Executive Function, Emotional Regulation and Attention: Implications for Assessment and Intervention

Sam Goldstein, Ph.D.
Assistant Clinical Professor
University of Utah
School of Medicine
www.samgoldstein.com

Financial Disclosure

The Mind

We Are About the Mind!

The Five Child Challenge

What variables predict the capacity to learn and the quality of performance?
### EF & Achievement

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Note: All correlations were corrected for range instability.

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Note: All correlations were corrected for range instability.
Gender Differences: Parent Raters
Girls have better EF than Boys

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What do we mean by the term Executive Function(s)?
What is Executive Function(s)

There is no formal excepted definition of EF!
- We typically find a vague general statement of EF (e.g., goal-directed action, cognitive control, top-down inhibition, effortful processing, etc.).
- Or a listing of the constructs such as
  - Inhibition,
  - Working Memory,
  - Planning,
  - Problem Solving,
  - Goal Directed Activity,
  - Strategy Development and Execution,
  - Emotional Self-Regulation,
  - Self Motivation

What Neural Activities Require EF?

- Those that involve planning or decision making.
- Those that involve error correction or troubleshooting.
- Situations when responses are not well-rehearsed or contain novel sequences of actions.
- Dangerous or technically difficult situations.
- Situations that require the overcoming of a strong habitual response or resisting temptation.

Goldstein, Naglieri, Princiotta, & Otero (2013)

- We found more than 30 definitions of EF(s).
- Executive function(s) has come to be an umbrella term used for many different abilities, including planning, working memory, attention, inhibition, self-monitoring, self-regulation and initiation carried out by pre-frontal areas of the frontal lobes.
**What is Executive Function(s)**

1. Barkley (2011): “EF is thus a self-directed set of actions” (p. 11).
2. Dawson & Guare (2010): “Executive skills allow us to organize our behavior over time” (p. 1).
3. Delis (2012): “Executive functions reflect the ability to manage and regulate one’s behavior” (p. 14).

5. Gioia, Isquith, Guy, & Kenworthy (2000): “A collection of processes that are responsible for guiding, directing, and managing cognitive, emotional, and behavioral functions” (p. 1).

7. Roberts & Pennington (1996): EF “a collection of related but somewhat distinct abilities such as planning, set maintenance, impulse control, working memory, and attentional control” (p. 105).
What is Executive Function(s)

6. Stuss & Benson (1986): “a variety of different capacities that enable purposeful, goal-directed behavior, including behavioral regulation, working memory, planning and organizational skills, and self-monitoring” (p. 272).

7. Welsh and Pennington (1988): “the ability to maintain an appropriate problem-solving set for attainment of a future goal” (p. 201).

What is Executive Function(s)

10. McCloskey (2006): “a diverse group of highly specific cognitive processes collected together to direct cognition, emotion, and motor activity, including ... the ability to engage in purposeful, organized, strategic, self-regulated, goal directed behavior” (p. 1)

“think of executive functions as a set of independent but coordinated processes rather than a single trait” (p. 2).

What is Executive Function(s)

10. Lezak (1995): “a collection of interrelated cognitive and behavioral skills that are responsible for purposeful, goal-directed activity.” ...

11. “how and whether a person goes about doing something” (p. 42).

12. Luria (1966): “... ability to correctly evaluate their own behavior and the adequacy of their actions” (p. 227).
Executive Functions

Executive functions

An NICHD panel in 1994 identified 33 EFs by consensus!

And Finally... The Top Six Were:

- Self-regulation
- Sequencing of behavior
- Flexibility
- Response inhibition
- Planning
- Organization of behavior
What is the relationship of EF to attention?

Conditions and Disorders That Have Demonstrated EF Impairments
- Depression – sense of helplessness and hopelessness.
- Anxiety – lack of confidence in predicting outcome.
- ADHD – immaturity in developing effective self-discipline.
- Oppositional and Conduct Disorders – noncompliance and rule violation.
- Autism – social learning impairment.
- Learning Disability – delayed acquisition of academic knowledge despite good instruction.

Executive Function(s)
- One way to examine the issue addressing the nature of EF is to research the factor structure of behaviors related to EF(s).
- To do so, we examined the factor structure of a nationally representative sample of children.
- We conducted a series of research studies to answer the following question:
  - What is the underlying structure of EF behaviors?
  - Is there just one underlying factor called Executive Function, or do the behaviors group together into different constructs suggesting a multidimensional structure?
Both item-level and scale-level exploratory factor analyses (EFA) were conducted.

The normative samples for parents, teacher, and self-ratings were randomly split into two samples and EFA conducted using:
- The item raw scores
- Nine scales' raw scores

We used a standardization sample from our instrument the Comprehensive Executive Functioning Inventory (CEFI).

Sample Characteristics

- Sample was stratified by:
  - Sex, age, race/ethnicity, parental education level (PEL; for cases rated by parents), geographic region
  - Race/ethnicity of the child (Asian/Pacific Islander, Black/African American/African Canadian, Hispanic, White/Caucasian, Multi-racial by the rater
  - Parents provided PEL of both parents
    - The higher of the two levels was used to classify the parental education level of the child.
  - All raters completed the questionnaire via paper-and-pencil or online methods.

For the first half of the normative sample using item scores: EFA of the 90 items was conducted

The scree plot test and the very simple solution criterion both indicated that only one factor should be retained.

The ratio of the first and second eigenvalues was greater than four for all three forms, which is a common rule to support a one factor solution.
**Exploratory Factor Analyses**

- Using the second half of the normative sample EFA was conducted using raw scores for the Attention, Emotion Regulation, Flexibility, Inhibitory Control, Initiation, Organization, Planning, Self-Monitoring, and Working Memory scales.
- Both the Kaiser rule (eigenvalues > 1) and the Eigenvalue Ratio criterion (> 4) unequivocally indicated one factor.

**Table E.4. Eigenvalues of the CEFI Scales Correlations**

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Note: Extraction method: Pq.

**Conclusions**

- When using parent (N = 1,400), teacher (N = 1,400), or self-ratings (N = 700) based on behaviors observed and reported for a nationally representative sample (N = 3,500) aged 5 to 18 years, Executive Function *not functions* is the best term to use.
Executive Function is: how efficiently you do what you decide to do.

What is Attention?

- Attention appears to primarily involve the basal ganglia, cerebellum and the frontal lobes.
- Problems with attention are often a biopsychosocial phenomena often leading to/interacting with cognitive deficits causing impairment in all walks of life.
- The symptoms of inattention as reflected in ADHD lead to a nearly infinite number of consequences (Barkley, 2015).

Current diagnostic criteria specify that ADHD involves difficulties with inattention and/or hyperactivity/impulsivity. Researchers using factor analysis have consistently found support for an inattention factor in both children and adults. Findings have been mixed regarding whether hyperactivity and impulsivity reflect one or two dimensions.
Inattention appears to be a condition stemming in part from inefficient operation of the physical brain moderated by the mind relative to task and environmental demands leading to poor execution of behavior.

ADHD reflects exaggeration of normal behavior.

Poor regulation of attention leads to a nearly infinite number of consequences.
Self-regulation

- The ability to inhibit
- The ability to delay
- The ability to separate thought from feeling
- The ability to separate experience from response
- The ability to consider an experience and change perspective
- The ability to consider alternative responses

Self-regulation

- The ability to choose a response and act successfully towards a goal
- The ability to change the response when confronted with new data
- The ability to negotiate life automatically
- The ability to track cues

Poor self-regulation is synonymous with...

Poor self-control
Poor self-regulation leads to . . .

Impulsive behavior

Poor self-regulation leads to:

- Knowing what to do is not the same as doing what you know
- Cue-less behavior
- Inconsistent behavior
- Unpredictable behavior
- The illusion of competence
- Riding an emotional roller coaster
- Problems with automatic behavior

In light of these data it is not surprising that inattention contributes to EF deficits and that both fuel poor emotional regulation.
Symptom relief is not synonymous with changing long term outcome.

Cognitive Strategy = EF Instruction
- A strategy is a procedure that the learner uses to perform academic tasks
- Using a strategy means the child thinks about 'how you do what you do'
- Successful learners use many strategies.
- Some of these strategies include visualization, verbalization, making associations, chunking, questioning, scanning, using mnemonics, sounding out words, and self-checking and monitoring.

Promising Programs
Conclusions

The concept of EF is evolving.

Not unexpectedly there is a strong relationship between EF and attention.

Not unexpectedly both are bi-directional in their relationship to emotional regulation.

There is emerging evidence that children can be taught to be more strategic – an important indication of good EF behavior and outcome.
www.samgoldstein.com

TEDx
Sam Goldstein, Ph.D.
sam@samgoldstein.com
The Power Of Resilience
https://www.youtube.com/watch?v=bekJ+eWMA/HatunyouTube_7date