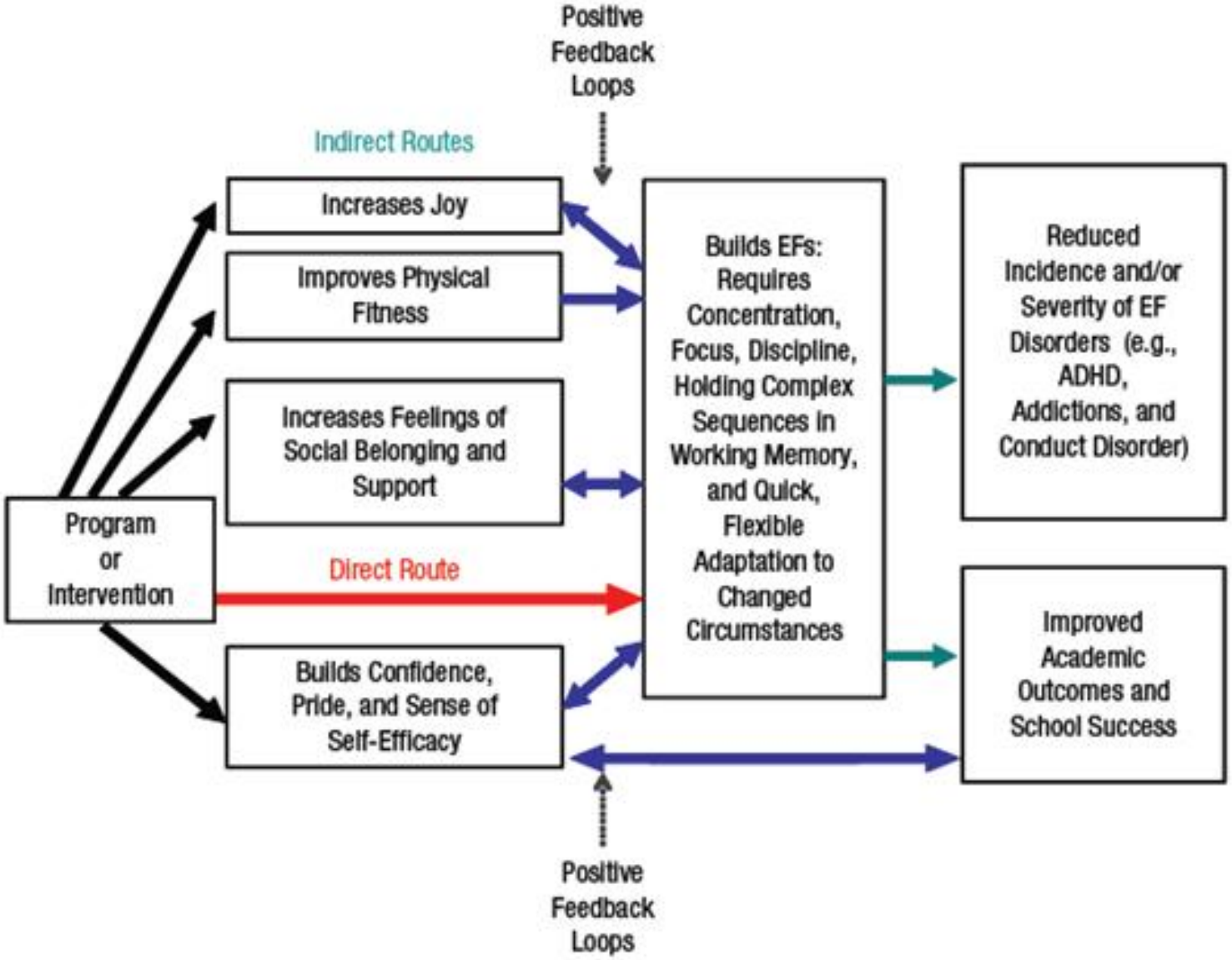


Self-control gradient. Children with low self-control had poorer health (*A*), more wealth problems (*B*), more single-parent child rearing (*C*), and more criminal convictions (*D*) than those with high self-control.

Moffitt, Arseneault, Belsky et al (2011) Proc Natl Acad Sci U S A. Feb 15; 108(7): 2693–2698.

“If correct, the observed gradient implies room for better outcomes even among the segment of the

population whose childhood self-control skills were somewhat above average. Universal interventions that benefit everyone often avoid stigmatizing anyone and also attract widespread citizen support” (Moffitt et al., 2011).



Diamond, 2012

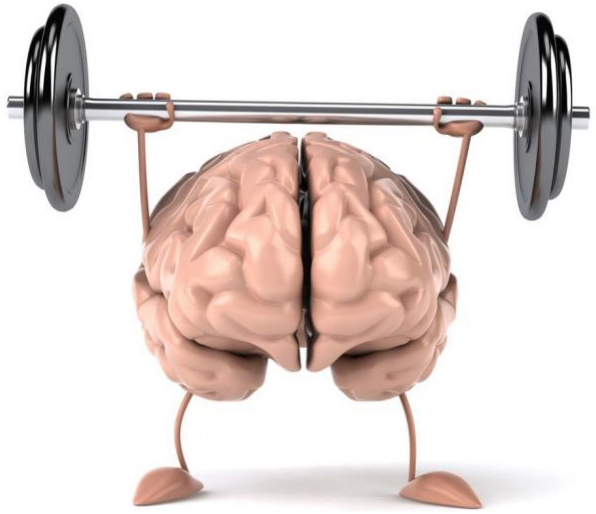
EF Interventions

- The good news: EFs can be improved!
- Computer based programs:
  - CogMed© for working memory
  - Computer games for cognitive flexibility
- School-based programs:
  - Promoting Alternative Thinking Strategies (PATHS)
  - Chicago School Readiness Project (CSRP)
- Alternative programs:
  - Tae kwon do
  - Yoga
  - Mindfulness
  - Aerobics

Klingberg et al., 2010; Diamond & Lee, 2011; Bergman, Nutley et al., 2011; Thorell et al, 2009; Karback & Kray, 2009; Lakes & Hoyt, 2004; Raver et al, 2008, 2001; Riggs et al, 2006; Flook et al., 2010

EF Interventions

- The brain is a huge muscle—needs consistent strengthening!



- What's the perfect recipe?
  - Practice (daily)
  - Reinforcement (rewards)
  - Skills should be just beyond proficiency
  - Skills improve when EF demands are high and the challenge remains high
  - Transfer of skills increases from training to other areas when EFs are addressed globally, rather than discretely
  - School curricula challenges/trains EFs throughout the day

Klingberg et al, 2005; Diamond, 2012; Diamond, 2013; Diamond & Lee, 2011; Karback & Kray, 2009; Bergman Nutley et al, 2011

Wait a second! I didn't have to be taught those skills. I just did them!

It's not that hard to use a post-it. I put them all over the place to remind you!

Why behavioral interventions?

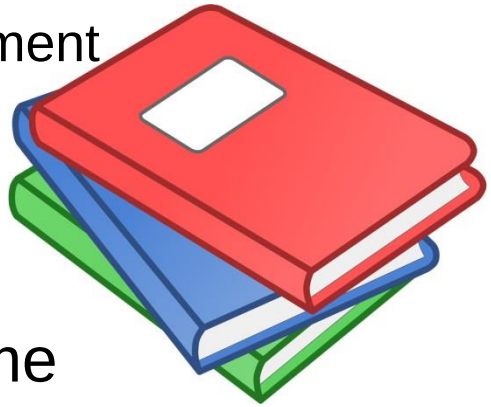
- Medications are not enough!
  - Clinical range impairments are typically still observed after stimulants
- Organizational skills can be improved with intervention!
- Many youths lack the proficiency at skills related to day-to-day executive functioning:
  - Organize materials
  - Track assignments
  - Manage time
  - Plan work

Langberg et al., 2008; Pfiffner et al., 2007; Abikoff et al., 2009

Why behavioral interventions?

- Problems with organization, time management and planning are behavioral manifestations of poor EF

- Problems with organization, planning, time management, losing belongings are associated with:
  - Reduced school performance and scholastic attainment
  - Increased conflict with parents and teachers
  - More difficulties with peer relationships



- Problems with organization, planning, and time management persist into adulthood

Barkley & Fischer, 2011; Power et al, 2006; Barkley et al, 1997; Diamantopoulou et al., 2007

- Obstacles for youth (particularly with ADHD):
  - Skills Deficit
  - “Delay aversion” deficit: weaknesses in motivation and follow-through
  - Performance deficit: EF weaknesses in linking behaviors to outcomes

- ADHD is “*not a disorder of knowing what to do, but of doing what one knows*”—Russel Barkley (2006).

Sonuga-Barke, 2003; Barkley, 2006

Randomized controlled trial

- Participants (N=180):
  - 3rd-5th grade children
  - ADHD diagnosis
  - Significant problems in organization, time management and planning
- Randomized into one of 3 conditions:
  - Organizational skills training (OST)
  - Performance based intervention
  - Wait-List
- 20 sessions (2x/week for 10 weeks)

Abikoff, Gallagher, et al, 2013

Results

- Both treatments improved:
  - Homework management and related problems*
  - Academic proficiency
  - Family cohesiveness and conflict
- Organizational skills training improved:
  - Parent-reported organization, time management and planning
  - Sustained at follow-up
- Support for skills-based, child-focused intervention!

*effect sizes similar to stimulants

Abikoff, 2013; Hinshaw et al., 2007, Hechtman et al, 2004.

Limitations

- Non-generalizable: ADHD only and grade-school
- 40% of youth continued to display clinically significant problems
- Feasibility of 2 sessions per week
- Only focus on some aspects of EF
- Limited parent involvement

I shouldn't have to reward my teen for doing something that he should be doing anyway.

Why should I try something new when my way is working…well, sorta working.

My child should be doing this on her own. Her classmates are doing it without help!

I just don't want to…

I tell her this over and over again. It's like she doesn't even care!

Ugh! I'm going to be up all night finishing this paper…again! I should have started earlier.

He knows what he's supposed to be doing. He just needs to do it!

I'll take the trash out after I finish playing this video game…

What is thinkSMART™?

- Format
  - 12-Sessions (1x week)
  - Group intervention
  - Parents included
  - Groups for ages 12+
  - No diagnosis required
  - Cognitive-behavioral approach

- Goals: **think SMARTER, not HARDER!**
  - Psychoeducation on EF
  - Teach behavioral strategies
  - Improve areas of EF weakness
  - Increase independence of youth
  - Increase parent effectiveness

Keys to thinkSMART™

- What does the literature tell us?
  - Skills can be taught to adults and children
  - Practice makes perfect
  - Parents are critical--reinforcement (rewards, praise, prompting)
  - Emotions and the associated cognitions are important targets
  - Groups increase positive modeling, social reinforcement and support
  - Group intervention is cost-effective

- Included in every session:
  - Mindfulness
  - Didactic instruction on skill
  - In-session practice of skill
  - Discussion of obstacles
  - Problem solving
  - At-home skill building activity
  - Weekly reminders

Abikoff et al, 2013; Solanto et al, 2010; Diamond, 2012

thinkSMART™ obstacles

- Youth “buy-in” (feeling like they know or don’t need it)
- Parent commitment
- Effort needed (“change would be too hard”; prefer the easy way)
- Parent EF weaknesses
- Parent “saving” child

thinkSMART™ targets

- Planner use
- Time awareness
- Scheduling
- To-do lists
- Time management
- Breaking things down
- Task initiation
- Increasing motivation & rewards
- Organization
- Long-term planning
- Emotional control
- Effective Communication
- Behavior Activation
- Sleep Hygiene

What makes thinkSMART™ smart?

- *Major* role of the parent
- Weekly practice/habit formation
- Skills based
- Added components: Mindfulness, sleep hygiene, emotion-focus, study skills

Mindfulness

- Empirically supported treatment for:
  - ADHD (kids and adults)
  - Mood
  - Parent-child interactions
  - Pain
  - Anxiety

- Three primary aspects to Mindfulness
  - Attention
  - Awareness
  - Non-judgmental

Segal et al, 2002; Zylowska et al, 2008; Khoury et al., 2013

Skill Building!

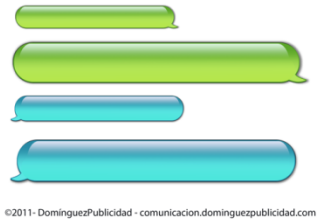
- Catch your distraction!

Planner use

- Why use a planner?
  - It's your brain's dump!
- What makes a good planner?
  - Week view
  - Enough space
  - Notes section
- Obstacles to planner use:
  - Lazy
  - Don't have it on me
  - Not enough time to write it down
  - I'll remember it
  - It's online

Planner Use

- The problem with technology…



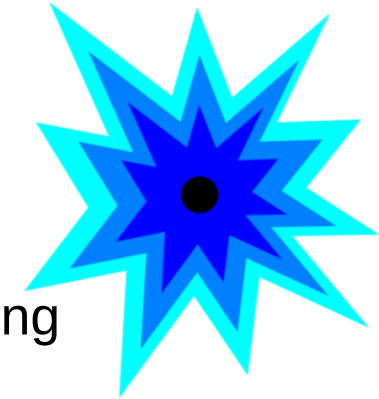
A planner should have one job: PLANNING!

- **Remember, if you don’t use it, you lose it!**

Time Awareness and Scheduling

- Before you can manage time, you must be aware of time
  - Individuals with ADHD and executive dysfunction have poor time awareness
- Skills:
  - Time estimatior
  - Wear a watch

- Efficiency Explosions!
  - Those little bits of time that can make you more efficient
  - Help the child identify these through prompts and modeling



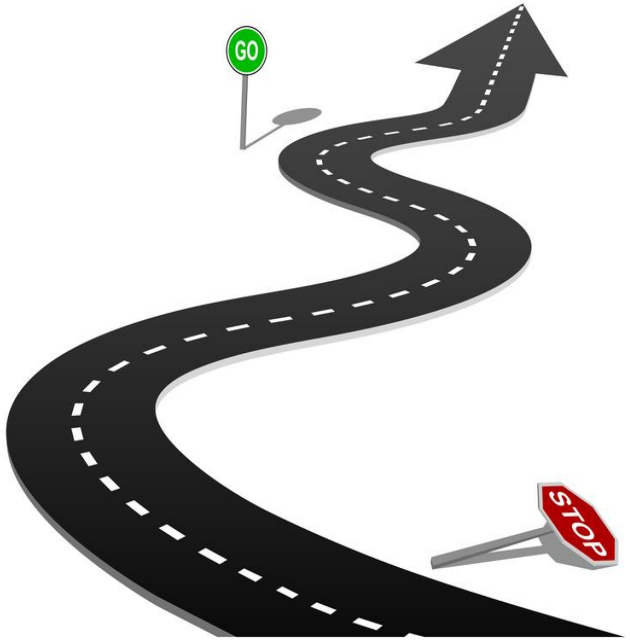
Time Awareness and Scheduling

Tips for effective scheduling:

- Multiple your time estimation by 2
- Regular schedule for everyday tasks: Routine is good!
  - After-school routine
  - Strict/rigid is okay!
- Use energy to dictate task order
  - Tired? Do on easy task
- Use ***Efficiency Explosions*** for little tasks
- If the schedule gets messed up, start again!

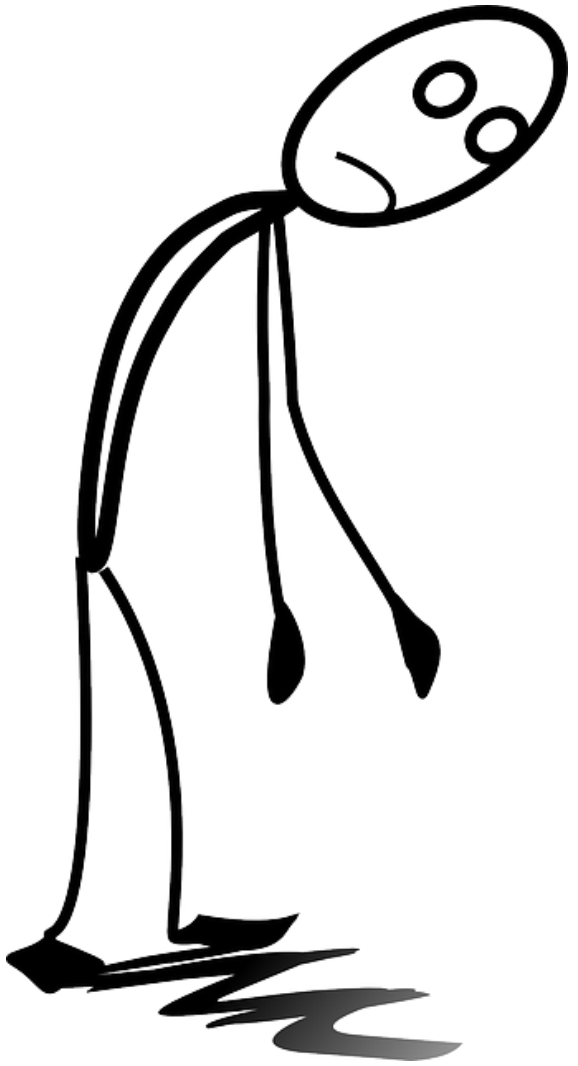
To-Do Lists

- What goes on a to-do list?
  - Activities that you can fit in an efficiency explosion (5-30 minutes)
    - If takes longer than that—break it down
  - Things and/or tasks you are worried that you might forget
- Be SPECIFIC
  - All to-do list items should be tangible and concrete
- Be BRIEF
  - Daily to-do list vs. weekly to-do list
  - Can be tasks that are a part of a bigger project
- Think of these as roadmaps



Task Initiation

- Newton's 1st Law!
- Hardest part is getting started…but once you get going…
- 5-minute rule
- How small can you go?



Increasing Motivation and Rewards

Task Completion & Perseverance

- Self Contingent Rewards
  - If-then contingencies
  - Using small “tasks” as rewards (e.g., drink of water)
- *No fun until it’s done…unless, you can make it fun to get it done!*

Organization

Steps to successful organization

1. Group like items (e.g., pens, homework, sports equipment)
2. Decide where to store them*
   - Bedroom
   - Desk
   - Folders
   - Should be linked with the item's purpose!
   - Stick to this decision—it's the item's new home.
3. ALWAYS put items in their place

Organization

School Organization

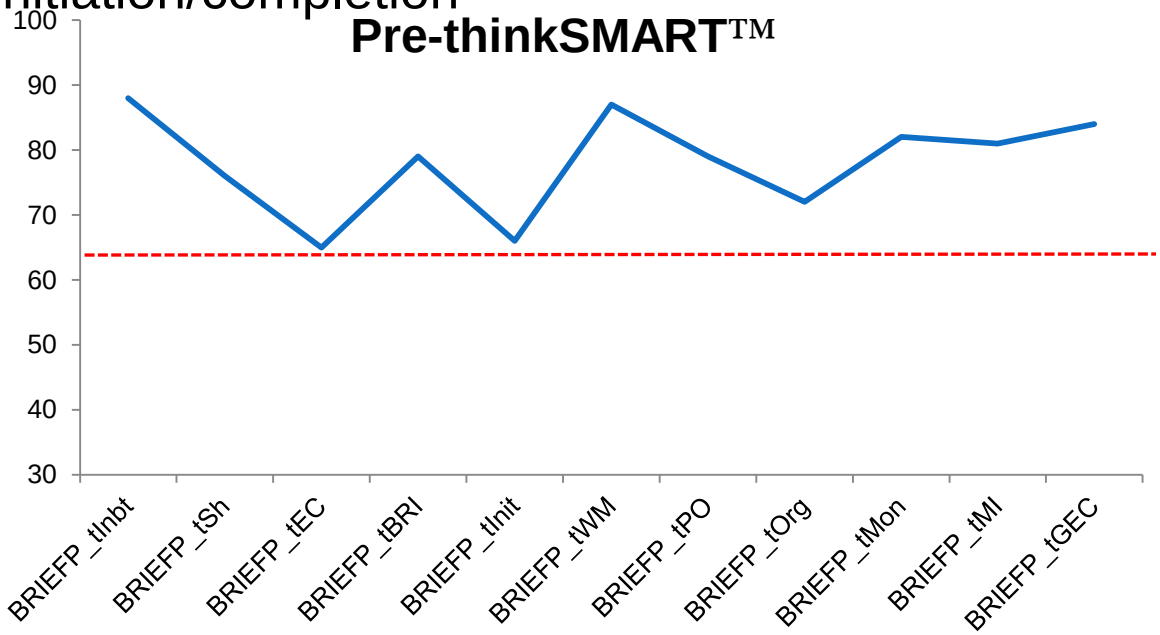
- Accordion Folders
  - Tabs
  - Sections
- Binders for individual classes
  - Hole punch everything
  - Action v. No Action
- Planner use to help organization
  - List necessary materials in planner
  - Use short hand to reduce burden of writing
- Homework/Study Spot
  - Designate a “place”
  - Reduce distractions

How can educators help?

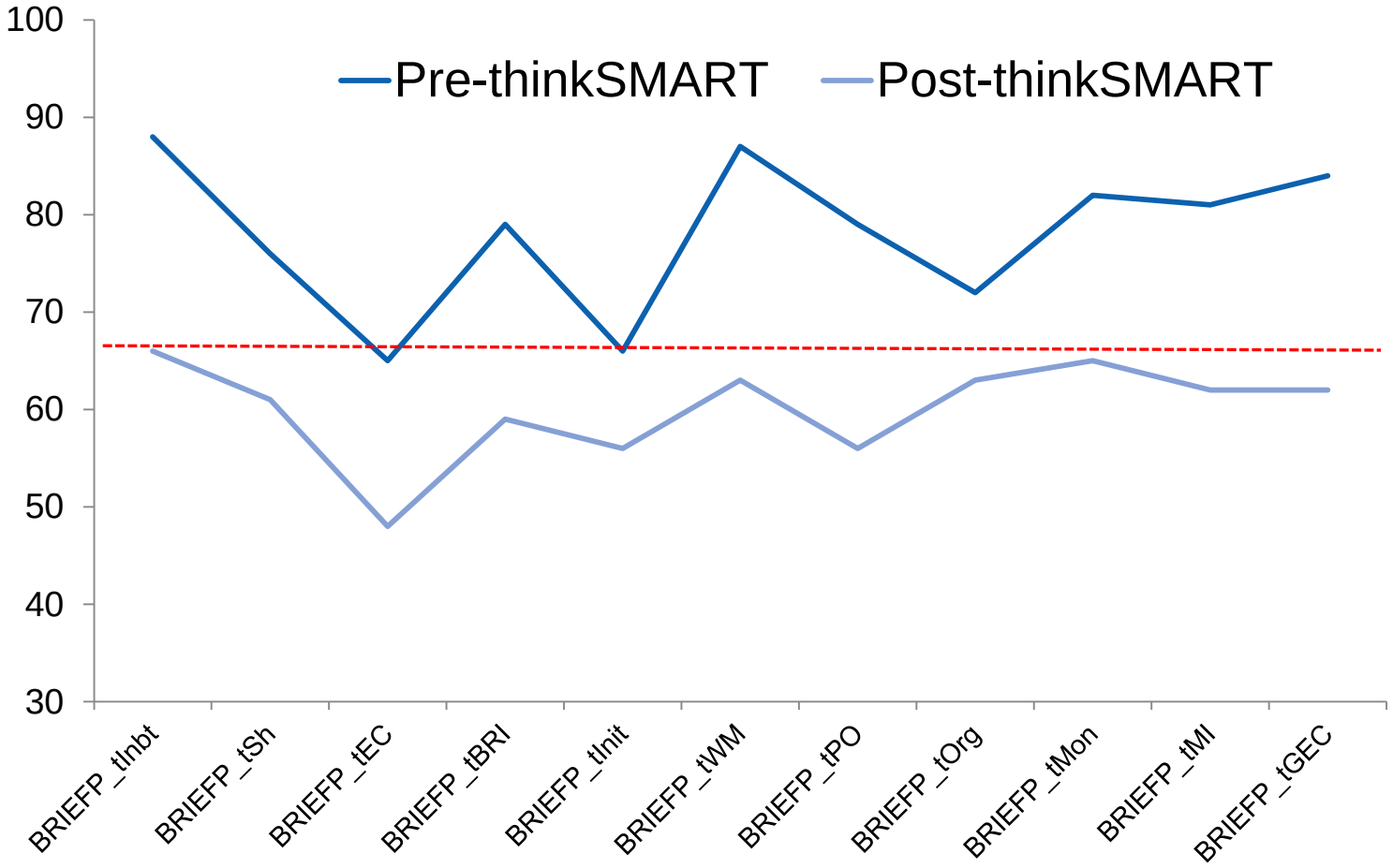
- Implement these skills in the classroom
- Check the use of planners
- Help create an organizational system for class materials
- Use behavioral reinforcement strategies (e.g., rewards!)
- Use class time to actively break big tasks down
- Set deadlines for “parts” of projects
- Identify and praise a skill that has worked
- Develop a communication plan with parents

Case Study: JP

- Presenting complaint:
  - 13-yo male
  - History of major depression
  - ADHD
  - High average intellect, but low grades
  - Difficulties with task initiation/completion
  - Perfectionism
  - Competitive



Results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90
80
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Pre-thinkSMART
Post-thinkSMART
BRIEFP _tInbt
BRIEFP _tSh
BRIEFP _tEC
BRIEFP _tBRI
BRIEFP _tInit
BRIEFP _tWM
BRIEFP _tPO
BRIEFP _tOrg
BRIEFP _tMon
BRIEFP _tMI
BRIEFP _tGEC

- “…he still wears his watch, he uses his planner. It bailed him out a couple of weekends when he forgot to do something then checked and remembered. A new white board in the hall with a list like house key, medicine, lunch, water, homework, etc. has helped him make sure he is less forgetful leaving the house!” –JP’s mother

Keys to improvement

- Parent involvement/engagement
  - “I feel like our relationship is better because we are going through this together! We talk about using the skills.” –Mom of 15 year old boy
- Improved communication
  - “The other day, my mom identified that I was on a thought train [mindfulness skill], which helped me recognize this.” –14 year old boy
- Social comparison
  - “Fine, I’ll write in my planner but only because you’re bringing us cookies if we all do it.”—13 year old girl
- Validation of struggles
  - “wait, you forgot your backpack this week, too?”—13 year old boy

Conclusions

- Executive functions ***CAN*** be improved through behavioral strategies.
- Creating new habits is *difficult—for everyone!*
- Repetition and reinforcement from teachers/parents is critical.
- Youth need to be held accountable and rewarded for use of skills.
- Skills should be practiced ***DAILY.***

Special thanks to…

Collaborators:

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