thinkSMARTer, not Harder: improving executive functioning in youth with developmental disorders

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Today’s Roadmap

• What are executive functions (EF) and why do they matter?

• How are EFs compromised in developmental disorders?

• What programs have evidence to work?

• What are some strategies to help weak EFs?

• How can we overcome obstacles?
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
“Steering wheel” of executive functions

- Planning
- Task initiation
- Problem solving
- Inhibition
- Organization
- Cognitive flexibility
- Fluency
- Time awareness; management
- Working memory
- Emotional control
EFs and the brain
Why are EFs important?

- 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

- Characteristics of EF:
  - Worsen with age
  - Associated with many psychological and neurodevelopmental disorders
  - Susceptible to environmental stress

Diamond, 2011; Diamond, 2013 (for review); Moffitt et al, 2011; Galambos et al., 2005, Safren, 2006; Baler & Volkow, 2006; von Hecker & Meiser, 2005; Diamond 2005; Fairchild et al, 2009; Taylor-Tavares et al, 200
EFs and ADHD

- Planning
- Problem Solving
- Inhibition
- Organization
- Cognitive Flexibility
- Fluency
- Emotional Control
- Time Awareness; Management
- Working memory

Executive Functions

Barkley, 2006; Prevatt et Al, 2011
EFs and LD

Executive Functions

- Planning
- Problem Solving
- Inhibition
- Organization
- Cognitive Flexibility
- Fluency
- Time Awareness; Management
- Emotional Control
- Working memory

Grinblat & Rosenblum, 2016; Guare et al., 2013; Varvara et al., 2014
EFs and ASD

Executive Functions

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

Russell, 1997; Hill, 2004; Demetriou et al., 2017; Kenworthy, 2005; Kenworthy et al., 2008
**Flexibility**
- Making transitions
- Tolerating routine changes
- Generating solutions to problems
- Changing expectations

**Planning/Organizing**
- Steps in setting goals
- Knowing how to achieve goals
- Knowing what’s important/prioritizing
- Seeing the big picture
- Self-monitoring/updating

Russel, 1997; Hill, 2004; Kenworthy, 2005; Kenworthy et al., 2008; Robinson et al., 2009
Implications of EFs in ASD

- Reduced adaptive/independent behaviors
- Increased risk of co-morbid psychopathology
- Problems with social and play behaviors
- Greater communication problems
- Decreased job success
- Poorer quality of life

✓ **Flexibility**
  - Adaptive behavior
  - Learning
  - Social adaptation
  - Family stress
  - Less independence
  - Poor outcomes as adults
  - Anxiety
  - Depression
  - Aggression

Pugliese et al., 2015; Gilotty et al., 2002; Lawson et al., 2015; Wallace et al., 2016; Hume et al., 2009; Bishop-Fitzpatrick et al., 2016
What can we do about it?

• Medications are first-line treatment (e.g., ADHD, bipolar disorder)
  • Clinical range impairments in EF are typically still observed after stimulants

• Need to supplement with *non-medication* interventions specific to executive functioning

Langberg et al., 2008; Molina et al., 2009; Evans et al., 2014
What interventions work?

- Alternative programs:
  - Tae kwon do
  - Yoga
  - Mindfulness
  - Aerobics
  - Unclear mechanisms of how they impact EF

- Computer based programs:
  - Working memory
  - Cognitive flexibility
  - Inhibition
  - Difficult to generalize outside of the specific domain

- In ASD, computer training was ineffective
  - Targeted WM and cognitive flexibility
  - 26% of participants dropped out

Klingberg et al., 2010; de Vries et al., 2015; 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; Evants et al. 2011; Langberg et al; 2012
Why behavioral interventions?

- Poor EF observed in behaviors related to:
  - Organizing materials
  - Tracking assignments
  - Managing time/time awareness
  - Planning work
  - Delaying gratification

- Daily behavioral challenges associated with:
  - Reduced school performance/scholastic attainment
  - Increased conflict with parents and teachers
  - More difficulties with peer relationships

- Most teens *do not* grow out of these problem areas.

Barkley & Fischer, 2011; Power et al, 2006; Barkley et al, 1997; Diamantopoulou et al., 2007; Langberg et al., 2008; Abikoff et al., 2009; Spear et al., 2011
Why behavioral interventions?

- **What do they do?**
  - Teach specific skills
  - Focus on practice
  - Use behavior management techniques (e.g., rewards/reinforcements)
  - Allow for skills to be taught **across** domains
    - Improves generalizability and transfer of skills

Boyer et al., 2014; Antshel et al., 2012; Sprich et al. 2016; Cortese et al., 2015; Dovis et al., 2015
Limitations to current interventions

• Most research in youth ADHD

• One ASD behavioral intervention

• No adolescent specific interventions outside of ADHD, despite being a key developmental time

• EF skills need to be taught to parents

• Multiple sessions per week design
SCHOOL AGE
INTERVENTION
Unstuck and On-Target

**Intervention Details:**
- Specific to autism
- Cognitive behavioral approach
- Delivered in schools to 3rd-5th graders
- Small group setting

**Intervention Targets:**
- Inflexibility
- Impaired goal-setting and planning
- Problems using self-talk for problem solving

Kenworth et al., 2013; Kenworth et al., 2011
Unstuck and On-Target

Specific Instruction in the following:

• What does flexibility mean?
• What does planning mean?
• Why are these important?
• How can “scripts” help with self-regulation?

Teaching Method:

• Parent/teacher modeling
• Scaffolding
• Gradual reduction of support

Kenworth et al., 2013; Kenworth et al., 2011
ADOLESCENT INTERVENTION
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
- Increase independence of youth
- Increase parent effectiveness
Keys to thinkSMART®

- **thinkSMART® must-haves:**
  - **Skills:** taught to adults and teens
  - **Practice:** practice creates habits
  - **Parents:** to prompt, model, reward, praise
  - **Emotions:** feelings and associated cognitions are important targets
  - **Group atmosphere:** increase positive modeling, social reinforcement and support

- **Session must-haves:**
  - 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, Sprich et al., 2016; Shauie et al., 2017
## Targets of behavioral interventions

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<th>Teens</th>
<th>Adults</th>
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thinkSMART® targets

- Planner use
- Time awareness
- Scheduling
- To-do lists
- Time management
- Breaking things down
- Task initiation
- Organization
- Increasing motivation & rewards
- Long-term planning
- Emotional control
- Effective communication
- Sleep Hygiene
- Study skills
EF changes following thinkSMART®

**p < .05**

![Graph showing changes in executive function following thinkSMART®](image)

**p < .05**

**p < .08**
How does thinkSMART® do?

• How helpful was thinkSMART® for you and/or your teen?

[5 stars and 1 blank star]

• How appropriate and relevant was the session content?

[5 stars]
Keys to success

UOT and thinkSMART® both...

✓ Use parent support/prompts
✓ Encourage structure/routine
✓ Target anxiety/over-load
✓ Emphasize communication and “lingo”
✓ Provide clear rationale for when/how to use skill
✓ Teach how to identify when to use skill
✓ Use scaffolding approach
Skills and Obstacles

Mindfulness

Time Awareness

Scheduling

To-Do Lists

Organization

Task Initiation

Planner Use

Task Completion and Motivation
Planner use

Why use a planner?
• It’s your brain’s dump!
• Reduce working memory needs
• Organizing your time
• Planning ahead

Obstacles to planner use:
• *Not open to trying new things*
• Lazy
• Don’t have it on me
• Not enough time to write it down
• I’ll remember it
• It’s online
• I can use my phone
“I always have my phone on me, why can’t I just use that?”
Time Awareness and Scheduling

• Before you can manage time, you must be aware of time
  • Time estimation practice
  • Rule of thumb: Multiply your estimated time by 2!
  • Wear a watch
  • Have a regular schedule/routine
  • Obstacle: no sense of urgency; using own routine

• Increase productivity with **Time Cracks!**
  • Little bits of time between activities that go unused
  • Build awareness of these and practice using them effectively

Solanto et al., 2010
To-Do Lists

- What goes on a to-do list?
  - Activities that don’t have a set “time”
  - Tasks likely to be forgotten
  - Time crack activities
  - Anything!

- Can help with prioritizing & planning

- Be SPECIFIC
  - Tangible
  - Concrete

- Be BRIEF
  - Daily list v. weekly list
  - Parts of bigger projects

- These are roadmaps!
Stars to successful organization

1. Identify
2. Categorize
3. Sort/Place

- Can be used to help “see the forest through the trees.”

School Organization

- Binders
  - Action v. No Action
  - “Meat” goes in the middle

5-minute “clean up”
Why is this so hard?
thinkSMART® obstacles

• Youth “buy-in”/Motivation
• Not convinced of “need”
• Rigidity to change
• Parent commitment
• Effort needed to practice
• Parent EF weaknesses
thinkSMART® “Do Nots”

- write in your teens calendar
- make to-do lists for your teen
- save your teen at the last minute
- nag
thinkSMART® tips for success…

• Creating new *habits* is the way to master the strategy and optimize effectiveness
  ✓ Pair a new strategy with something you already do every day!

  ✓ Don’t bite off more than you can chew!

  ✓ The earlier good habits begin, the better

  ✓ Be patient and observant of *any* steps in the right direction

  ✓ Don’t quit if the skill doesn’t initially work—identify the obstacle and problem solve.
thinkSMART® tips for success…

- Identify quicksand and AVOID
- Set expectations/boundaries—bad habits *can and should* be expected to change
Conclusions

• Executive functioning difficulties are **universal**...but prominent across developmental disorders

• Executive functions can be strengthened using behavioral strategies to compensate for weaknesses

• Teens and kids with developmental disorders (and their parents!) can learn skills

• Programs that are developmentally/diagnostically appropriate may be most suitable for elementary-age

• Your *can* get your teen to finish line!
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