

The Science of Executive Functioning: New Ideas, New Data, and the Comprehensive Executive Functioning Inventory (CEFI)



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

www.samgoldstein.com

info@samgoldstein.com

[@drsamgoldstein](https://twitter.com/drsamgoldstein)

[@doctorsamgoldstein](https://twitter.com/doctorsamgoldstein)



Relevant Disclosure

- Co-author of
 - Comprehensive Executive Functioning Inventory-Child and Adult
 - Cognitive Assessment System –Second Edition
 - Co-Editor Handbook of Executive Functioning
 - Co-Editor Handbook of Intelligence and Achievement Testing
 - Compensated Speaker

2

Goals for This Presentation

- Historical Perspective and Need
- Definitions of Executive Function
- Executive Function or Functions?
- Rating Scales for EF
- Comprehensive Executive Function Inventory (CEFI)
 - Structure – Normative Sample
 - Reliability
 - Interpretation
 - Validity
- EF and instruction

The Five Student Challenge

What variables predict the capacity to learn and the quality of performance?

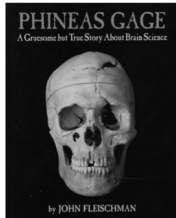
How do we help children be skillful?



4

The Curious Story of Phineas Gage

John Fleischman's book "Phineas Gage: A Gruesome but True Story About Brain Science" is an excellent source of information about this person, his life, and how this event impacted our understanding of how the brain works; and particularly the frontal lobes.



5

The Curious Story of Phineas Gage

- **Before** the accident 'he possessed a well-balanced mind, was seen as a shrewd, smart business man, very energetic and persistent in executing all his plans of operation' (p 59)
- **After** the accident his mind was radically changed; so much so that his friends said he was no longer Phineas Gage
- Although most of his brain was not damaged, his frontal lobes were significantly injured.

6

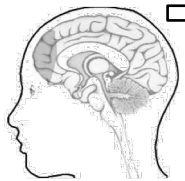
The Curious Story of Phineas Gage

- Phineas and his tamping iron
- This presentation is about the important role of the frontal lobes and the unique function this part of the brain provides we now call "Executive Function(s)".



7

The case of Phineas Gage and others spurred scientists in the mid 1800s to seek to develop an understanding of the frontal lobes in particular the pre-frontal cortex.



8

A Bit of EF Neuroanatomy

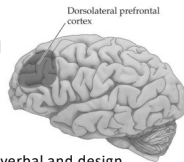
- Prefrontal
- Rich cortical, sub-cortical and brain stem connections.



9

More Specifically

- The dorsolateral prefrontal cortex (DLPFC) is involved with integrating different dimensions of cognition and behavior.



- This area is associated with verbal and design fluency, ability to maintain and shift set, planning, response inhibition, working memory, organizational skills, reasoning, problem solving and abstract thinking.
- Chronic pain patients show declines in DLPFC functioning.

10

More Specifically:

- The anterior cingulate cortex (ACC) is involved in emotional drives, experience and integration, inhibition of inappropriate responses, decision making and motivation



- Lesions in this area can lead to low drive states such as apathy and may also result in low drive states for such basic needs as food or drink and possibly decreased interest in social or vocational activities and sex.
- Chronic pain patients also show declines in ACC function.

11

And Finally:

- The orbitofrontal cortex (OFC) plays a key role in impulse control, maintenance of set, monitoring ongoing behavior and socially appropriate behaviors.



- Lesions in this area can cause dis-inhibition, impulsivity, aggressive outbursts, sexual promiscuity and antisocial behavior.

12

Another View: *Hot* and *Cool* EF

- Cool (metacognitive) – functions associated with cognition such as planning and problem solving (deficits leading to a Dorsolateral Syndrome).
- Hot (emotional/motivational) – functions associated with coordinating and controlling emotions (deficits leading to an Orbitofrontal/Medial Syndrome).

13

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

14

Executive Function (s)

- In 1966 Alexandr Luria first wrote and defined the concept of Executive Function (EF)
- He credited Bianchi (1895) and Bekhterev (1905) with the initial definition of the process



1902 - 1977

15

What is/are 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



16

Does Experience Shape EF?

- The Family Life Project has demonstrated that poverty is associated with elevated cortisol in infancy and early childhood.
- This association is mediated through characteristics of the household.
- Parenting sensitivity mediates the relationship between poverty and stress physiology.
- In combination parenting sensitivity and elevated cortisol mediate the association between poverty and poor EF in children.



APPLIED DEVELOPMENTAL PSYCHOLOGY, CHILD, 27 (1-3), 363
Copyright © Taylor & Francis Group, LLC
ISSN: 0193-3962 print/ISSN 1366-5847 online
DOI: 10.1080/01933962.2011.595493



Long-Term Cognitive Sequelae: Abused Children Without PTSD

Robert B. Perna
Behavioral Medicine Department, Walter Rehabilitation Hospital, Augusta, Georgia

Mark Kieffer
Baystate Neuro-Rehabilitation Services, Lewiston, Maine

Many lines of research suggest that childhood abuse and neglect are associated with later developing psychiatric diagnoses, academic problems, cognitive difficulty, and possible brain changes as measured through brain imaging. Data were collected on children (N=41) who completed a neuropsychological evaluation. Of those evaluated, 19 had a documented history of physical and/or emotional abuse or neglect and 22 had no history of abuse/neglect. When controlling for Full-Scale IQ (FISQ), the abused children had significantly lower scores on measures of executive functioning (EF) compared to the non-abused children.

Long-term cognitive sequelae of childhood abuse and neglect were more likely to subsequently be diagnosed with a behavioral or emotional disorder. Consistent with psychological theories and imaging studies, our data are suggestive that childhood abuse and neglect are associated with later development of behavioral and emotional disorders and areas of cognitive weakness and possible impairment. Future research may be conducted to clarify these effects, the possibility of a dose-effect relationship, and the role of neurobiological mechanisms in the development of these effects.

Key words: abuse/neglect, executive dysfunction, neuropsychological assessment

18

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.

19

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.

20

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).

21

What is Executive Function(s)

4. Denckla (1996): "EF (is) a set of **domain-general control processes...**" (p. 263).
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).

22

What is Executive Function(s)

6. Pribram (1973): "**executive programmes ...to maintain brain organization**" (p. 301).
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).

23

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).

24

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).

25

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).

26

Executive Functions

Executive functions

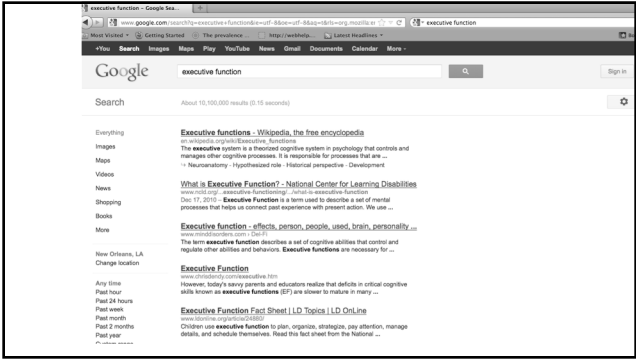
From Wikipedia, the free encyclopedia
Redirected from Executive system

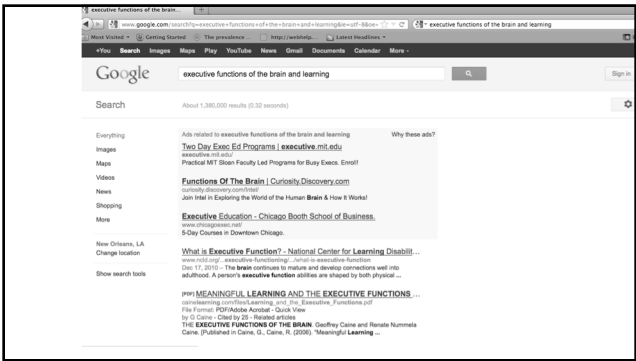
The **executive system** is a theorized cognitive system in psychology that controls and manages other cognitive processes. It is also referred to as the **executive function**, **executive functions**, **supervisory attentional system**, or **cognitive control**.

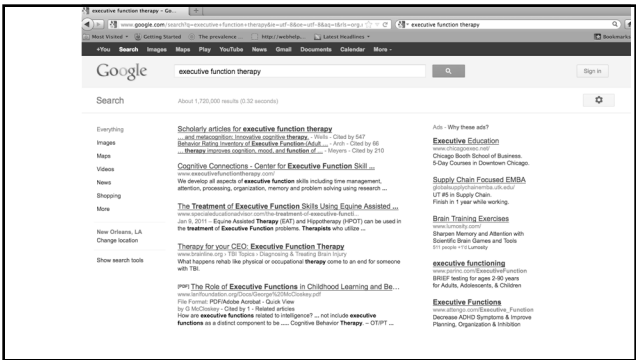
The concept is used by psychologists and neuroscientists to describe a loosely defined collection of brain processes which are responsible for planning, cognitive flexibility, abstract thinking, rule acquisition, initiating appropriate actions and inhibiting inappropriate actions, and selecting relevant sensory information.

Hypothesized role

The executive system is thought to be heavily involved in handling novel situations outside the domain of some of our automatic psychological processes that could be explained by the reproduction of learned schemas or set behaviors. Psychologists Don Norman and Tim Shallice have outlined two types of situation where routine







And Finally. . .

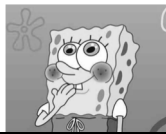
A NICHD panel in 1994
identified 33 EFs by consensus!



31

The Top Six Were:

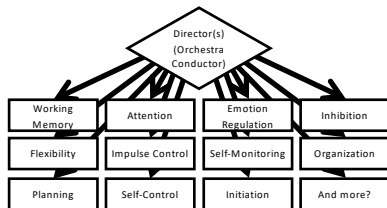
- Self-regulation
- Sequencing of behavior
- Flexibility
- Response inhibition
- Planning
- Organization of behavior



32

Three Categories of Theories

- Regulators that control
- Abilities (cognitive processes)
- Behaviors



33

A similarly named ability and behavior (e.g. planning) may only overlap to a small extent in explaining outcome.

34

In fact EF ability likely forms the foundation reflected in behavior, achievement, emotional regulation and socialization. The contributed variance likely is impacted by a host of other variables. Ability and knowledge interact with these variables to shape skillful behavior.

35

Are EF challenges associated with other psychiatric and developmental conditions?



36

EF and ADHD

EF deficits are not necessarily unique to ADHD. They are neither necessary nor sufficient to make a diagnosis of ADHD. When EF impairments are measured in children with ADHD they tend to reflect specific rather than global impairments.

EF and Other Disruptive Disorders (ODD & CD)

Early reviews reported that EF deficits were not characteristic of children and adolescents with ODD and CD after comorbid ADHD was factored out. More recent studies, however, suggest that inhibition deficits may be characteristic of both ADHD and CD but whether children with CD display impairments on additional EF measures is equivocal.

EF and Tourette's

Distinct and robust impairments in EF do not appear to be characteristic of children with TD.

EF and Anxiety Disorders

EF deficits in set-shifting, cognitive flexibility, concept formation, interference control, and verbal fluency have been documented among children with separation anxiety disorder, overanxious disorder, and PTSD. EF in OCD has not been well addressed.

EF and Depression

Scant research has been conducted on the EF abilities among youth with depression. Studies that have included older adolescents have suggested some degree of sensitivity of EF tasks in identifying unipolar depression, but less specificity.

EF and Bi-Polar Disorder

There is a growing consensus about the nature of BD among children. Several studies have targeted its EF concomitants. Although results often have been confounded with significant co-morbidity issues, children and adolescents with BD reliably have demonstrated impairments relative to those without any history of mood disorders on several EF measures (e.g. working memory, set shifting).

EF and Traumatic Brain Injury

Neuropsychol 2011; 27(12):337-345

Original Article

Pragmatic and executive functions in traumatic brain injury and right brain damage

An exploratory comparative study

Nicolas Zimmermann^a, Gigiane Gindri^a,
Camila Rosa de Oliveira^a, Raquelle Paz Fonseca^a

Abstract - Objective: To describe the frequency of pragmatic and executive deficits in right brain damaged (RBD) and in traumatic brain injury (TBI) patients, and to verify possible dissociations between pragmatic and executive functions in these two groups. Methods: The sample comprised 7 cases of TBI and 7 cases of RBD. All participants were assessed by means of tasks from the Manual Communication Evaluation Battery and executive functions tests including the Trail Making Test, Stroop Test, Wisconsin Card Sorting Test, semantic and phonemic verbal fluency tasks, and working memory tasks from the Brazilian Brief Neuropsychological

TBI individuals again exhibited a general profile of executive dysfunction, affecting mainly working memory, initiation, inhibition, planning and switching. Pragmatic and executive deficits were generally associated upon comparisons of RBD patients and TBI cases, except for two simple dissociations: two post-TBI cases showed executive deficits in the absence of pragmatic deficits. Discussion: Pragmatic and executive deficits can be very

43

EF Deficits and ASD

J Child Psychol Psychiatr. Vol. 51, No. 1, pp. 100-110, 2010
Printed in Great Britain

0021-9630/10 \$1.00 + 0.00
© 2010 Association for Child Psychology and Psychiatry

Executive Function Deficits in High-Functioning Autistic Individuals: Relationship to Theory of Mind

Sally Ozonoff,* Bruce F. Pennington* and Sally J. Rogers†

Abstract - A group of high-functioning autistic individuals was compared to a clinical control

on spatial or other control measures. Second-order theory of mind and executive function deficits were widespread among the autistic group, while first-order theory of mind deficits were found in only a subset of the sample. The relationship of executive function and theory of mind deficits to each other, and their primacy to autism, are discussed.

44

EF and Learning Disabilities

Working Memory Impairments in Children with Specific Arithmetic Learning Difficulties

Janet F. McLean, Graham J. Hitch

Lancaster University, Lancaster, United Kingdom

http://dx.doi.org/10.1080/10682010.2010.500000

View full text

Purchase \$19.95

Abstract

Working memory impairments in children with difficulties in arithmetic have previously been investigated using questionable selection techniques and control groups, leading to problems concluding where deficits may occur. The present study attempted to overcome these criticisms by assessing 8-year-old children with difficulties specific to arithmetic, as indicated by normal reading, and comparing them with both non-matched and ability-matched controls. A battery of 10 tasks was used to measure different aspects of

and some aspects of executive processing. Compared to ability-matched controls, they were impaired only on one task designed to assess executive processes for holding and manipulating information in long-term memory. These deficits in executive and spatial aspects of working memory seem likely to be important factors in poor arithmetical attainment.

If all of these conditions are statistically related to behaviors and abilities reflecting EF than a common denominator must exist.

46

Impairment in behaviors associated with EF can have multiple etiologies often operating simultaneously.



47

Impaired Behavior Associated With Poor EF Can Result From:

- Lack of ability.
- Lack of knowledge.
- Lack of motivation.
- Internalizing symptoms.
- Externalizing symptoms.
- Poor impulse control.

48

Starting with an assessment of EF behaviors defines the real life landscape and can be used as a foundation to than explore etiologies.



"Hard work and putting your nose to the grindstone, son. That's the way to get ahead. At least until you start earning a substantial income. Then you can just throw money at your problems."

49

Executive Function

- EF is a **unitary** construct (e.g., Duncan & Miller, 2002; Duncan & Owen, 2000).
- EF is **unidimensional** in early childhood not adulthood.

Both views are supported by some research (Miyake et al., 2000). -- EF is a **unitary construct ...but with partially different components**

Executive Functions

- EF has **three components**: *inhibitory control, set shifting (flexibility), and working memory* (e.g., Davidson, et al., 2006; Miyake et al., 2000).
- EF has independent **abilities** (Wiebe, Espy, & Charak, 2008).
- Executive Functions is a **multidimensional** model (Friedman et al., 2006; Miyake et al., 2000).

50

Executive Function(s)

- Given all these definitions of EF(s) we wanted to address the question...

Executive Functions ... or
Executive Function?

51

Executive Function(s)

- One way to examine this issue is to research the factor structure of behaviors related to EF(s)
- To do so, we examined the factor structure of the Comprehensive Executive Function Inventory (CEFI)
- We conducted a series of research studies to answer the following question:
 - What is the underlying structure of the behaviors assessed on the CEFI?
 - Is there is just one underlying factor called executive function), or do the behaviors group together into different constructs suggesting a multidimensional structure?

52

EXPLORATORY FACTOR ANALYSES

- 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
- The sample ...

CEFI Scales
 Attention
 Emotion Regulation
 Flexibility
 Inhibitory Control
 Initiation
 Organization
 Planning
 Self-Monitoring
 Working Memory

53

CEFI Standardization Samples

- 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)
 - Parent (N=1,400), Teacher (N=1,400) and Self (N=700) ratings were obtained

54

ITEM FACTOR ANALYSES – PART 1

- For the *first half* of the normative sample for Parent, Teacher and Self ratings' **item scores** (90 items) was analyzed using exploratory factor analysis
- The *scree plots* and the *very simple solution* criterion both indicated that only **one factor**.
- The *ratio of the first and second eigenvalues* was greater than four for all three forms, which indicated a **one factor solution**.

55

Item Factor Analyses – Part 1

- Item level factor analysis clearly indicated that one factor was the best solution

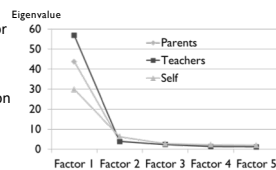


Table 8.2. Eigenvalues from the Inter-Item Correlations

Form	Factor						
	1	2	3	4	5	6	7
Parent	43.7	4.1	2.3	1.5	1.3	1.3	1.0
Teacher	56.8	3.8	2.3	1.3	1.1	1.1	0.8
Self-Report	29.9	6.3	2.7	2.1	1.9	1.8	1.5

Note: Extraction used Axis Factoring. Only the first 10 eigenvalues are presented.

56

SCALE FACTOR ANALYSES – PART 2

- 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**.

57

Item Factor Analyses – Part 1

- Scale level factor analysis clearly indicated that one factor was the best solution

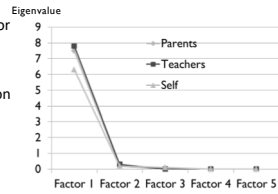


Table 8.4. Eigenvalues of the CEFI Scales Correlations

Form	1	2	3	4	5	6	7
Parent	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Teacher	0.8	0.3	0.0	0.0	0.0	0.0	0.0
Self Report	0.3	0.2	0.1	0.0	0.0	0.0	0.1

Note. Eigenvalue method: Pg

58

EXPLORATORY FACTOR ANALYSES

- Coefficients of Congruence – all very high

Table 8.6. Consistency of Factor Loadings Across Groups

Grouping Factor	CEFI Form	Coefficient of Congruence	Group 1				Group 2			
			Level	N	M	SD	Level	N	M	SD
Gender	Parent	.999	Male	700	98.1	14.9	Female	699	101.8	15.0
	Teacher	.999	Male	700	96.7	14.4	Female	700	103.2	15.0
	Self Report	.992	Male	350	98.9	15.4	Female	350	101.0	14.6
Race/Ethnic Group	Parent	.996	Non-White	615	99.8	15.6	White	784	100.0	14.6
	Teacher	.999	Non-White	609	97.8	15.3	White	791	101.6	14.6
	Self Report	.995	Non-White	308	100.3	15.0	White	392	99.7	15.1
Age	Parent	.999	5 to 11	699	99.9	15.1	12 to 18	700	100.0	15.1
	Teacher	.999	5 to 11	700	100.0	15.1	12 to 18	700	100.0	15.0
	Self Report	.995	12 to 15	400	98.7	15.0	16 to 18	300	101.6	15.0
Clinical/Educational	Parent	.993	Non-Clinical	1,298	101.0	14.7	Clinical/Educational	277	84.6	12.4
	Teacher	.994	Non-Clinical	1,338	100.7	14.9	Clinical/Educational	280	87.1	12.2
	Self Report	.976	Non-Clinical	632	100.8	14.8	Clinical/Educational	121	91.7	14.3

59

EXPLORATORY FACTOR ANALYSES

- 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.

60

Our Conclusion. . .

The concept of Executive Function is best defined as a unitary construct....how you do what you do.



He got in it and he drew up the covers.

61

Latent class analysis of frontal lobe tasks strongly suggests a general EF that reflects the efficiency and perhaps automaticity of the executive management system.

Miyake, Friedman, et al
Cognitive Psychology

62

Conclusive evidence concerning the developmental trajectories of the different EF components on neuropsychological tests has yet to be established.

Huizinga, Dolan et al, 2006
Neuropsychologia

63

An examination of factor analytic studies examining EF in children finds only a single factor- planning – common to all studies.

Anderson, 2002
Clin. Neuropsych.

64

EF skills may develop in different tracks but merge in function as children develop.

Wasserman and Wasserman, 2013
Applied Neuropsych. Child

65

EF appears to be a unitary, more domain specific process in children

Wiebe, Scheffeld, et al, 2011
J. Of Exp. Child Psych.

66

Naglieri & Goldstein, 2012

Executive Function is how efficiently you do
what you decide to do



67

EF as a Mediator of Ability and Knowledge

- **Ability:** The skills we use to acquire and manipulate knowledge to solve problems. Also referred to as intelligence.
- **Knowledge:** Everything we learn in life. Also referred to as achievement.
- **Executive Function:** How efficiently or skillfully you do what you decide to do.

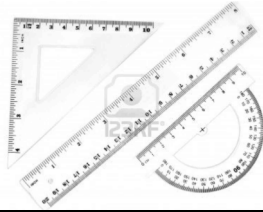
68

What comprises the best means of
assessment of EF?



How to Measure Executive Function(s)

A recent review by Weyandt et al (2012) found 168 measures used to evaluate EF.



70

From Weyandt et al, 2012

Executive Function Test	Number of Times Used	Sensitivity to Group Differences	Percentage of Significant Differences Between Clinical and Control Groups	Percentage of Significant Group Differences Between Two Clinical Groups
Stroop Color and Word Test and variants	41	28/73 = 38%	22/57 = 39%	6/36 = 17%
Wisconsin Card Sorting Test (including computerized and non-computerized versions)	34	75/226 = 33%	60/139 = 43%	14/88 = 16%
Trail Making Test and variants	26	43/121 = 36%	35/79 = 44%	8/42 = 19%
Continuous Performance Test and variants	19	31/72 = 43%	26/52 = 50%	5/15 = 33%
BRIEF	16	177/266 = 67%	88/104 = 85%	24/64 = 38%
Go/No-Go Test	14	37/81 = 46%	23/41 = 56%	7/17 = 41%
Tower of London test and Variants	13	3/75 = 4%	1/39 = 3%	2/39 = 5%
Rey-Osterich Complex Figure Test (ROCF) or Rey Complex Figure Test (RCFT)	12	31/93 = 33%	24/56 = 43%	7/37 = 19%

71

How can we reliably and validly evaluate EF?



MIDVALE
SCHOOL FOR
THE GIFTED

In general single EF tests share at most 10% of the variance with EF ratings and observations of everyday behavior.

Batteries of combined EF tests fare a bit better sharing up to 20% of the variance with observation and reported behavior.

The more tests in an EF battery the more factors identified in both exploratory and confirmatory studies.

Importance of a National Norm

- The diagnostic conclusions we reach are greatly influenced by the tools we use.
- The composition of the reference group can make a substantial difference in the conclusions reached.
- Norms that represent a typical population are needed for all assessment tools.
- We have an obligation to use the highest quality tests.

76

Importance of a National Norm

- What is one problem with scores based on a sample that is not representative of the U.S. populations?
 - You don't know how much the score you get is influenced by demographic variables
 - Let's look at some data ...
- We created norms from our CEFI data for groups of children based on PEL levels to see just how much influence this variable could have on a standard score (Mean = 100, SD = 15).

77

Importance of a National Norm

Calibration of Standard Scores (Mn = 100; SD = 15) Across Parental Educational Levels for CEFI Parent Ratings.

Raw Score	Standard Scores				
	<HS	HS Grad	Some Coll	Coll Grad	National
230	96	91	88	85	90
235	97	92	89	87	91
240	98	93	90	88	92
245	99	95	92	89	93
250	100	96	93	90	94
255	101	97	94	92	95
260	102	98	95	93	97
265	103	99	96	94	98
270	104	100	98	95	99
275	105	101	99	96	100
280	106	102	100	98	101
285	107	103	101	99	102
290	108	105	102	100	103
295	109	106	103	101	105
300	110	107	105	103	106
305	111	108	106	104	107
310	112	109	107	105	108
315	113	110	108	106	109

78

Importance of a National Norm

- Only tests that yield standard scores based on a **representative** normal sample should be used in clinical practice.
- A comparison of EF symptoms to a normative group is essential.
- Comparisons to children who do not represent the US population can be misleading.
- The use of raw scores should be avoided in all tests (especially achievement tests).

79

Importance of a National Norm

- A normative sample that is representative of the US population is absolutely required.
- The sample should be stratified carefully and that sample should be thoroughly described in the test Manual.
- Remember the key question is not how similar someone is to an impaired group but how dissimilar they are to the norm.

80

Comprehensive Executive Function Inventory (CEFI)

Jack A. Naglieri
Sam Goldstein

A rating scale designed to measure behaviors association with Executive Function for ages 5-18 years rated by a parent, teacher, or the child/youth.



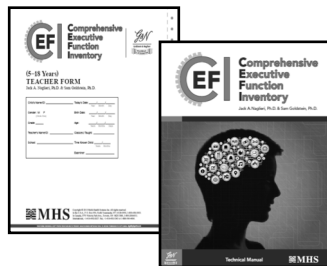
81

CEFI

- The Comprehensive Executive Function Inventory (CEFI) is a rating scale designed to measure behaviors that are associated with Executive Function (EF) for children and youth aged 5 through 18 years.
- The rating scale can be completed by a parent, teacher, or the child/youth.
- The CEFI is composed of items evaluating behaviors associated with to attention, emotion regulation, flexibility, inhibitory control, initiation, organization, planning, self-monitoring, and working memory.
- The rating scale has been developed to demonstrate the highest psychometric qualities.

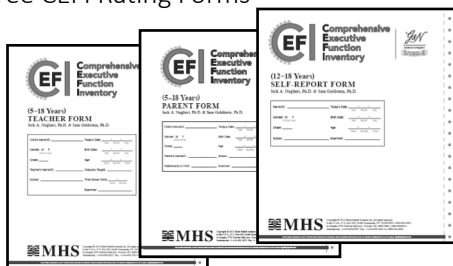
82

CEFI (Naglieri & Goldstein, 2012)



83

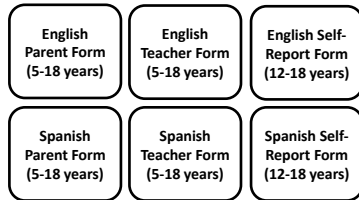
Three CEFI Rating Forms



84

CEFI Forms

- Each 100-item form yields scales set at a mean of 100 and SD of 15



85

CEFI Scales

Each form yields a **Full Scale** score and 9 separate content scales which contain items as follows...

Consistency Index
Negative Impression Scale
Positive Impression Scale

Full Scale

CEFI Scales
Attention
Emotion Regulation
Flexibility
Inhibitory Control
Initiation
Organization
Planning
Self-Monitoring
Working Memory

86

Executive Function Full Scale



CEFI Items by Scale

Table C.4. Attention (12 items)

Item #	Parent/Teacher Item During the past 4 weeks, how often did the child...	Self-Report Item During the past 4 weeks, how often did you...
3	finish a boring task?	finish a boring task?
11	work well in a noisy environment?	work well in a noisy environment?
21	work well for a long time?	work well for a long time?
25	concentrate while reading?	concentrate while reading?
36	stay on topic when talking?	stay on topic when talking?

Table C.5. Emotion Regulation (9 items)

Item #	Parent/Teacher Item During the past 4 weeks, how often did the child...	Self-Report Item During the past 4 weeks, how often did you...
10	control emotions when under stress?	control emotions when under stress?
12	stay calm when handling small problems?	stay calm when handling small problems?
42	find it hard to control his/her emotions? (R)	find it hard to control your emotions? (R)
47	get upset when plans were changed? (R)	get upset when plans were changed? (R)
64	wait patiently?	wait patiently?

88

CEFI Items by Scale

Table C.6. Flexibility (7 items)

Item #	Parent/Teacher Item During the past 4 weeks, how often did the child...	Self-Report Item During the past 4 weeks, how often did you...
7	come up with a new way to reach a goal?	come up with a new way to reach a goal?
41	come up with different ways to solve problems?	come up with different ways to solve problems?
45	have many ideas about how to do things?	have many ideas about how to do things?

Table C.7. Inhibitory Control (10 items)

Item #	Parent/Teacher Item During the past 4 weeks, how often did the child...	Self-Report Item During the past 4 weeks, how often did you...
1	think before acting?	think before acting?
19	find it hard to control his/her actions? (R)	find it hard to control your actions? (R)
32	think of the consequences before acting?	think of the consequences before acting?
36	maintain self-control?	maintain self-control?
49	have trouble waiting to get what he/she wanted? (R)	have trouble waiting to get what you wanted? (R)

89

CEFI Items by Scale

Table C.8. Initiation (10 items)

Item #	Parent/Teacher Item During the past 4 weeks, how often did the child...	Self-Report Item During the past 4 weeks, how often did you...
16	start something without being asked?	start something without being asked?
30	start conversations?	start conversations?
39	take on new projects?	take on new projects?
40	need others to tell him/her to get started on things? (R)	need others to tell you to get started on things? (R)
55	take initiative?	take initiative?

Table C.9. Organization (10 items)

Item #	Parent/Teacher Item During the past 4 weeks, how often did the child...	Self-Report Item During the past 4 weeks, how often did you...
5	complete one task before starting a new one?	complete one task before starting a new one?
13	organize his/her thoughts well?	organize your thoughts well?
18	appear disorganized? (R)	appear disorganized? (R)
27	complete homework or tasks on time?	complete homework or tasks on time?
34	work neatly?	work neatly?
52	keep track of belongings?	keep track of belongings?

90

CEFI Items by Scale

Table C.10. Planning (11 Items)

Item #	Parent/Teacher Item During the past 4 weeks, how often did the child...	Self-Report Item During the past 4 weeks, how often did you...
9.	prepare for school or work?	prepare for school or work?
15.	solve problems creatively?	solve problems creatively?
22.	do things in the right order?	do things in the right order?
28.	plan for future events?	plan for future events?

Table C.11. Self-Monitoring (10 Items)

Item #	Parent/Teacher Item During the past 4 weeks, how often did the child...	Self-Report Item During the past 4 weeks, how often did you...
6.	ask for help when needed?	ask for help when needed?
14.	fix his/her mistakes?	fix your mistakes?
17.	change a plan that was not working?	change a plan that was not working?
29.	learn from past mistakes?	learn from past mistakes?

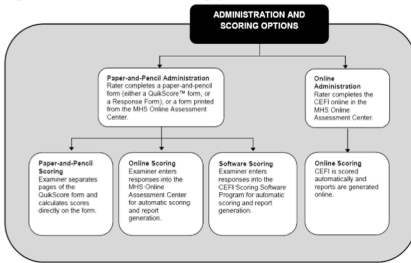
Table C.12. Working Memory (11 Items)

Item #	Parent/Teacher Item During the past 4 weeks, how often did the child...	Self-Report Item During the past 4 weeks, how often did you...
4.	forget instructions? (R)	forget instructions? (R)
8.	remember how to do something?	remember how to do something?
23.	forget instructions with many steps? (R)	forget instructions with many steps? (R)
26.	remember many things at one time?	remember many things at one time?

91

CEFI Administration & Scoring

Figure 3.1. Overview of Administration and Scoring Options

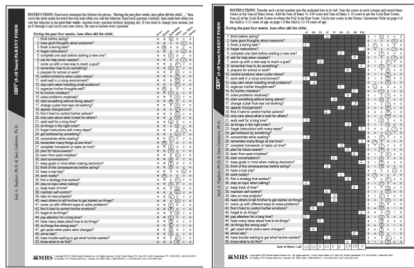


92

CEFI Rating Form

93

CEFI Rating Form



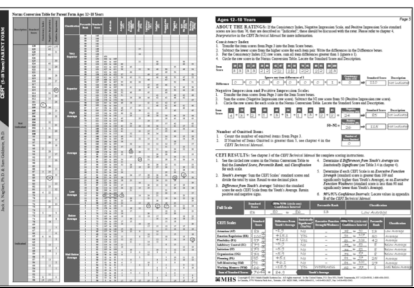
This is the first page of the CEFI Rating Form. It contains a list of 100 items on the left, each with a corresponding box for a rating. The items are organized into categories such as 'General', 'Specific', and 'Other'. The right side of the page has a header section with instructions and a footer with the number 94.

CEFI Rating Form



This is the second page of the CEFI Rating Form. It continues the list of 100 items from the previous page. The layout is similar, with a list of items on the left and rating boxes on the right. The right side of the page has a header section with instructions and a footer with the number 95.

CEFI Rating Form



This is the third page of the CEFI Rating Form. It contains a list of 100 items on the left, each with a corresponding box for a rating. The items are organized into categories such as 'General', 'Specific', and 'Other'. The right side of the page has a header section with instructions and a footer with the number 96.

CEFI Rating Form

Ages 12-18 Years Page 5

ABOUT THE RATINGS: If the Controversy Index, Negative Impression Scale and Positive Impression Scale standard scores are less than 75, they are described as "Outstanding"; those should be discussed with the owner. Please refer to chapter 4, Interpretation in the CEFI Technical Manual for more information.

Controversy Index

- Transfer the raw scores from Page 1 into the Data Score boxes.
- Subtract the lower score from the higher score for each item pair. Write the difference in the Difference boxes.
- For the Controversy Index (CI) raw score, sum all item differences greater than 1 (Figure 1).
- Circle the raw score in the Norms Conversion Table. Locate the Standard Score and Description.

Item Scores:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Difference:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Negative Impression and Positive Impression Scales

- Transfer the item scores from Page 1 into the Data Score boxes.
- Sum the scores (Negative Impression raw score). Subtract the NC raw score from 50 (Positive Impression raw score).
- Circle the raw scores for each scale in the Norms Conversion Table. Locate the Standard Score and Description.

Item Scores:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NI-NC =

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Number of Omitted Items:

- Count the number of omitted items from Page 1.
- If Number of Items Omitted is greater than 5, see chapter 4 in the CEFI Technical Manual.

Number of Items Omitted:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

97

CEFI Rating Form

CEFI RESULTS: See chapter 3 of the CEFI Technical Manual for complete scoring instructions.

- See the circled raw scores in the Norms Conversion Table to find the **Standard Score**, **Percentile Rank**, and **Classification** for each scale.
- Youth's Average:** Sum the CEFI Scales' standard scores and divide the total by nine. Round to one decimal place.
- Difference from Youth's Average:** Subtract the standard scores for each CEFI Scale from the Youth's Average. Retain positive and negative signs.
- Dimension of Difference from Youth's Average:** See the **Dimension of Difference from Youth's Average** in the Norms Conversion Table (see Table 3.4 in chapter 3).
- Strength of Difference from Youth's Average:** See the **Strength of Difference from Youth's Average** in the Norms Conversion Table (see Table 3.4 in chapter 3).
- 90%/90% Confidence Interval:** Locate values in appendix B of the CEFI Technical Manual.

Full Scale	Standard Score	90%/90% Confidence Interval	Percentile Rank	Classification
CEFI Scales				
Attention (AT)	100-110	90-110	90-110	90-110
Executive Function (EF)	100-110	90-110	90-110	90-110
Planning (P)	100-110	90-110	90-110	90-110
Working Memory (WM)	100-110	90-110	90-110	90-110
Impulsivity (I)	100-110	90-110	90-110	90-110
Emotion (E)	100-110	90-110	90-110	90-110
Reading (R)	100-110	90-110	90-110	90-110
Self-Reporting (SR)	100-110	90-110	90-110	90-110
Working Memory (WM)	100-110	90-110	90-110	90-110
Sum of Standard Scores	900-1000	800-1100	900-1000	900-1000

© 2015 by the American Psychological Association. All rights reserved. This publication is a copyrighted work of the American Psychological Association or one of its allied publishers. This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.

98

CEFI Readability

- Reading levels were determined using the Flesch-Kincaid Grade Level Formula which is based on the total number of words, syllables, and sentences

Table 3.1. CEFI Readability Levels

Form	Readability Score		
	Overall	Instructions	Items
CEFI (5-18 Years) Parent Form	5.4	7.4	5.3
CEFI (5-18 Years) Teacher Form	5.4	7.4	5.3
CEFI (12-18 Years) Self-Report Form	5.2	6.7	5.2

99

CEFI Standardization

- Data collection: January – December, 2011
- Standardization and related research data (N = over 5,000 forms) were collected from 50 US states
- Data were collected using paper and pencil and online administration formats

Table 6.1. Differences Between Online and Paper Administrations: Cohen's *d* Effect Size Ratios

Rater	Full Scale	CEFI Scales	
		Medium	Range
Parent	0.03	0.02	0.00-0.09
Teacher	0.01	0.04	0.01-0.06
Self	0.02	0.03	0.00-0.10

Note. Guidelines for interpreting *d*: small effect size = 0.2; medium effect size = 0.5; large effect size = 0.8. N = 60, 66, and 52 for the parent, teacher, and self-report studies, respectively.

100

CEFI Normative Samples

- 1,400 ratings by Parents for children aged 5-18 years
- 1,400 ratings by Teachers for children aged 5-18 years
- 700 ratings from the self-report form for those aged 12-18 years
- There were equal numbers of ratings of or by males and females

101

CEFI Normative Samples

- Stratified according to the 2009 US Census by race/ethnicity, parental education, region, age, and sex
- The samples included students in special education

Table 6.16. Categories of Eligibility to Receive Educational Services across Normative Samples

Eligibility/Diagnostic Category	Parent		Teacher		Self-Report		% Dept. Education ^a
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
ADHD	62	4.4	55	3.9	43	6.1	4.7
Autism Spectrum Disorder	9	0.6	6	0.4	0	—	0.7
Communication ^b	13	0.9	20	1.4	0	—	2.9
Emotional	8	0.6	16	1.1	7	1.0	0.9
Hearing	0	—	5	0.4	0	—	0.2
Intellectual	2	0.1	6	0.4	0	—	1.0
Specific Learning	56	4.0	67	4.8	18	2.6	5.0
Traumatic Brain Injury	2	0.1	2	0.1	0	—	0.1
Visual	1	0.1	1	0.1	0	0.0	0.1
Other	9	0.6	15	1.1	0	0.0	—
TOTAL	162	10.9	193	12.7	68	9.7	—

^a SOURCE: for all disorders except ADHD, Digest of Education Statistics, National Center for Education Statistics. SOURCE for ADHD: National Center

102

Age x (Race/Ethnicity) x Gender

Age	White				Black				Hispanic				Other				
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female			
5-6	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
7-8	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
9-10	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
11-12	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
13-14	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
15-16	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
17-18	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
19-20	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
21-22	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
23-24	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
25-26	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
27-28	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
29-30	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
31-32	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
33-34	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
35-36	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
37-38	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
39-40	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
41-42	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
43-44	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
45-46	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
47-48	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
49-50	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
51-52	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
53-54	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
55-56	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
57-58	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
59-60	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
61-62	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
63-64	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
65-66	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
67-68	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
69-70	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
71-72	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
73-74	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
75-76	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
77-78	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
79-80	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
81-82	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
83-84	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
85-86	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
87-88	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
89-90	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
91-92	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
93-94	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
95-96	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
97-98	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
99-100	15	2	7	28	2	16	15	2	7	28	2	16	22	4	14	36	4
Total	11.0	2.0	7.0	28.0	2.0	16.0	11.0	2.0	7.0	28.0	2.0	16.0	22.0	4.0	14.0	36.0	4.0

Note: U.S. Population data are from the American Community Survey, 2000.

Table 6.3. Age x Race/Ethnicity x Gender Distribution: CEFI Teacher Normative Sample

Detailed View										Detailed View									
Category		Sub-category		Item		Value		Unit		Category		Sub-category		Item		Value		Unit	
01	1	7	50	1	11	2	8	200	2	01	1	7	50	1	11	2	8	200	2
01	2	7	200	2	11	2	7	200	2	01	2	7	200	2	11	2	7	200	2
01	3	7	200	2	11	2	7	200	2	01	3	7	200	2	11	2	7	200	2
01	4	7	200	2	11	2	7	200	2	01	4	7	200	2	11	2	7	200	2
01	5	7	200	2	11	2	7	200	2	01	5	7	200	2	11	2	7	200	2
01	6	7	200	2	11	2	7	200	2	01	6	7	200	2	11	2	7	200	2
01	7	7	200	2	11	2	7	200	2	01	7	7	200	2	11	2	7	200	2
01	8	7	200	2	11	2	7	200	2	01	8	7	200	2	11	2	7	200	2
01	9	7	200	2	11	2	7	200	2	01	9	7	200	2	11	2	7	200	2
01	10	7	200	2	11	2	7	200	2	01	10	7	200	2	11	2	7	200	2
01	11	7	200	2	11	2	7	200	2	01	11	7	200	2	11	2	7	200	2
01	12	7	200	2	11	2	7	200	2	01	12	7	200	2	11	2	7	200	2
01	13	7	200	2	11	2	7	200	2	01	13	7	200	2	11	2	7	200	2
01	14	7	200	2	11	2	7	200	2	01	14	7	200	2	11	2	7	200	2
01	15	7	200	2	11	2	7	200	2	01	15	7	200	2	11	2	7	200	2
01	16	7	200	2	11	2	7	200	2	01	16	7	200	2	11	2	7	200	2
01	17	7	200	2	11	2	7	200	2	01	17	7	200	2	11	2	7	200	2
01	18	7	200	2	11	2	7	200	2	01	18	7	200	2	11	2	7	200	2
01	19	7	200	2	11	2	7	200	2	01	19	7	200	2	11	2	7	200	2
01	20	7	200	2	11	2	7	200	2	01	20	7	200	2	11	2	7	200	2
01	21	7	200	2	11	2	7	200	2	01	21	7	200	2	11	2	7	200	2
01	22	7	200	2	11	2	7	200	2	01	22	7	200	2	11	2	7	200	2
01	23	7	200	2	11	2	7	200	2	01	23	7	200	2	11	2	7	200	2
01	24	7	200	2	11	2	7	200	2	01	24	7	200	2	11	2	7	200	2
01	25	7	200	2	11	2	7	200	2	01	25	7	200	2	11	2	7	200	2
01	26	7	200	2	11	2	7	200	2	01	26	7	200	2	11	2	7	200	2
01	27	7	200	2	11	2	7	200	2	01	27	7	200	2	11	2	7	200	2
01	28	7	200	2	11	2	7	200	2	01	28	7	200	2	11	2	7	2	

103

Other Tables of Demographics (N=12)

Table 6.5. Age \times Region \times Race/Ethnicity: CEFI Parent Normative Sample (5–11-Year-Olds)

Age	Region	Hispanic	Asian	Black	White	Other	Subtotal	Subtotal (%)	U.S. Population (%)
1 Years	Northeast	2	2	2	33	0	38	18.0	17.0
	Midwest	2	0	2	17	2	23	23.0	26.7
	South	0	0	0	19	2	21	37.0	37.2
	West	10	2	2	33	0	47	24.0	24.5
	Subtotal	22	4	14	96	4	139	100.0	100.0

Table 6.11. Age \times PEL \times Race/Ethnicity: CEFI Parent Normative Sample (12–18-Year-Olds)

[illegible]

104

CEFI Scale Reliabilities

Table 7.1. Cronbach's Alpha: CEFI Normative and Clinical/Educational Samples

Table 7.1. Cronbach's Alpha: CPTI Normative and Normative Educational Samples									
	Normative Samples			Normative Educational Samples			Self-Report		
	5-11 Years	12-18 Years	Clinical/Educational Sample	5-11 Years	12-18 Years	Clinical/Educational Sample	Normative Sample	Clinical/Educational Sample	
Scale	N = 682-698	N = 676-691	N = 250-260	N = 690-700	N = 682-701	N = 232-243	N = 667-705	N = 148-205	
Full Scale	.90	.98	.99	.97	.99	.99	.97	.97	
Attention	.12	.92	.93	.93	.96	.96	.94	.86	
Emotion Regulation	.9	.88	.90	.87	.93	.93	.93	.78	
Flexibility	.7	.84	.85	.78	.90	.90	.86	.77	
Inhibitory Control	.10	.89	.90	.87	.94	.94	.91	.80	
Initiation	.10	.88	.90	.84	.92	.93	.91	.80	
Organization	.10	.89	.92	.85	.93	.94	.91	.85	
Planning	.11	.91	.93	.88	.95	.96	.93	.85	
Self-Monitoring	.10	.85	.89	.78	.91	.92	.86	.78	
Working Memory	.11	.88	.89	.86	.94	.94	.91	.83	

Memory	11	.88	
--------	----	-----	--

Note. Sample sizes vary due to omitted items

106

Inter-Rater Reliability

- Parent Form (5-18 yrs) shows very good consistency and similar mean scores

Scale	Obtained <i>r</i>	Corrected <i>r</i>	<i>N</i>	Parent 1		Parent 2		<i>d</i> -ratio
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Full Scale	.83	.88	100	96.5	13.4	97.6	13.2	0.08
Attention	.79	.86	100	97.8	13.3	98.1	12.8	0.03
Emotion Regulation	.65	.73	98	94.7	13.5	95.6	13.4	0.07
Flexibility	.64	.76	99	97.8	13.0	97.9	12.3	0.01
Inhibitory Control	.80	.84	100	95.9	14.6	97.6	13.8	0.12
Initiation	.78	.84	100	96.8	13.7	98.8	13.3	0.15
Organization	.81	.86	99	96.5	13.2	97.9	13.9	0.10
Planning	.78	.85	100	98.0	13.6	98.4	13.0	0.03
Self-Monitoring	.70	.80	100	96.5	13.0	96.7	12.9	0.02
Working Memory	.81	.82	100	97.4	15.1	99.2	14.5	0.12

106

Inter-Rater Consistency

- Teacher Form (5-18 yrs) shows good consistency and similar mean scores

Scale	Obtained <i>r</i>	Corrected <i>r</i>	<i>N</i>	Teacher 1		Teacher 2		<i>d</i> -ratio
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Full Scale	.70	.68	98	94.4	17.0	96.8	13.8	0.16
Attention	.64	.63	98	93.5	16.8	96.4	13.9	0.19
Emotion Regulation	.56	.54	98	97.6	16.1	98.4	14.7	0.05
Flexibility	.66	.63	98	94.7	17.2	97.1	13.9	0.15
Inhibitory Control	.64	.64	98	96.5	16.0	98.2	14.2	0.11
Initiation	.64	.57	98	93.9	18.3	97.5	14.7	0.22
Organization	.67	.67	96	94.4	16.6	96.4	13.6	0.13
Planning	.70	.68	98	94.4	17.0	97.0	13.7	0.17
Self-Monitoring	.68	.68	98	94.4	16.4	96.1	13.7	0.11
Working Memory	.65	.61	98	94.3	18.0	97.2	13.9	0.18

Note. All *r*s significant. Pair-wise deletion of missing cases was used.

107

Intra-Rater Consistency

- Self-Rating Form (12-18 yrs) two ratings over time shows very good consistency and similar means

Scale	Obtained <i>r</i>	Corrected <i>r</i>	<i>N</i>	Time 1		Time 2		<i>d</i> -ratio
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Full Scale	.78	.77	200	101.9	15.1	101.8	15.6	0.01
Attention	.74	.74	200	100.7	14.8	100.7	15.0	0.00
Emotion Regulation	.71	.74	200	100.7	14.2	102.6	14.6	0.13
Flexibility	.86	.86	200	101.9	14.4	101.3	15.1	0.04
Inhibitory Control	.77	.79	200	103.2	14.2	101.7	14.8	0.10
Initiation	.77	.79	200	101.7	14.8	100.7	14.2	0.07
Organization	.85	.86	200	101.7	14.0	101.1	14.9	0.04
Planning	.80	.82	200	101.7	14.1	101.2	14.4	0.03
Self-Monitoring	.74	.74	200	101.5	14.7	100.1	15.1	0.09
Working Memory	.75	.79	200	101.8	14.3	100.8	14.2	0.07

108

CEFI Interpretation

- Step 1: Examine Quality of the Ratings: Consistency, Positive and Negative Impression
- Step 2: Interpret Scale Scores
- Step 3: Compare CEFI Scale Scores
- Step 4: Examine Item-Level Responses
- Step 5: Compare Results Across Raters
- Step 6: Compare Results Over Time

109

Step 1: Consistency Index

- The Consistency Index provides information about whether the rater responded to similar items differently.
- Inconsistent responding can occur intentionally or unintentionally, and could be due to deliberate non-compliance, fatigue, a misunderstanding of the items or instructions, inattention, disinterest, or a lack of motivation

110

Step 1: Impression Scales

- The Negative Impression scale evaluates the likelihood that the rater underestimated the individual's functioning.
- The Positive Impression scale evaluates the likelihood that the rater overestimated the individual's functioning.

111

Step 1: Impression Scales

- Negative and Positive Impression Scale Items

Table 5.3. CEFI Negative Impression Scale and Positive Impression Scale Items

Negative Impression Scale	Positive Impression Scale
Item	Item
2. have good thoughts about everyone? (R)	2. have good thoughts about everyone?
20. only care about what is best for others? (R)	20. only care about what is best for others?
24. get bothered by something? (R)	24. get bothered by something? (R)
33. have a bad day?	33. have a bad day? (R)
46. do things the wrong way?	46. do things the wrong way? (R)
54. get embarrassed?	54. get embarrassed? (R)
61. do things perfectly? (R)	61. do things perfectly?
66. like everyone he/she met? (R)	66. like everyone he/she met?
77. know the right answer? (R)	77. know the right answer?
95. get upset?	95. get upset? (R)

Note. (R) = Reverse scored item.

112

Step 1: Impression Scales

- A particular response style is indicated if the standard score is less than 76 (< 5% of the normative sample).

Scale	Interpretive Text	
	Standard Score ≤ 75	Standard Score > 75
Consistency Index	The rater responded in a different way to similar items. This rating pattern is not typical and should be further investigated.	The pattern of ratings is typical.
Negative Impression Scale	The pattern of ratings may underestimate the child's behavior. The rating pattern is not typical and should be further investigated.	The pattern of ratings is typical.
Positive Impression Scale	The pattern of ratings may overestimate the child's behavior. The rating pattern is not typical and should be further investigated.	The pattern of ratings is typical.
Time to Completion	The rater spent considerably less time than is usual completing the CEFI.	The time the rater took to complete the CEFI was typical.

Time to Completion is only for online administration

113

CEFI Interpretation

- Step 1: Examine Quality of the ratings: Consistency, Positive and Negative Impression
- Step 2: Interpret Scale Scores
- Step 3: Compare CEFI Scale Scores
- Step 4: Examine Item-Level Responses
- Step 5: Compare Results Across Raters
- Step 6: Compare Results Over Time

114

Step 2: Interpret Scale Scores

- All scales are set at mean of 100, SD of 15
- Low scores mean poor EF

Table 4.3. Interpretation Guidelines for Examining Scale Scores

Scale	Interpretation Guidelines
Full Scale	Reflects overall executive function. The Full Scale score is made up of 50 items from nine different areas that are conceptually related to executive function (i.e., Attention, Emotion Regulation, Flexibility, Inhibitory Control, Initiation, Organization, Planning, Self-Monitoring, and Working Memory). The CEPI Scales describe the content of the items for intervention purposes. If there is significant variation among the CEPI Scales, the Full Scale score will sometimes be higher and other times lower than scores on these scales. However, the Full Scale score is a good description of a child's/youth's executive function behaviors if there is no significant variation among the CEPI Scales.
Attention	Describes how well a child/youth can avoid distractions, concentrate on tasks, and sustain attention.
Emotion Regulation	Indicates the child's/youth's control and management of emotions, including staying calm when handling small problems and reacting with the right level of emotion.
Flexibility	Reflects a child's/youth's skill at adjusting behavior to meet circumstances, including coming up with different ways to solve problems, having many ideas about how to do things, and being able to solve problems using different approaches.

115

Step 2: Interpret Scale Scores

Table 4.3. Interpretation Guidelines for Examining Scale Scores

Scale	Interpretation Guidelines
Inhibitory Control	Describes the child's/youth's ability to control behavior or impulses, including thinking about consequences before acting, maintaining self-control, and keeping commitments.
Initiation	Indicates a child's/youth's skill at beginning tasks or projects on his/her own including starting tasks easily, being motivated, and taking the initiative when needed.
Organization	Reflects the child's/youth's ability to manage personal effects, work, or multiple tasks, including organizing tasks and thoughts well, managing time effectively, and working neatly.
Planning	Describes how well a child/youth can develop and implement strategies to accomplish tasks, including planning ahead and making good decisions.
Self-Monitoring	Indicates the child's/youth's ability to evaluate his/her own behavior in order to determine when a different approach is necessary, including noticing and fixing mistakes, knowing when help is required, and understanding when a task is completed.
Working Memory	Reflects how well a child/youth can keep information in mind that is important for knowing what to do and how to do it, including remembering important things, instructions, and steps.

116

Classification of Standard Scores

Standard Score	Percentile Rank	Classification
≥ 130	≥ 98	Very Superior
120–129	91–97	Superior
110–119	75–90	High Average
90–109	25–73	Average
80–89	9–23	Low Average
70–79	2–8	Below Average
≤ 69	≤ 2	Well Below Average

117

Step 2: Interpret Estimated True Score Based Confidence Intervals

TABLE B.1. CEFI (5-18 Years) Parent Form: 90% Confidence Intervals for 5-11-Year-Olds

Standard Score	Full Scale	Attention (AT)	Emotion Regulation (ER)	Flexibility (FX)	Inhibitory Control (IC)	Organization (OG)	Planning (PL)	Self-Monitoring (SM)	Working Memory (WM)	Standard Score
145	-	-	-	-	-	-	-	-	-	145
144	-	-	-	-	-	-	-	-	-	144
143	139-145	-	-	-	-	-	-	-	-	143
142	138-144	-	-	-	-	-	-	-	-	142
141	137-143	-	-	-	-	-	-	-	-	141
140	136-142	-	-	-	-	-	-	-	-	140
139	135-141	129-143	126-141	127-141	127-141	127-141	127-141	127-141	127-141	139
138	134-140	128-142	125-141	126-140	125-141	125-141	125-141	125-141	125-141	138
137	133-140	127-141	124-140	125-140	124-141	124-141	124-141	124-141	124-141	137
136	132-139	126-140	123-139	124-140	123-139	123-139	123-139	123-139	123-139	136
135	131-138	125-139	122-138	123-139	122-138	122-138	122-138	122-138	122-138	135
134	130-137	124-138	121-137	122-138	121-137	121-137	121-137	121-137	121-137	134
133	129-136	123-137	120-136	121-137	120-136	120-136	120-136	120-136	120-136	133
132	128-135	122-136	119-135	120-136	119-135	119-135	119-135	119-135	119-135	132
131	127-134	121-135	118-134	119-135	118-134	118-134	118-134	118-134	118-134	131
130	126-133	120-134	117-133	118-134	117-133	117-133	117-133	117-133	117-133	130
129	125-132	119-133	116-132	117-133	116-132	116-132	116-132	116-132	116-132	129
128	124-131	118-132	115-131	116-132	115-131	115-131	115-131	115-131	115-131	128
127	123-130	117-131	114-130	115-131	114-130	114-130	114-130	114-130	114-130	127
126	122-129	116-130	113-129	114-130	113-129	113-129	113-129	113-129	113-129	126

The Confidence Interval for a score of 130 in Planning is 120 (-10) to 134 (+4)

118

Step 2: Interpret Scale Scores Using the Prorating Tables

- If items are not completed by the rater, you can prorate the scores

TABLE A.1. CEFI Full Scale Prorated Values: 1 to 5 Omitted Items

Raw Score	1 Omitted Item	2 Omitted Items	3 Omitted Items	4 Omitted Items	5 Omitted Items	Raw Score
645	450					645
644	449					644
643	448					643
642	447					642
641	446					641
640	445	450				640
639	444	449				639
638	443	448				638
637	442	447				637
636	441	446				636
635	440	445	450			635
634	439	444	449			634

119

Step 2: Interpret Scale Scores Using the Prorating Tables

- If 1 item on each scale is not completed by the rater, you can prorate that scale's score

TABLE A.2. CEFI Scales Prorated Values: 1 Omitted Item

Raw Score	Attention (AT)	Emotion Regulation (ER)	Flexibility (FX)	Inhibitory Control (IC)	Organization (OG)	Planning (PL)	Self-Monitoring (SM)	Working Memory (WM)	Raw Score
27	29	30	32	30	30	30	30	30	27
26	28	29	31	29	29	29	29	29	26
25	27	28	30	28	28	28	28	28	25
24	26	27	29	27	27	27	27	27	24
23	25	26	28	26	26	26	26	26	23
22	24	25	27	25	25	25	25	25	22
21	23	24	26	24	24	24	24	24	21
20	22	23	25	23	23	23	23	23	20
19	21	22	24	22	22	22	22	22	19
18	20	21	23	21	21	21	21	21	18
17	19	20	22	20	20	20	20	20	17
16	18	19	21	19	19	19	19	19	16
15	17	18	20	18	18	18	18	18	15
14	16	17	19	17	17	17	17	17	14

120

CEFI Interpretation

- Step 1: Examine Quality of the ratings: Consistency, Positive and Negative Impression
- Step 2: Interpret Scale Scores
- Step 3: Compare CEFI Scale Scores
- Step 4: Examine Item-Level Responses
- Step 5: Compare Results Across Raters
- Step 6: Compare Results Over Time

121

Step 3: Compare CEFI Scale Scores

Compare CEFI Scales to the child's mean **and** the normative mean.

122

Step 3: Compare CEFI Scale Scores

Table 3.4. Critical Values for Significance Testing (at $p \leq .05$ and $p \leq .10$) when Comparing CEFI Scale Standard Scores with Individual's Average CEFI Scale Standard Score

Scale	Parent Form				Teacher Form				Self-Report Form	
	5-11 Years		12-18 Years		5-11 Years		12-18 Years		12-18 Years	
	$p < .05$	$p < .10$	$p < .05$	$p < .10$	$p < .05$	$p < .10$	$p < .05$	$p < .10$	$p < .05$	$p < .10$
Attention	9.1	7.6	8.5	7.1	6.6	5.5	6.6	5.5	11.8	9.9
Emotional Regulation	11.0	9.3	10.0	8.4	8.4	7.0	8.3	7.0	14.4	12.1
Flexibility	12.3	10.3	11.8	9.9	9.9	8.3	9.8	8.2	14.8	12.5
Inhibitory Control	10.6	8.9	10.0	8.4	8.0	6.7	7.9	6.6	13.9	11.7
Initiation	10.9	9.1	10.0	8.4	8.8	7.4	8.6	7.2	14.1	11.8
Organization	10.3	8.7	9.0	7.5	8.3	7.0	8.1	6.8	12.3	10.3
Planning	9.6	8.0	8.7	7.3	7.2	6.1	6.9	5.8	12.3	10.3
Self-Monitoring	11.9	10.0	10.5	8.8	9.4	7.9	9.0	7.6	14.6	12.2
Working Memory	10.8	9.1	10.2	8.5	7.8	6.6	8.0	6.7	13.1	11.0

123

Step 3: Compare CEFI Scale Scores

Figure 4.1. Illustration of Executive Function Weakness and Strengths on the CEFI (5-18 Years) Teacher Form

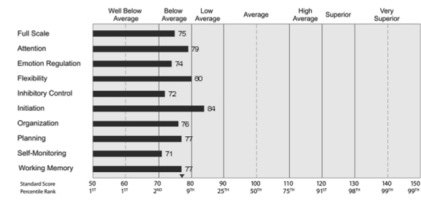
CEFI Scales	Standard Score	Difference From Youth's Average	Statistically Significant? (Yes/No)	Executive Function Strength/Weakness	90% 95% (wide/narrow) Confidence Interval	Percentile Rank	Classification
Attention (AT)	95	-6.7	Yes	---	-90 to -100	37	Average
Emotion Regulation (ER)	82	-19.7	Yes	Weakness	-77 to -90	12	Low Average
Flexibility (FX)	112	10.3	Yes	Strength	103 to 118	79	High Average
Inhibitory Control (IC)	99	-2.7	No	---	93 to 105	47	Average
Initiation (IT)	120	18.3	Yes	Strength	112 to 125	91	Superior
Organization (OG)	99	-2.7	No	---	93 to 105	47	Average
Planning (PL)	101	-0.7	No	---	96 to 106	53	Average
Self-Monitoring (SM)	102	0.3	No	---	95 to 109	55	Average
Working Memory (WM)	105	3.3	No	---	99 to 111	63	Average
Sum of Standard Scores	915	101.7	Youth's Average				

Note: Differences from the Child's/Youth's Average are significant at $p < .10$.

124

Scores in Relation to the Norm

Brittany Ambler's results are provided in the graph below.



Scores in Relation to the Norm and the Individual

Brittany Ambler's results are detailed in the tables that follow. These scores show how Brittany Ambler compares to the normative sample. They also provide an analysis of the variability of scores on the separate CEFI Scales. Differences between Brittany Ambler's average score and her standard scores on each scale are presented, as is a summary column that indicates whether or not these differences were statistically significant. If a standard score on any of the CEFI Scales is greater than 100 and significantly higher than the youth's average score on the CEFI Scales, or less than 80 and significantly lower than the youth's average score, then that score represents an Executive Function Strength (Strength) or an Executive Function Weakness (Weakness), respectively.

125

Full Scale							
Standard Score		90% Confidence Interval		Percentile Rank		Classification	
75		73-76		5		Below Average	
CEFI Scales							
Scale	Standard Score	90% Confidence Interval	Percentile Rank	Classification	Difference from Youth's Average (75.7)	Statistically Significant? ($p < .05$)	Executive Function Strengths/Weaknesses
Attention	79	74.87	8	Below Average	-2.3	No	
Emotion Regulation	74	69.04	4	Below Average	-2.7	No	
Flexibility	80	74.92	9	Low Average	3.3	No	
Inhibitory Control	72	67.82	3	Below Average	-4.7	No	
Initiation	84	78.93	14	Low Average	7.3	No	
Organization	76	71.85	5	Below Average	-0.7	No	
Planning	77	72.85	6	Below Average	0.3	No	
Self-Monitoring	71	67.82	3	Below Average	-5.7	No	
Working Memory	77	72.85	6	Below Average	0.3	No	

126

CEFI Interpretation

- Step 1: Examine Quality of the ratings: Consistency, Positive and Negative Impression
- Step 2: Interpret Scale Scores
- Step 3: Compare CEFI Scale Scores
- Step 4: Examine Item-Level Responses
- Step 5: Compare Results Across Raters
- Step 6: Compare Results Over Time

127

Step 4: Examine Item-Level Scores

Table C.1. CEFI (5–18 Years) Parent Form: Item-Level Classifications for 5–11-Year-Olds

Item	Scale Scores						T-Score
	1	2	3	4	5	6	
1. think before acting?	Below Average	Below Average	Average	Average	Above Average	Above Average	70
2. finish a boring task?	Below Average	Below Average	Average	Average	Above Average	Above Average	87
3. forget instructions?	Below Average	Below Average	Average	Average	Above Average	Above Average	90A
4. complete one task before starting a new one?	Below Average	Below Average	Average	Average	Above Average	Above Average	95G
5. ask for help when needed?	Below Average	Below Average	Average	Average	Above Average	Above Average	98A
6. come up with a new way to reach a goal?	Below Average	Below Average	Average	Average	Above Average	Above Average	99
7. remember how to do something?	Below Average	Below Average	Average	Average	Above Average	Above Average	99B
8. prepare for school or work?	Below Average	Below Average	Average	Average	Above Average	Above Average	99
9. control emotions when under stress?	Below Average	Below Average	Average	Average	Above Average	Above Average	99
10. work well in a noisy environment?	Below Average	Below Average	Average	Average	Above Average	Above Average	99
11. stay calm when handling small problems?	Below Average	Below Average	Average	Average	Above Average	Above Average	99
12. organize his/her thoughts well?	Below Average	Below Average	Average	Average	Above Average	Above Average	99
13. fix his/her mistakes?	Below Average	Below Average	Average	Average	Above Average	Above Average	99
14. solve problems creatively?	Below Average	Below Average	Average	Average	Above Average	Above Average	99

128

CEFI Interpretation

- Step 1: Examine Quality of the ratings: Consistency, Positive and Negative Impression
- Step 2: Interpret Scale Scores
- Step 3: Compare CEFI Scale Scores
- Step 4: Examine Item-Level Responses
- Step 5: Compare Results Across Raters
- Step 6: Compare Results Over Time

129

Step 5: Compare Results Across Raters

Table 4.5. Critical Values ($p < .10$) Denoting Statistically Significant Differences Between Raters

Scale	Parent to Parent		Teacher to Teacher		Parent to Teacher		Parent to Self-Report		Teacher to Self-Report	
	5-11 Years	12-18 Years	5-11 Years	12-18 Years	5-11 Years	12-18 Years	12-18 Years	12-18 Years	12-18 Years	12-18 Years
Full Scale	5	6	4	4	4	4	8	5		
Attention	10	10	7	7	9	9	13	11		
Emotion Regulation	13	12	10	10	11	11	15	14		
Flexibility	14	14	12	12	13	13	15	15		
Inhibitory Control	12	12	9	9	11	10	14	13		
Initiation	13	12	10	10	12	11	14	14		
Organization	12	10	10	9	11	10	12	12		
Planning	11	10	8	8	10	9	13	11		
Self-Monitoring	14	12	11	11	13	11	15	14		
Working Memory	13	12	9	9	11	11	11	13		

130

CEFI Interpretation

- Step 1: Examine Quality of the ratings: Consistency, Positive and Negative Impression
- Step 2: Interpret Scale Scores
- Step 3: Compare CEFI Scale Scores
- Step 4: Examine Item-Level Responses
- Step 5: Compare Results Across Raters
- Step 6: Compare Results Over Time

131

Step 6: Compare Results Over Time

- Determine if CEFI pre post scores differ significantly – but also if the post-test standard score is in the Average range or higher

Table 4.6. Critical Values Denoting Statistically Significant Change Over Time

Scale	Parent Form		Teacher Form		Self-Report Form	
	5-11 Years	12-18 Years	5-11 Years	12-18 Years	5-11 Years	12-18 Years
Full Scale	6	5	5	4	6	6
Attention	12	10	11	10	9	7
Emotion Regulation	15	13	14	12	11	10
Flexibility	17	14	16	14	14	12
Inhibitory Control	15	12	14	12	11	9
Initiation	15	13	14	12	12	10
Organization	14	12	12	10	11	9
Planning	13	11	12	10	10	8
Self-Monitoring	17	14	14	12	13	11
Working Memory	15	13	14	12	11	9

132

Validity of the CEFI Scales

- Factor analysis is a valuable tool to understand how items group.
- But we also need to know if the items have validity.
- Discriminating children with EF deficits from the regular population is important.
- Discriminating children with EF deficits from those who are not in the regular population and have other problems is very important.

133

Content Validity

Table 8.1 Sample Items for Each CEFI Component

Component	CEFI Definition	Example Item Content
Attention	Describes how well a child/youth can avoid distractions, concentrate on tasks, and sustain attention.	focus on one thing?
		pay attention for a long time?
Emotion Regulation	Indicates control and management of emotions, including staying calm when handling small problems and reacting with the right level of emotion.	stay calm when handling small problems?
		respond calmly to delays?
Flexibility	Reflects how well a child/youth adjusts his/her behavior to meet circumstances, including coming up with different ways to solve problems, having many ideas about how to do things, and being able to solve problems using different approaches.	come up with different ways to solve problems?
		have many ideas about how to do things?
Inhibitory Control	Describes the ability to control behavior or impulses, including thinking about consequences before acting, maintaining self-control, and keeping commitments.	think of the consequences before acting?
		maintain self-control?
Initiation	Indicates how a child/youth begins tasks or projects on his/her own, including starting tasks easily, being motivated, and taking the initiative when needed.	appear motivated?
		start tasks easily?

134

Content Validity

Table 8.1 Sample Items for Each CEFI Component

Component	CEFI Definition	Example Item Content
Organization	Reflects the ability to manage personal effects, work, or multiple tasks, including organizing tasks and thoughts well, managing time effectively, and working neatly.	organize tasks well?
		manage time effectively?
Planning	Describes how well a child/youth can develop and implement strategies to accomplish tasks, including planning ahead and making good decisions.	find a strategy that worked?
		plan ahead?
Self-Monitoring	Indicates the child's/youth's ability to evaluate his/her own behavior in order to determine when a different approach is necessary, including noticing and fixing mistakes, knowing when help is required, and understanding when a task is completed.	fix his/her/your mistakes?
		notice his/her/your mistakes?
Working Memory	Reflects how well a child/youth can keep information in mind that is important for knowing what to do and how to do it, including remembering important things, instructions, and steps.	remember many things at one time?
		remember important things?

135

US vs Canada

- Samples were matched on age, gender, race/ethnicity, and parental education levels

Table 8.13. Differences Between Canadian and U.S. Matched Samples: CEFI Full Scale

Form		Canadian	U.S.	d-ratio	F (df)	p
Parent	M	101.5	102.7	0.08	0.87 (1, 521)	0.351
	SD	15.5	15.6			
	N	263	263			
Teacher	M	98.3	100.5	0.16	1.75 (1, 272)	0.187
	SD	14.0	14.0			
	N	137	137			
Self-Report	M	102.0	101.4	-0.04	0.10 (1, 196)	0.750
	SD	15.4	14.9			
	N	101	101			

136

CEFI Consistency Between Raters

- Comparisons across parent, teacher, and self-report ratings show good correlations and good mean score consistency

Table 8.15. Correlations Between CEFI Forms: CEFI Full Scale

Comparison	Obtained r	Corrected r	N	Rater Type	M	SD	Rater Type	M	SD	d-ratio
Parent to Teacher	.719	.791	126	Parent	96.2	14.3	Teacher	97.2	12.6	-0.08
Parent to Self-Report	.669	.705	126	Parent	96.2	14.3	Self-Report	94.4	14.3	0.12
Teacher to Self-Report	.594	.679	126	Teacher	97.2	12.6	Self-Report	94.4	14.3	-0.21

Note. All is significant, $p < .001$.

137

CEFI Scores by Diagnosis

- We expected that individuals with ADHD, mood disorders, and Autism Spectrum Disorders might earn a low CEFI Full Scale score.
- We compared groups matched on gender, race/ethnicity, and parental education

Impairment in executive function is common in a number of internalizing and externalizing forms of psychopathology (Willcutt et al., 2005; see chapter 2, *Theory and Research*, for further discussion). For instance, research and theory has pointed to executive function deficits in Attention-Deficit/Hyperactivity Disorder (ADHD) and mood disorders (e.g., Woyan et al., in press), as well as Autism Spectrum Disorders (ASD; e.g., Gilbert, Bird, Brindley, Frith, & Burgess, 2008; Gidycz, Kaniwsky, Siran, Black, & Wagner, 2002; Happé, Booth, Charlton, & Hughes, 2006; Ozonoff, Pennington, & Rogers, 1991; Solomon, Ozonoff, Urru, Ravizza, Cummings, Ly, & Carter, 2009).

138

Group Differences: ADHD

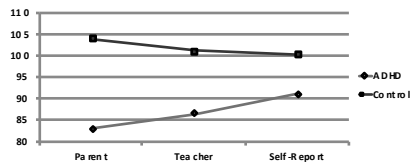


Table 8.19 Differences Between ADHD and Matched General Population Samples: CEPI Full Scale

Form	ADHD	Matched Gen. Pop.	d-ratio	F(df)	p
Parent	M	83.1	-1.59	216.56 (1, 340)	< .001
	SD	13.0			
	N	171			
Teacher	M	103.9	-1.07	79.93 (1, 278)	< .001
	SD	12.2			
	N	142			
Self-Report	M	103.9	-0.62	22.21 (1, 232)	< .001
	SD	14.7			
	N	117			

139

Group Differences: ASD

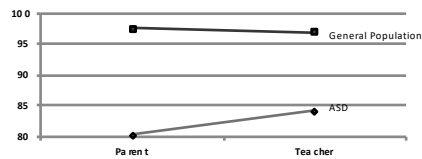


Table 8.20 Differences Between ASD and Matched General Population Samples: CEPI Full Scale

Form	ASD	Matched Gen. Pop.	d-ratio	F(df)	p
Parent	M	80.4	-1.41	48.96 (1, 96)	< .001
	SD	12.2			
	N	48			
Teacher	M	122.7	-0.99	23.11 (1, 92)	< .001
	SD	12.7			
	N	47			

140

Group Differences: Learning Disabilities

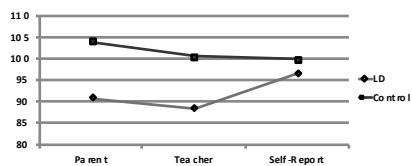


Table 8.22 Differences Between LD and Matched General Population Samples: CEPI Full Scale

Form	LD	Matched Gen. Pop.	d-ratio	F(df)	p
Parent	M	90.8	-0.92	19.89 (1, 93)	< .001
	SD	14.4			
	N	47			
Teacher	M	103.9	-0.91	37.29 (1, 178)	< .001
	SD	13.4			
	N	90			
Self-Report	M	103.9	-0.21	1.45 (1, 126)	0.231
	SD	15.9			
	N	64			

141

Group Differences: Mood Disorders

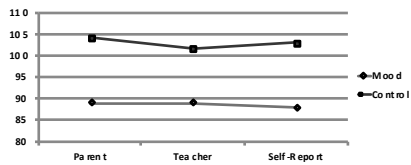


Table 8.21 Differences Between Mood Disorder and Matched General Population Samples: CEFI Full Scale

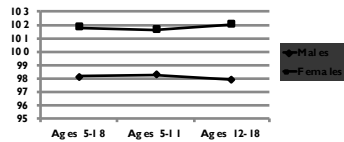
Form		Mood disorder	Matched gen. pop.	z-test	z (CI)	p
Parent	M	88.9	104.3	-1.11	22.66 (1.71)	< .001
	SD	13.8	13.8			
	N	36	37			
Teacher	M	88.9	101.7	-1.01	14.9 (1.57)	< .001
	SD	12.8	12.8			
	N	29	30			
Self-Report	M	88.0	103.1	-1.09	16.94 (1.53)	< .001
	SD	13.9	13.9			
	N	27	28			

142

CEFI Gender Differences: Parent Raters

Girls are Smarter than Boys!

Parents	N	Mn	SD	N	Mn	SD	ES
Ages 5-18	700	98.1	14.9	699	101.8	15.0	-0.25
Ages 5-11	350	98.2	14.3	349	101.6	15.6	-0.22
Ages 12-18	350	97.9	15.4	350	102.0	14.4	-0.28

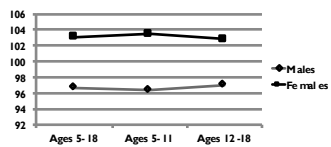


143

CEFI Gender Differences: Teacher Raters

• Girls are Smarter than Boys

Teachers	N	Mn	SD	N	Mn	SD	ES
Ages 5-18	700	96.7	14.4	700	103.2	15.0	-0.44
Ages 5-11	350	96.4	14.5	350	103.5	14.9	-0.49
Ages 12-18	350	97.0	14.4	350	102.9	15.0	-0.40



144

Gender Differences: Abilities Associated With EF

Journal of Educational Psychology
2001, Vol. 93, No. 2, 145–157

Copyright 2001 by the American Psychological Association, Inc.
0022-0665/01/\$12.00 DOI: 10.1037/0022-0665.93.2.145

Gender Differences in Planning, Attention, Simultaneous, and Successive (PASS) Cognitive Processes and Achievement

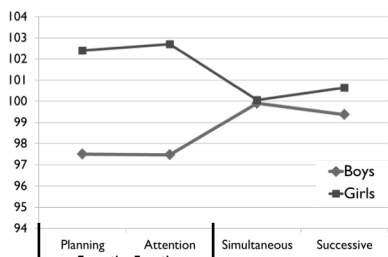
Jack A. Naglieri
George Mason University

Johannes Rojahn
Ohio State University

Gender differences in ability and achievement have been studied for some time and have been conceptualized along verbal, quantitative, and visual-spatial dimensions. Researchers recently have called for a theory-based approach to studying these differences. This study examined 1,100 boys and 1,100 girls who matched the U.S. population using the Planning, Attention, Simultaneous, Successive (PASS) cognitive-processing theory, built on the neuropsychological work of A. R. Luria (1973). Girls outperformed boys on the Planning and Attention scales of the Cognitive Assessment System by about 5 points ($d = .30$ and $.35$, respectively). Gender differences were also found for a subsample of 1,266 children on the Woodcock-Johnson Revised Tests of Achievement Profiling ($d = .33$), Letter-Word Identification ($d = .22$), and Dictation ($d = .22$). The results illustrate that the PASS theory offers a useful way to examine gender differences in cognitive performance.

145

Gender Differences: Abilities Associated With EF



146

Computer Scored Printout

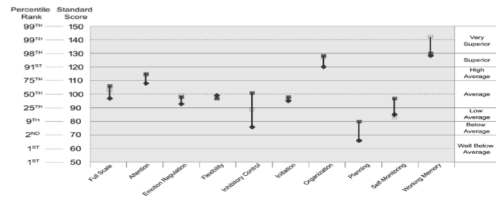
Classification: Well Below Average ≤ 69; Below Average = 70–79; Low Average = 80–89; Average = 90–109; High Average = 110–119; Superior = 120–129; Very Superior ≥ 130

Full Scale				
Score	P	F	SR	Significant Differences Between Raters
	(10/15/2012)	(10/15/2012)	(10/15/2012)	
Standard Score	108	97	103	
90% CI	103–109	95–99	99–107	P = T
Percentile Rank	80	67	78	SR > F
CEFI Scales				
Score	P	F	SR	Significant Differences Between Raters
	(10/15/2012)	(10/15/2012)	(10/15/2012)	
Attention	Standard Score	118	108	
	90% CI	108–120	103–112	No significant differences
	Percentile Rank	84	69	
Inhibition Control	Standard Score	88	83	
	90% CI	81–106	87–100	No significant differences
	Percentile Rank	46	37	
Flexibility	Standard Score	97	89	
	90% CI	89–109	87–108	No significant differences
	Percentile Rank	42	27	
Inhibitory Control	Standard Score	101	78	
	90% CI	90–108	72–85	P = T
	Percentile Rank	63	5	
Weaknesses				
SP Scale W				

147

Overview of Results Between Raters for John Hancock

John Hancock's ratings from different raters are provided in the graph below.

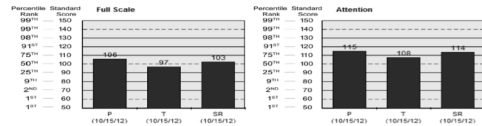


148

Scale-Level Scores and Significant Differences Between Raters

John Hancock's CEFI results from different raters are provided in the graphs that follow. Any statistically significant ($p < .05$) differences between raters' scores are noted below each graph. Note: P = Parent, T = Teacher, and SR = Self-Report.

Classification: Well Below Average ≤ 69 ; Below Average = 70-79; Low Average = 80-89; Average = 90-109; High Average = 110-119; Superior = 120-129; Very Superior ≥ 130 .



P significantly higher than T.
SR significantly higher than T.

No significant differences.

149

CEFI: WISC-IV, CAS, and WJ III

- Data from the Neurology, Learning and Behavior Center in Salt Lake City, UT
- Children given the CEFI, WISC-IV (N = 43), CAS (N = 62), and the WJIII achievement (N = 58) as part of a typical test battery.

150

CEFI, WISC-IV, CAS, Achievement

Table 8.26. Demographic Characteristics of the CAS, WISC-IV, and WJ III ACH Validity Samples

Demographic	Sample						
	CAS		WISC-IV		WJ III ACH		
	N	%	N	%	N	%	
Gender	Male	38	61.3	29	67.4	36	62.1
	Female	24	38.7	14	32.6	22	37.9
Race/Ethnic Group	Hispanic	1	1.6	3	7.0	1	1.7
	Asian	2	3.2	2	4.7	2	3.4
	White	53	88.7	38	88.4	52	89.7
	Other	4	6.5	2	4.7	3	5.2
Parental Education Level	High school diploma or less	1	1.6	9	20.5	1	1.7
	Some college or associate's degree	21	33.9	12	27.9	18	31.0
	Bachelor's degree or higher	36	58.1	26	60.5	34	58.7
	Missing information	4	6.5	5	11.6	5	8.6
Diagnostic or Educational Group	ADHD	24	38.7	15	34.9	30	51.5
	Anxiety	13	24.2	9	20.9	14	24.1
	ASD	7	11.3	5	11.6	7	12.1
	LD	3	4.8	3	7.0	3	5.2
	Mood	4	6.5	3	7.0	5	8.6
	Other	9	14.3	8	18.2	9	15.5
Total	62	100.0	43	100.0	58	100.0	
Age M (SD)	10.4 (2.2)		10.7 (2.0)		10.5 (2.7)		

Note. ADHD = Attention-Deficit/Hyperactivity Disorder; Anxiety = Anxiety Disorder; ASD = Autism Spectrum Disorder; LD = Learning Disorder; Mood = Mood Disorder.

CEFI, WISC-IV, CAS, Achievement

Table 8.27 CEFI Manual		Corrected <i>r</i>	<i>N</i>	CEFI Full Scale		CAS, WISC-IV, or WJ III ACH	
Other Measure				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
WISC-IV	Full Scale	.39*	41	93.1	12.0	95.5	18.1
	Working Memory	.30	42	93.0	11.9	92.6	17.5
	Verbal Comprehension	.44**	42	93.0	11.9	96.8	14.7
	Perceptual Reasoning	.27	42	93.0	11.9	101.5	17.5
	Processing Speed	.34*	42	93.0	11.9	90.7	19.4
CAS	Full Scale	.45**	60	91.4	13.2	95.8	17.1
	Attention	.37**	60	91.4	13.2	96.5	15.1
	Planning	.49**	60	91.4	13.2	92.4	14.5
	Simultaneous	.43**	60	91.4	13.2	101.6	17.0
	Successive	.37**	60	91.4	13.2	98.0	14.6
WJ III ACH	Total Achievement	.51**	40	93.4	12.1	96.6	16.8
	Broad Reading	.48**	54	91.9	12.4	98.1	14.2
	Broad Math	.49**	53	92.0	11.9	97.7	16.9
	Broad Written Language	.47**	41	93.5	12.3	94.9	16.8

CEFI & WISC-IV

Table H.25. Correlations Between the CEFI (5–18 Years) Teacher Form and the WISC-IV

CEFI	WISC-IV						CEFI	
	Full Scale	Working Memory	Verbal Comprehension	Perceptual Reasoning	Processing Speed			
	Obt. <i>r</i>	Cor. <i>r</i>	Obt. <i>r</i>	Cor. <i>r</i>	Obt. <i>r</i>	Cor. <i>r</i>	M	SD
Full Scale	.37*	.39**	.30	.35*	.25	.27	95.5	11.9
Attention	.38*	.39*	.36*	.40**	.25	.33*	92.6	11.2
Emotion Regulation	.17	.14	-.07	-.06	.24	.25	96.8	14.7
Flexibility	.32**	.35**	.40**	.46**	.35**	.40**	90.7	19.4
Inhibitory Control	.22	.21	.09	.08	.18	.20	101.5	17.5
Initiation	.30	.25	.24	.21	.31*	.31*	92.4	14.5
Organization	.16	.15	.15	.15	.17	.17	98.0	14.6
Planning	.42**	.46**	.34*	.38*	.42**	.44**	95.8	17.1
Self-Monitoring	.36*	.39*	.29	.33*	.35*	.37*	96.5	15.1
Working Memory	.41**	.38*	.38*	.36*	.39*	.33*	92.6	11.2
WISC-IV M	93.5	92.6	96.8	101.5	90.7			
WISC-IV SD	18.1	17.5	14.7	17.5	19.4			

Note. Pair-wise deletion of missing cases was used (N = 41–43); Obt. *r* = Obtained *r*; Cor. *r* = Corrected *r*.

CEFI & CAS

Table H.18. Correlations Between the CEFI (5–18 Years) Teacher Form and the CAS

	Full Scale		Attention		Planning		Simultaneous		Successive		CEFI	
	Obt. <i>r</i>	Cor. <i>r</i>	Obt. <i>r</i>	Cor. <i>r</i>	Obt. <i>r</i>	Cor. <i>r</i>	Obt. <i>r</i>	Cor. <i>r</i>	Obt. <i>r</i>	Cor. <i>r</i>	<i>M</i>	<i>SD</i>
Full Scale	.45**	.45**	.33*	.37**	.43**	.45**	.42**	.43**	.28*	.32*	91.4	13.2
Attention	.40**	.41**	.26*	.30*	.36**	.42**	.38**	.39**	.30*	.35**	90.3	12.8
Emotion Regulation	.28*	.24	.24	.24	.21	.22	.28*	.23	.12	.13	96.9	14.7
Flexibility	.52**	.53**	.35**	.40**	.47**	.54**	.50**	.51**	.37**	.42**	92.2	13.0
Inhibitory Control	.27*	.25*	.17	.18	.28*	.29*	.24	.23	.19	.21	96.0	13.9
Initiation	.40**	.39**	.33**	.30*	.38**	.39**	.38**	.31*	.21	.20	89.0	16.3
Organization	.29*	.27*	.19	.20	.33**	.35**	.23	.21	.23	.23	90.5	14.3
Planning	.47**	.48**	.31*	.37**	.46**	.54**	.44**	.46**	.31*	.35**	92.5	12.4
Self-Monitoring	.40**	.39**	.37**	.34**	.41**	.45**	.40**	.40**	.27*	.30*	91.2	12.4
Working Memory	.40**	.35*	.38**	.35**	.42**	.46**	.47**	.46**	.27*	.30*	91.0	14.0
CAS <i>M</i>	99.8		96.5		92.4		101.8		98.0			
CAS <i>SD</i>	17.1		15.1		14.5		17.0		14.6			

Note. Pair-wise deletion of missing cases was used ($N = 60-62$). Obt. *r* = Obtained *r*; Cor. *r* = Corrected *r*.

* $p < .05$; ** $p < .01$.

154

CEFI & WJ-III Total Achievement

Table H.26. Correlations Between the CEFI (5–18 Years) III ACH Total Achievement Cluster

	WJ III ACH Total Achievement		CEFI	
	Obt. <i>r</i>	Cor. <i>r</i>	<i>M</i>	<i>SD</i>
Full Scale	.47**	.51**	93.4	12.1
Attention	.51**	.58**	92.5	10.9
Emotion Regulation	.22	.18	96.5	16.1
Flexibility	.56**	.61**	94.0	11.9
Inhibitory Control	.24	.23	97.8	14.0
Initiation	.37*	.32*	91.5	15.6
Organization	.32*	.32*	92.5	13.5
Planning	.51**	.58**	94.1	11.3
Self-Monitoring	.46**	.53**	92.7	11.1
Working Memory	.57**	.63**	93.2	13.1
WJ III ACH <i>M</i>	96.6			
WJ III ACH <i>SD</i>	16.8			

Note. Pair-wise deletion of missing cases was used ($N = 40-41$). Obt. *r* =

155

CEFI & WJ-III Reading

Table H.27. Correlations Between the CEFI (5–18 Years) WJ ACH Broad Reading Cluster

	WJ III ACH Broad Reading		CEFI	
	Obt. <i>r</i>	Cor. <i>r</i>	<i>M</i>	<i>SD</i>
Full Scale	.39**	.48**	91.9	12.4
Attention	.41**	.52**	90.9	11.7
Emotion Regulation	.25	.27*	96.9	14.6
Flexibility	.43**	.50**	92.5	12.8
Inhibitory Control	.26	.27*	96.6	13.0
Initiation	.26	.26	89.1	16.1
Organization	.27*	.31*	91.0	13.9
Planning	.43**	.54**	92.8	11.5
Self-Monitoring	.40**	.51**	91.4	11.7
Working Memory	.43**	.54**	91.5	13.7
WJ III ACH <i>M</i>	98.1			
WJ III ACH <i>SD</i>	14.2			

Note. Pair-wise deletion of missing cases was used ($N = 54-55$). Obt. *r* =

156

CEFI & WI-III Broad Math

Table H.28. Correlations Between the CEFI (5–18 Years)

III ACH Broad Math Cluster

	WI-III ACH Broad Math		CEFI	
	Obt. <i>r</i>	Cor. <i>r</i>	<i>M</i>	<i>SD</i>
Full Scale	.44**	.57**	92.0	11.9
Attention	.40**	.50**	90.7	11.4
Emotion Regulation	.16	.31	96.7	14.8
Flexibility	.52**	.55**	93.0	12.1
Inhibitory Control	.15	.28	96.6	13.0
Initiation	.43**	.50**	89.9	15.1
Organization	.33*	.41*	90.8	13.4
Planning	.49**	.52**	93.1	10.8
Self-Monitoring	.40**	.50**	91.6	11.4
Working Memory	.59**	.60**	91.6	13.1
WI-III ACH <i>M</i>	97.7			
WI-III ACH <i>SD</i>	16.9			

Note. Pair-wise deletion of missing cases was used ($N = 53-54$); Obt. *r* =

157

CEFI & WI-III Written Language

Table H.29. Correlations Between the CEFI (5–18 Years)

III ACH Broad Written Language Cluster

	WI-III ACH Broad Written Language		CEFI	
	Obt. <i>r</i>	Cor. <i>r</i>	<i>M</i>	<i>SD</i>
Full Scale	.44**	.52**	93.5	12.3
Attention	.47**	.52**	92.5	10.9
Emotion Regulation	.20	.31	97.4	15.9
Flexibility	.50**	.54**	94.2	12.2
Inhibitory Control	.27	.26	98.1	13.8
Initiation	.33*	.28	91.6	15.6
Organization	.34*	.31*	92.0	13.8
Planning	.44**	.50**	94.4	11.5
Self-Monitoring	.44**	.50**	92.5	11.5
Working Memory	.47**	.57**	93.4	13.5
WI-III ACH <i>M</i>	94.9			
WI-III ACH <i>SD</i>	16.8			

Note. Pair-wise deletion of missing cases was used ($N = 41-42$); Obt. *r* =

158

CEFI Has an Extensive Section on Strategies

CEFI (5–18 Years) Teacher Interpretive Report for John Hancock

Admin Date: 10/15/2012

Intervention Strategies

This section provides intervention strategies for improving upon the weaknesses identified by Low Average to Well Below Average scores on the CEFI Scales. References for the sources of these strategies are provided at the end of the Intervention Strategies section. (See CEFI Items by Scale for a full list of items with below average scores for item-level indicators of specific weaknesses.)

Executive Function

Executive function is a dynamic system; its successful operation involves the inhibition and activation of various processes in an integrated effort to direct goal-oriented behavior. Additionally, executive function has a developmental trajectory. As the brain develops, executive function behaviors are acquired and progressively refined. Since executive function involves the integrated effort of multiple processes, a wide range of abilities or behaviors are implicated in its operation. Any single behavior or domain of behaviors can present as a symptom of a problem if the executive function system is impaired. As such, specific behaviors can be targeted through intervention strategies that will have a broad impact on executive function behaviors in general.

General Intervention Strategies

- Take a child's natural development into account when planning intervention strategies. Executive function behaviors require greater effort and are less accurate in early stages of development.
- Develop intervention strategies that initially incorporate external controls, prompts and cues to help the child learn and develop new abilities.
- Have strategies in place that gradually remove external controls to promote internalization of new behaviors. Encourage a child to self-prompt so that newly acquired skills become habit.

• Direct behavioral challenges in a specific manner that incorporate external controls to promote internalization.

159

Intervention Strategies for Inhibitory Control

Teaching a Child to Stop and Think

To encourage positive self-control, a student should be first directly taught to pay attention to and think about his or her behavior. Teachers can explicitly teach the student that when the phrase "Stop and think" is said, the student should think about what he or she is doing. The student then should be taught to ask him- or herself appropriate questions about actions, such as "What am I doing?" and "Is what I'm doing okay?" If the child is about to do something, the questions "What do I want to do?" and "Is what I want to do okay?" may be posed. Initially, these questions could be put on the student's desk or posted on the wall as a reminder.

The student may be given the following plan to follow to determine what is going on in a situation, think about what his or her options are, and choose the best one.

- Stop and think.
- Identify the situation.
- Ask, "What do I want to do?"
- Ask, "Is there a problem?"
- Ask, "What are possible solutions?"
- Consider the consequences to each solution.
- Choose the best solution.
- Evaluate the results.

Reigel, J. A., & Polking, E. B., *Helping Children Learn: Intervention Handbooks for Use at School and at Home*, Second Edition, 2010. Baltimore, Pa: Brookes Publishing Co., Inc. www.brookespublishing.com. Used with the permission of the publisher.

160

Comprehensive Executive Function Inventory (5–18 Years)
Teacher Feedback Report

Child's Name/ID:	John Hancock	Teacher's Name/ID:	Mr. Lincoln
Age:	6 years	Date of Assessment:	October 16, 2012
Gender:	Male	School:	DC
Birth Date:	October 15, 2006	Examiner:	
Grade:	1		

Note: This feedback report is intended to provide a record of scores obtained on the CEFI. It does not replace a detailed explanation of the scores by the examiner, identified at the top of this report. If you have any questions or concerns regarding the material herein, please speak to the examiner.

About the CEFI

The Comprehensive Executive Function Inventory (CEFI) is a rating scale that is used to measure Attention, Emotion Regulation, Flexibility, Inhibitory Control, Initiation, Organization, Planning, Self-Monitoring, and Working Memory. The CEFI gives an overall score and scores on nine separate scales.

What CEFI Scores Mean

This report provides standard scores that are based on ratings of children in the normative sample (that is, children who represent the general population). The scores are set so that 100 is Average, and equal to the 50th percentile rank. This means that when a child obtains a score of 100, he did as well as or better than 50 percent of children his age. The Average category includes scores that range from 90 (25th percentile) to 109 (75th percentile). Scores below 90 may suggest difficulties in specific areas. Scores above 109 may suggest strengths in specific areas.

161

A Case Study: Barry

- Barry is a 17-year-old, 11th grader with a long standing history of good academic, social and behavioral functioning.
- 5 years ago Barry's parents divorced; his mother remarried. His relationship with his mother is good but inconsistent with his father.
- Over the past year, he became increasingly depressed and socially isolated. School work has declined.
- This past fall he took a number of advanced placement classes, he was also a starter on his high school football team.
 - As the season ended his school work declined precipitously and a long standing relationship with a girlfriend ended.

162

Barry

- Barry's self-report: Revised Children's Manifest Anxiety Scale = 99th percentile.
- His self-report: Reynolds Adolescent Depression Scale = 96th percentile.
- His Millon profile was characteristic of a youth feeling vulnerable, anxious, misunderstood, unappreciated, angry, depressed and disconnected from others.

163

Barry

Full Scale							
Standard Score	90% Confidence Interval		Percentile Rank		Classification		
	68-73		2		Below Average		
CEPI Scales							
Scale	Standard Score	90% Confidence Interval	Percentile Rank	Classification	Difference from Youth's Average (T2.4)	Statistically Significant? (p < .10)	Executive Function Weakness
Attention	72	68-80	3	Below Average	-0.4	No	-
Emotion	78	73-88	7	Below Average	5.6	No	-
Flexibility	76	70-87	6	Below Average	2.6	No	-
Inhibitory Control	82	76-91	12	Low Average	9.6	Yes	-
Initiation	68	64-70	2	Well Below Average	-4.4	No	-
Organization	76	71-85	6	Below Average	3.6	No	-
Planning	62	58-71	1	Well Below Average	-10.4	Yes	Weakness
Self-Monitoring	62	58-74	1	Well Below Average	-10.4	Yes	Weakness
Working Memory	77	72-87	6	Below Average	4.6	No	-

164

Barry

Scores	
Consistency Index	Standard Score = 110 Inconsistent response style is not indicated.
Negative Impression Scale	Standard Score = 72 Negative Impression response style is indicated.
Positive Impression Scale	Standard Score = 128 Positive Impression response style is not indicated.
Number of Omitted Items	Number of Items Omitted = 0 None of the items were omitted.

165

Barry

CEFI Scales

Note: For the CEFI Scales, item scores that are substantially above the average are indicated by a lightly shaded cell (i.e.,), and those substantially below the average rating are in a darker cell (i.e.,).

Attention		Emotion Regulation	
Item	Score	Item	Score
10: finish a boring task?	3	10: control emotions when under stress?	1
11: work well in a noisy environment?	2	12: stay calm when handling small problems?	2
21: work well for a long time?	2	42: find it hard to control his/her emotions? (R)	1
26: concentrate while reading?	1	47: get upset when plans were changed? (R)	3
36: stay on topic when talking?	2	54: wait patiently?	3
44: pay attention for a long time?	2	58: become upset in new situations? (R)	3
50: concentrate?	2	78: respond calmly to things?	3
62: pay attention during a boring task?	1	79: react well to surprises?	2
78: get distracted? (R)	1	81: react with the right level of emotion?	1
80: pay attention to details?	1		
91: listen closely to instructions?	2		
97: focus on one thing?	0		

166

Barry

CEFI Scales

Note: For the CEFI Scales, item scores that are substantially above the average are indicated by a lightly shaded cell (i.e.,), and those substantially below the average rating are in a darker cell (i.e.,).

Attention		Emotion Regulation	
Item	Score	Item	Score
10: finish a boring task?	3	10: control emotions when under stress?	1
11: work well in a noisy environment?	2	12: stay calm when handling small problems?	2
21: work well for a long time?	2	42: find it hard to control his/her emotions? (R)	1
26: concentrate while reading?	1	47: get upset when plans were changed? (R)	3
36: stay on topic when talking?	2	54: wait patiently?	3
44: pay attention for a long time?	2	58: become upset in new situations? (R)	3
50: concentrate?	2	78: respond calmly to things?	3
62: pay attention during a boring task?	1	79: react well to surprises?	2
78: get distracted? (R)	1	81: react with the right level of emotion?	1
80: pay attention to details?	1		
91: listen closely to instructions?	2		
97: focus on one thing?	0		

167

Barry - Conclusions

- Barry's depression has a significant influence on what he does and how he performs on a daily basis
- Barry is intellectually capable (WAIS and CAS) and good in Planning and Attention on the CAS, but his behavior reflects poor application of those neurocognitive abilities

168

EF Interventions

Can strategic, instructional interventions provide remedial and compensatory support for children with EF deficits?

169

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.

170

My Granddaughter Hones Her EF Skills



171

My Granddaughter Hones Her EF Skills



172

Practice Pays Off!




173

Cognitive Instructional Methods



174

EF Instruction

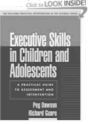


Promoting Executive Function in the Classroom (What Works for Special-Needs Learners) Paperback
Lynn M. Gutkin, Ph.D. (Author)
ISBN-10: 1418032300 | ISBN-13: 978-1418032300

List Price: \$35.00
Price: \$30.45 & this item ships for **FREE with Super Saver Shipping**. [Details](#)
You Save: \$4.55 (13%)

In Stock.
Ships from and sold by Amazon.com. Gift-wrap available.

Want it delivered Tuesday, November 20? Order it in the next 23 hours and 9 minutes, and choose **One-Day Shipping** at checkout. [Details](#)
Ordering for Christmas? To ensure delivery by December 24, choose **FREE Super Saver Shipping** at checkout. [Read more about holiday shipping.](#)




Executive Skills in Children and Adolescents: A Practical Guide to Assessment and Intervention (The Guilford Practical Intervention in Schools Series) Paperback
Fredson C. Achen, Richard G. L. Scott, Day (Author)
ISBN-10: 1418032300 | ISBN-13: 978-1418032300

List Price: \$35.00
Price: \$30.45 & this item ships for **FREE with Super Saver Shipping**. [Details](#)
You Save: \$4.55 (13%)

In Stock.
Ships from and sold by Amazon.com. Gift-wrap available.

Want it delivered Tuesday, November 20? Order it in the next 23 hours and 9 minutes, and choose **One-Day Shipping** at checkout. [Details](#)
Ordering for Christmas? To ensure delivery by December 24, choose **FREE Super Saver Shipping** at checkout. [Read more about holiday shipping.](#)




Raising a Thinking Child: Help Your Young Child to Resolve Everyday Conflicts and Get Along with Others (Paperback)
Patricia Storch (Author), Thomas D. Storch (Author)
ISBN-10: 1418032300 | ISBN-13: 978-1418032300

List Price: \$14.99
Price: \$10.11 & this item ships for **FREE with Super Saver Shipping** on orders over \$25. [Details](#)
You Save: \$4.88 (33%)

In Stock.
Ships from and sold by Amazon.com. Gift-wrap available.

Want it delivered Tuesday, November 20? Order it in the next 23 hours and 4 minutes, and choose **One-Day Shipping** at checkout. [Details](#)
Ordering for Christmas? To ensure delivery by December 24, choose **FREE Super Saver Shipping** at checkout. [Read more about holiday shipping.](#)

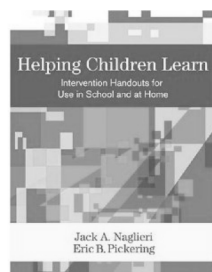
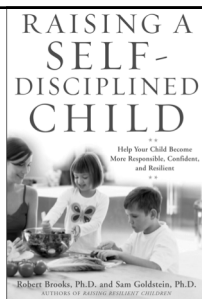


I Can Problem Solve: An Interpersonal Cognitive Problem-Solving Program : Intermediate Elementary Grades (Paperback)
Thomas D. Storch (Author)
ISBN-10: 1418032300 | ISBN-13: 978-1418032300

List Price: \$14.99
Price: \$10.11 & this item ships for **FREE with Super Saver Shipping**. [Details](#)
You Save: \$4.88 (33%)

In Stock.
Ships from and sold by Amazon.com. Gift-wrap available.

Want it delivered Tuesday, November 20? Order it in the next 23 hours and 4 minutes, and choose **One-Day Shipping** at checkout. [Details](#)
Ordering for Christmas? To ensure delivery by December 24, choose **FREE Super Saver Shipping** at checkout. [Read more about holiday shipping.](#)



Tools of the Mind



178

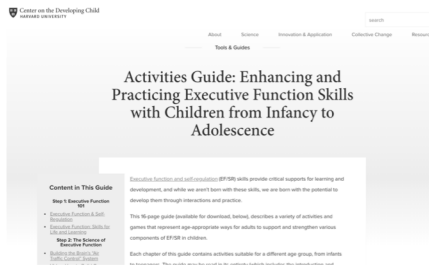
<http://www.hoagiesgifted.org/eric/e638.html>



<https://childmind.org/article/helping-kids-who-struggle-with-executive-functions/>



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



<https://www.understood.org/en/school-learning/partnering-with-childrens-school/instructional-strategies/at-a-glance-classroom-accommodations-for-executive-functioning-issues>



<http://nichcy.org/research/ee/learning-strategies>

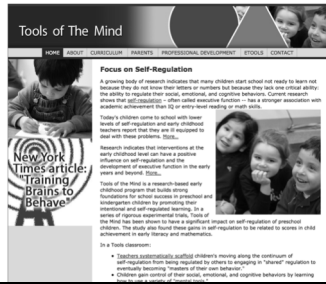


<http://www.ncl.org/at-school/especially-for-teachers/effective-teaching-practices/strategic-instruction-model-sim-how-to-teach-how-to-learn>



184

Tools of the Mind



185

<http://www.hoagiesgifted.org/eric/e638.html>



http://nichcy.org/research/ee/learning-strategies

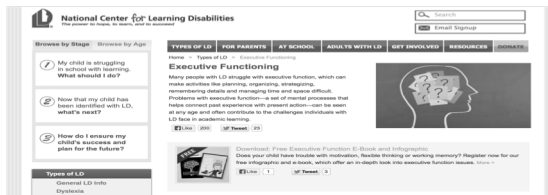


187

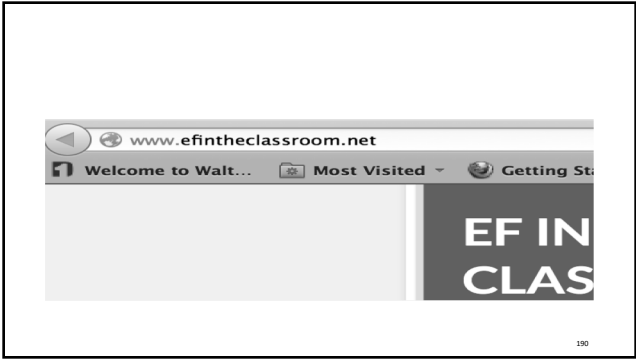
http://www.nclld.org/at-school/especially-for-teachers/effective-teaching-practices/strategic-instruction-model-sim-how-to-teach-how-to-learn

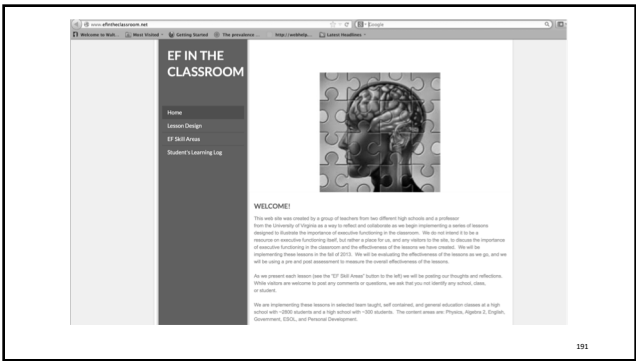


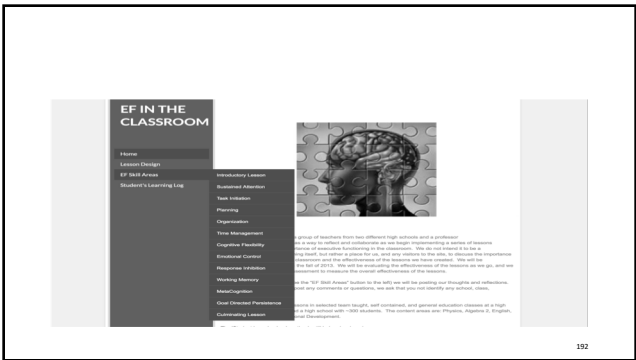
188

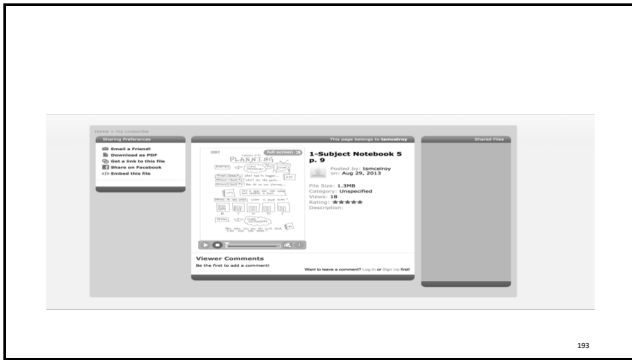


189



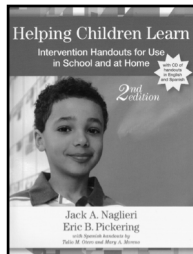






Teaching Children to use EF

- Helping Children Learn Intervention Handouts for Use in School and at Home, *Second Edition*
By Jack A. Naglieri, Ph.D., & Eric B. Pickering, Ph.D.,
- Spanish handouts by Tulio Otero, Ph.D., & Mary Moreno, Ph.D.



Four Ways to Think Smart!

Think smart
and use a plan!



Think smart and put
the pieces together!



Think smart and
look at the details!



Think smart and
follow the sequence!



Steps to Strategic Instruction:

- **Describe the strategy.** Students obtain an understanding of the strategy and its purpose-why it is important, when it can be used, and how to use it.
- **Model its use.** The teacher models the strategy, explaining to the students how to perform it.
- **Provide ample assisted practice time.** The teacher monitors, provides cues, and gives feedback. Practice results in automaticity so the student doesn't have to "think" about using the strategy.
- **Promote student self-monitoring and evaluation of personal strategy use.** Students will likely use the strategy if they see how it works for them; it will become part of their learning schema.
- **Encourage continued use and generalization of the strategy.** Students are encouraged to try the strategy in other learning situations.

196

Benefits of Strategy Instruction

- Students trust their minds
- Students know there is more than one right way to do things
- They acknowledge their mistakes and try to rectify them
- They evaluate their products and behavior
- Memories are enhanced
- Learning increases
- Self-esteem increases
- Students feel a sense of power
- Students become more responsible
- Work completion and accuracy improve
- Students develop and use a personal study process
- They know how to "try"
- On-task time increases: students are more "engaged"

197

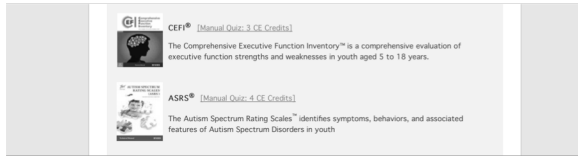
Conclusions

- The concept of EF is evolving.
- Data from the CEFI Standardization indicate that when measured using observable behaviors the term Executive Function is supported.
- The CEFI provides a well normed measure of EF that has demonstrated reliability & validity.
- There is emerging evidence that children can be taught to be more strategic – an important indication of good EF behavior and outcome.



198

Continuing Education

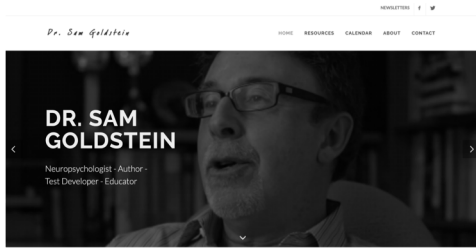


CEFR® [Manual Quiz: 3 CE Credits]
The Comprehensive Executive Function Inventory™ is a comprehensive evaluation of executive function strengths and weaknesses in youth aged 5 to 18 years.

ASRS® [Manual Quiz: 4 CE Credits]
The Autism Spectrum Rating Scales™ identifies symptoms, behaviors, and associated features of Autism Spectrum Disorders in youth.

199

www.samgoldstein.com



Dr. Sam Goldstein

HOME RESOURCES CALENDAR ABOUT CONTACT

DR. SAM GOLDSTEIN
Neuropsychologist - Author -
Test Developer - Educator

Questions?



 www.samgoldstein.com

 info@samgoldstein.com

 [@drsamgoldstein](https://twitter.com/drsamgoldstein)

 [@doctorsamgoldstein](https://facebook.com/doctorsamgoldstein)

TEDx: <https://www.youtube.com/watch?v=isfw8JJ-eWM>
