Executive Functions: the Basics

Monica Dowling, PhD
January 2019
At the end of this session, you will be able to

• Identify executive functions (EF)
• Discuss current research regarding EF in children who are D/HH
• Make appropriate recommendations for developing and supporting EF in children
Many bright and capable children do not succeed like they should because of difficulties with organization, focus, planning, and/or managing impulses. So, how do we help these children get things done?
What are EF & why are they important?

Complex cognitive processes foundational for flexible, goal-directed behaviors, including organizational and self-regulatory skills.

Guide behavior, thoughts & emotions

Think conductor!

Command & control center
The 2 core strands of EF

Social/Emotional/Behavioral Regulation:
• Response inhibition* (impulse control)
• Emotional control
• Adaptability

Metacognition:
• Goal setting
• Planning/strategizing*
• Sequencing
• Organization of materials
• Time management (PS)
• Task initiation
• Goal directed attention
• Task persistence
• Working memory*
• Set shifting
EF skills impact

Reading: decoding, fluency, comprehension
Writing: prewriting, writing, revision
Math: read signs/problems, follow multiple steps, alternative solutions, math facts, errors
Study skills: organization, homework, time management, note taking, projects
Social skills: self awareness, consequences, turntaking, impulse control, emotional self modulation/frustratation tolerance, adaptability
EF skills in preschool…

Predict SAT scores, attentiveness, concentration, self control and ability to cope with stress and frustration in adolescence, and are associated with physical health, financial well-being and criminal outcomes in adulthood (Moffitt, 2011)

After controlling for language, growth in WM, inhibitory control and attn shifting between preK and K uniquely predicted reading and math achievement in K (Welsh, 2010)
What do EF look like?
What about the book report?

• Lucy: time management, initiation, planning, inhibition

• Shroeder: initiation, goal directed attention, emotional regulation, self monitor

• Linus: initiation, time management, persistence, prioritizing

• Charlie Brown: initiation, emotional regulation
Compared to typical children

- D/HH students show a significantly higher problem rate for EF: inhibition, WM, shift, emotional regulation (Hintermair, 2013; Botting, 2017, Hall, 2018)

- 3 domains delayed in children with CI
  - Verbal working memory
  - Inhibition-concentration
  - Controlled fluency-processing speed (Beer et al, 2014; Kronenberg et al, 2014)
EF deficits found in older children with CI emerge in preschool \(\text{Beer 2014}\)

- Preschoolers with CI showed significantly poorer performance on inhibition-concentration and WM
- When data were controlled for language, differences in EF remained
- Hearing history unrelated to EF
And the conclusions are

“there is a greater need for action on the part of educators...a range of basic functions that have proven to be significant for the development of social-emotional behavior...are not present to a sufficient extent in a great many D/HH students. Reinforcing students EF should feature much more in educational endeavors.” (Hintermair, 2013)
“Findings of EF delays in a significant percentage of children and adolescents with cochlear implants suggest that EFs should be evaluated and monitored routinely in CI users. In particular, WM, inhibition-concentration and controlled fluency-processing speed should be assessed…Following identification of EF risk or delay, intervention to improve or provide accommodations is the next critical clinical goal…” (Kronenberg & Pisoni, 2018)
How do we measure EF?

- Neuropsychological tests
- Interviews and case reviews
- Rating scales (BRIEF2, BASC3, Brown, Conners3)
- Classroom observations
- Work samples and performance reviews
Neuropsychological tests of EF

- CPT (Conners, TOVA, Attemo)
- Cancellation
- Color word interference
- Complex figure drawing
- Mazes
- Towers
- Trail making
- Card sorting
- List learning and memory
- Fluency
Rating Scales for EF

- Behavior Rating Inventory of Executive Function, 2nd Ed (BRIEF2)
- Behavior Assessment System for Children, 3rd Ed (BASC3)
- Brown Attention Deficit Disorder Scales
- Conners, 3rd Ed (C3)
What behaviors could indicate EF difficulties

1. Difficulty making decisions
2. Requires numerous cues/reminders
3. Complaints.calls out
4. Stubborn, oppositional
5. Loses train of thought
6. Lack of effort/fatigues
7. Can’t put ideas on paper
8. Sloppy, erratic work
9. Prefers to “wing it”
10. Difficulty recalling key elements
11. Distractible/daydreams
12. Unable to follow multiple steps
13. Cannot wait turn
14. Difficulty reading connected text
15. Never finishes
16. Can’t seem “to get the ball rolling”

A. Goal directed attention
B. Prioritizing
C. Planning/organization
D. Initiation
E. Persistence
F. Cognitive flexibility
G. Inhibition
H. Self monitoring
I. Working memory
How do we improve EF?

- Organize environment
- Set an example
- Praise self initiation
- Organize time
- Provide structure
- Create opportunities for guided practice

- Give reminders
- Use calendars
- Stay calm and supportive
- Avoid negative labels
- Provide breaks
How do we accommodate EF difficulties?

Organized environment
Explicit expectations (consistent, predictable routines, classroom rules)
Systematic, explicit instruction (models, demos, I do…)
Minimize demands on WM (GO, checklist, calendar, template, timer, visual schedule)
Anticipate problems
Teach inhibition by inserting delays

-adapted from C Kaufman, 2010
Visual supports

- Activity schedules
- First/then boards
- Choice boards
- Token boards
- Timers
- Visual boundaries
- Contingency maps
Supports: Low Tech
Supports: organization

2019 Goals Calendar
A Printable Planner for Tweens With Executive Functioning Issues

Charlotte's Web
by E.B. White

Wilbur
polite and considerate
uneasy

Charlotte

Templeton

Baby

lazy

Charlotte's Web

Add depth
- Add notes
- Add hyperlinks
- Add audio

Comparison: Greece and Rome

Add depth
- Add notes
- Add hyperlinks
- Add audio
## Supports: working memory

### Morning Checklist
- Unpack backpack at desk
- Put materials you don’t need in your locker
- Check in your homework
- Turn in papers
- Pack up

### To School
- Do I have:
  - Completed homework?
  - Lunch/lunch money?
  - Binder/notepads?
  - Books?
  - Gym clothes?
  - Daily planner?
  - [ ]
  - [ ]
  - [ ]

### To Home
- Do I have:
  - Homework assignments?
  - Lunch box?
  - Binder/notepads?
  - Books?
  - Dirty gym clothes?
  - Daily planner signed?
  - Graded work/teacher’s notes?
  - [ ]
  - [ ]
  - [ ]

### Schedule

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Supports: Self-regulation

The Peace Place

~ Visual Aids for
~ Make Time-Out

What Zone are you in?

Blue Zone:
- Running Slow: sad, sick, tired, bored, moving slowly

Green Zone:
- Good to Go: happy, calm, feeling okay, focused, ready to learn

Yellow Zone:
- Caution: frustrated, worried, silly/wiggly, unfocused, loss of some control

Red Zone:
- STOP: mad/angry, hands on, yelling, refusing to work, out of control
Supports: Self-regulation

When I Get Upset...

Calm Down Choice Board

THE ANGER ABC's

By Jennifer Anzin & Cathy Kerr
Design and Illustration Jason Maher
Supports: Self-regulation

Contingency Map

1. This happens (trigger for behavior problem)
2. The behavior you want to occur (e.g., asks for a break)
3. The behavior problem (e.g., hitting)
4. The naturally occurring outcome (e.g., doesn’t get a break, is assigned more work)
5. The reinforcer or naturally occurring consequence (e.g., get a 5-minute break)
Technology oriented interventions

- Computer assisted, SGDs, smartphones, tablets
- Video modeling

IF... The Emotional IQ Game

Smiling Mind

Breathe, Think, Do Sesame

UHealth Pediatrics
Sooner than later

- A way to communicate without acting out
- AAC tools (T2S)
- AAC strategies
- Core vocabulary
EF Curricula

- SuperFlex (ages 7-10+)
- Zones of Regulation
- SMARTS (gr 6-12)
- Tools of the Mind (preK)
- Unstuck and on Target (8-11)
- PATHS/promoting alternative Thinking (all ages)
If interested in the neurobiology of EF

- Luria Neuroscience Institute online 3 hr webinar: 1/26 or 1/31 ($145)
- Executive Functions and Frontal Lobes in Health and Disease presented by Elkhonon Goldberg, Ph.D., ABPP., a clinical neuropsychologist and cognitive neuroscientist, NYU School of Medicine
- Agenda:
  - Executive functions and frontal-lobe functions: are they the same?
  - Components of executive functions (planning, impulse control, working memory, and others).
  - Frontal lobes and large-scale networks (Central Executive, Default Mode, and others).
  - Agent-centered cognition and frontal-lobe functions. Executive functions and laterality.
  - Sex differences in the functional organization of the frontal lobes.
  - Executive functions and intelligence.
  - Role of the frontal lobes in novelty-seeking and creativity.
  - Regulation of emotions: frontal lobes and amygdala.
  - Executive deficit in neurological and psychiatric disorders.
- https://LNINSTITUTE.ORG
Resources

- SMARTS (https://smarts-ef.org/)
- Teachers pay teachers (www.teacherspayteachers.com)
- Executive functioning strategies blog (www.beyondbooksmart.com/executive-functioning-strategies-blog)
- Center on the Developing Child. *Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence* (developingchild.harvard.edu)
Resources

- http://learningworksforkids.com/apps/choiceworks
- Stopbreathethink.org
- BreatheThinkDo with Sesame Street
- KidConnect app (14+)
- Smiling Mind app
- http://learningworksforkids.com/apps/ireward-chart/
References


References


References


