

Assessment of Executive Function Impairments in ADHD:

The Brown ADD Scales

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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)

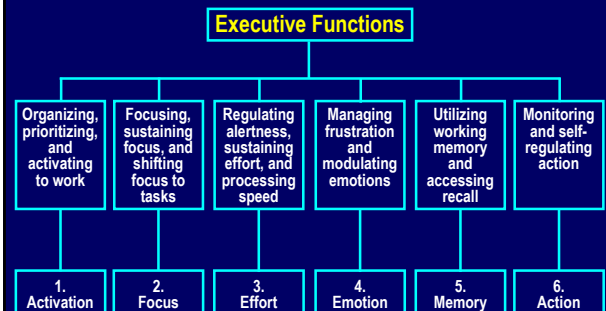
- ◆ Wide range of central control processes of the brain
- ◆ Connect, prioritize, and integrate cognitive functions—moment by moment
- ◆ Like conductor of a symphony orchestra

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

ADHD looks like willpower problem, but it isn't!

Executive Functions Often Impaired in ADHD



Brown TE. *Manual for Attention Deficit Disorder Scales for Children and Adolescents*; 2001.

1. Organize, Prioritize, and Activate

- ◆ Difficulty organizing tasks, materials
- ◆ Difficulty estimating time, prioritizing tasks
- ◆ Trouble getting started on work

Brown TE. *Attention-Deficit Disorders and Comorbidities in Children, Adolescents, and Adults*; 2000. Brown TE. *Manual for Attention Deficit Disorder Scales for Children and Adolescents*; 2001.

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

Brown TE. *Attention-Deficit Disorders and Comorbidities in Children, Adolescents, and Adults*; 2000. Brown TE. *Manual for Attention Deficit Disorder Scales for Children and Adolescents*; 2001.

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"

Brown TE. *Attention-Deficit Disorders and Comorbidities in Children, Adolescents, and Adults*; 2000. Brown TE. *Manual for Attention Deficit Disorder Scales for Children and Adolescents*; 2001.

4. Manage Frustration, Modulate Emotion

(Not included in DSM-IV criteria)

- ◆ 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"

Brown TE. *Attention-Deficit Disorders and Comorbidities in Children, Adolescents, and Adults*; 2000. Brown TE. *Manual for Attention Deficit Disorder Scales for Children and Adolescents*; 2001.

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

Brown TE. *Attention-Deficit Disorders and Comorbidities in Children, Adolescents, and Adults*; 2000. Brown TE. *Manual for Attention Deficit Disorder Scales for Children and Adolescents*; 2001.

6. Monitor and Self-Regulate Action

(Not just hyperactive/impulsive behavior)

- ◆ 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

Brown TE. *Attention-Deficit Disorders and Comorbidities in Children, Adolescents, and Adults*; 2000. Brown TE. *Manual for Attention Deficit Disorder Scales for Children and Adolescents*; 2001.

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) | |

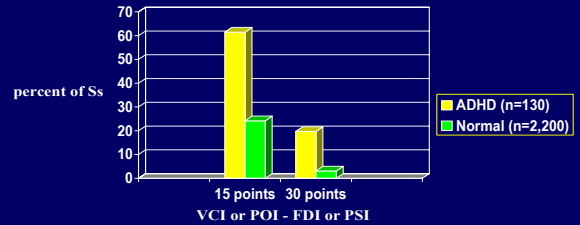
Comparisons of WISC/ WAIS-III Index Scores to Assess ADHD

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

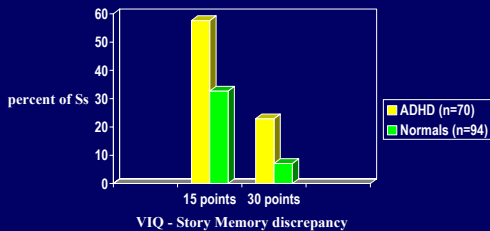
VS

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

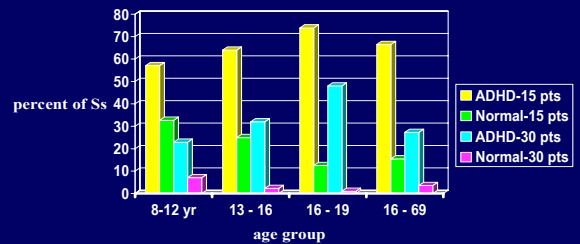
WISC-III Index Discrepancies VCI/POI v. FDI/PSI Children 8-12 years



Comparison of CMS Story Memory vs VIQ Children 8-12 years



VIQ - Story Memory in ADHD & Normals by age groups

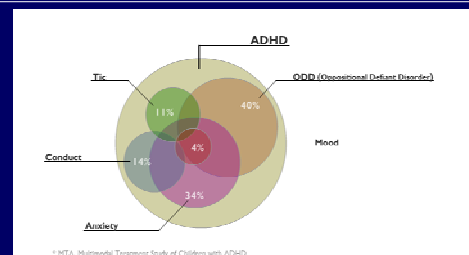


ADHD Is a Complex Disorder Often Complicated by Comorbidity

- ◆ 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

Pliszka SR, et al. *ADHD with Comorbid Disorders*; 1999. Brown TE. *Attention-Deficit Disorders and Comorbidities in Children, Adolescents, and Adults*; 2000.

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
(Pliczka, 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