**Assessment of Executive Function Impairments in ADHD:**

The Brown ADD Scales

Thomas E. Brown, PhD
Department of Psychiatry
Yale Medical School

**Shifts in Conceptualizing ADHD**

- 1968 Hyperkinetic Disorder of childhood
- 1980 Attention Deficit Disorder
  - With or without hyperactivity
  - Residual type recognized
- 1987 ADHD (only combined symptoms)
- 1994 AD/HD–3 types
- 2000 AD/HD (impaired executive function)

**2 ADHD Symptom Sets**

- Hyperactive-impulsive symptoms: impaired ability to inhibit
- “Inattention” symptoms: impairments in multiple cognitive functions
- Symptoms of “inattention” usually most persistent and most problematic

**ADHD Symptoms Overlap With “Executive Functions” (EF)**

- Wide range of central control processes of the brain
- Connect, prioritize, and integrate cognitive functions—moment by moment
- Like conductor of a symphony orchestra

**Characteristics of ADHD Symptoms**

- Dimensional, not “all-or-nothing”
  - Everyone sometimes has some impairments in these functions; in ADHD: chronic, severe impairment
- Situational variability: “If I’m interested”
  - Most persons with ADHD have a few activities where ADHD impairments are absent

**Executive Functions Often Impaired in ADHD**

- Organizing, prioritizing, and activating to work
- Focusing, sustaining focus, and shifting focus to tasks
- Regulating alertness, sustaining effort, and processing speed
- Managing frustration and motivating emotions
- Utilizing working memory and accessing recall
- Monitoring and self-regulating action

ADHD looks like willpower problem, but it isn’t!
1. Organize, Prioritize, and Activate
- Difficulty organizing tasks, materials
- Difficulty estimating time, prioritizing tasks
- Trouble getting started on work

2. Focus, Shift, and Sustain Attention
- Loses focus when trying to listen or plan
- Easily distracted—internal/external
- Forgets what was read, needs to re-read

3. Regulating Alertness, Effort, and Processing Speed
- Difficulty regulating sleep and alertness
- Quickly loses interest in task, especially longer projects; doesn’t sustain effort
- Difficult to complete task on time, especially in writing—“slow modem”

4. Manage Frustration, Modulate Emotion
- Emotions impact thoughts, actions too much
- Frustration, irritations, hurts, desires, worries, etc., experienced “like computer virus”
- “Can’t put it to the back of my mind”

5. Utilize Working Memory, Access Recall
- Difficulty holding one or several things “on line” while attending to other tasks
- Difficulty “remembering to remember”
- Inadequate “search engine” for activating stored memories, integrating these with current info to guide current thoughts and actions

6. Monitor and Self-Regulate Action
- Difficulty controlling actions, slowing self and/or speeding up as needed for tasks
- Doesn’t size up ongoing situations carefully
- Hard to monitor and modify own actions to fit situation/aims
EF Development and Demands

- EF capacity develops through childhood, into adolescence and beyond; it is not fully present in early childhood.
- Environmental demands for EF increase with age, from preschool through adulthood.
- EF impairments often are not noticeable by age 7.

When Are ADHD Impairments Noticeable?

- Some are obvious very early and are noticeable in preschool years.
- Some are not noticeable until middle elementary or junior high.
- Some are not apparent until child leaves home to go to college or later.

How Can ADHD Be Assessed?

- When ADHD was seen as just a disruptive behavior disorder in childhood, diagnosis was based on observing overt behavior.
- EF impairments of ADHD are largely cognitive, covert, and not easily observed.
- EF are complex, interactive, and not easily isolated for capture in laboratory measures.

Problems in Assessment of Executive Functions

- EF modulate and control other functions.
- Single function = pooled outcome of multiple sub-functions.
- EF are reciprocally dependent.
- Complex, everyday tasks are more sensitive diagnostic indicators.

Ask the Patients!

- Because EF impairments of ADHD are so complex and largely covert.
  - Assessment of impairment requires extensive self-report data from patient & family about relevant history, especially complex everyday tasks.
  - Compare these data with profiles of ADHD, normal development and other disorders.

Query Functioning for Tasks

- Not intrinsically interesting
- Useful and/or necessary
- Complex, self-managed
  - Organizing homework
  - Cleaning house
  - Driving in traffic
  - Utilizing feedback
  - Managing money
  - Explaining clearly
  - Allocating time
  - Completing chores
  - Interacting mutually
  - Sequencing tasks
  - Reading for comprehension (not self-chosen)
Comparisons of WISC/WAIS-III Index Scores to Assess ADHD

Index Scores [VCI, POI] less sensitive to problems in attention, memory, processing speed

VS

Index Scores [WMI, (FDI), PSI] more sensitive to these problems

WISC-III Index Discrepancies VCI/POI v. FDI/PSI

Children 8-12 years

Comparison of CMS Story Memory vs VIQ

Children 8-12 years

VIQ - Story Memory in ADHD & Normals by age groups

ADHD Is a Complex Disorder Often Complicated by Comorbidity

♦ In 50-70% of cases, ADHD is further complicated by one or more additional psychiatric or learning disorders

♦ Not only is it possible to have another disorder with ADHD, it is 2 to 5 times more likely in lifetime than for those without ADHD

Other Psychiatric Disorders Often Accompany ADHD

70% of children with ADHD had at least one psychiatric disorder in addition to ADHD.

(MTA, 1999)
**Other Disorders Often Found w/ADHD**

- Specific Learning Disorders (Reading, Math, Written Exp., Speech/Lang)
- Substance Use Disorders
- Dysthymia, Major Depressive Disorder
- Obsessive-Compulsive Disorder
- Developmental Coordination Disorder
- Central Auditory Processing Disorder
- Tourette's Disorder
- Asperger's Disorder

(Pilczka, Carlson & Swanson, 1999; Brown, 2000)

**LD in ADHD Children**

- **Clinical Sample of ADHD Children:**
  - Reading LD 27%
  - Math LD 31%
  - Written Expression LD 65%
  - One or more LD 70%

(Mayes, Calhoun, Crowell, 2000)

- **Epidemiological Sample:**
  - CDC National Health Interview Study:
    - 50% of children ADHD-diagnosed children are also identified as having LD

(CDC, 2002)

**How Is ADHD Related to Comorbid Disorders?**

- ADHD: developmental impairment of executive functions that organize and regulate many specific functions of mind cf: impaired orchestra conductor

- Comorbidity: ADHD with 1 or more specific mental functions also impaired cf: orchestra player(s) + conductor impaired

**Assessment for ADHD**

- Clinical interview with patient (conjoint)
- ADHD Rating Scale (multiple reporters)
- DSM-IV Diagnostic Criteria (multi-rater)
- Comparisons of IQ Index Scores
- Story Memory Test vs Verbal IQ
- Screening for comorbid disorders
- Integration and weighting of relevant data

**Key Points**

- ADHD is a complex cognitive disorder affecting all age groups, both genders
- ADHD = developmental impairment of EF
- Dimensional; Chronic, but not constant
- Not easily assessed by observation
- Usually complicated by other disorders
- Often responsive to medication treatments