ADHD and Executive Function: An Evolving Concept

page 199 in syllabus

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Individual Disclosure Statement

Faculty Author / Presenter

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Consultant/Advisor: Janssen-Ortho, Lundbeck, Novartis, Otsuka, Shire, Sunovion, Teva
Learning Objectives

• Understand conceptual definitions of executive function (EF)

• Understand the correlation of functionality to EF symptoms vs. EF testing

• Understand the limitations of neuropsychological testing defining EF

• Understand the response of EF to stimulant medications
Case Report

- Tom is a 37-year-old MWM who was diagnosed with ADHD-inattentive type at age 19 while in college.
- Having stopped his ADHD medication "years ago," he now seeks treatment because of declining work performance since his promotion 7 months ago.
- He complains of inattention in meetings and difficulty finishing paperwork; he states that "things are falling through the cracks" and that his "boss is getting annoyed."
Case Report Pretest Question 1

At this point, you recommend:

A. Discuss the stressors of work demands
B. Refer for neuropsychological testing since he's "been OK" for years
C. Start on ADHD medication
D. Have the patient complete an Adult Self-Report ADHD Symptom Checklist
Case Report

- He completes the Adult Self-Report ADHD Scale (ASRS) (18 items) for baseline symptoms.
- You start him on a long-acting stimulant, see him over 2 months, and titrate the dose to reduce symptoms.
- He states that his focus, sustained attention, and distractibility are much better.
- But he complains that he still can't get organized and that it takes him longer to complete tasks than it should.
At this point, you recommend:

A. Increase ADHD medication dose since symptoms are not optimally controlled
B. Neuropsychological testing to clarify the deficits
C. Start skill based therapy for organizational techniques
D. Pursue workplace accommodations
Case Report Question

If you ordered neuropsychological testing, you received a report that says, "Patient has some inattention and distractibility, but deficits in organization, task shifting, and prioritizing were substantially compromised."

Do you:

A. Ask if the testing was done on or off medication
B. Increase medication to improve residual ADHD symptoms
C. Start organizational skill therapy
D. Apply for workplace accommodations
"The executive system is responsible for the simultaneous operation of a number of cognitive processes in charge of goal-directed, task-oriented behaviors; self-regulation; and behavior inhibition as well as planning, working memory, mental flexibility, response inhibition, impulse control, and monitoring of action."

Executive Function (by Factor Analysis)

- Response inhibition
- Working memory
- Set shifting
- Interference control

Executive Dysfunction: ADHD vs. General Population

Defined by neuropsychological testing

Defining Executive Function

• Behavioral rating scales
  – Self, observer, clinician
  – ADHD scales, EF scales, impairment scales
• Neuropsychological testing
  – Which tests?
  – Ecological validity concept
• Neuroimaging/functional connectivity
• Genetics

Operationalized definition determines the construct. Construct relationships may not align.
Diagnostic Overlap

Neuropsychological Diagnoses

 Intelligence

ADHD

Executive Function

Learning Disabilities

Symptom Diagnosis
ADHD, Learning Disabilities (LDs), and Executive Function in Males

• 148 males diagnosed with DSM-III-R ADHD
  - With LD (N=69)
  - Without LD (N=79)
  - 127 non-ADHD, non-LD male controls of similar age (range 9–22)

• Children who had ADHD+LD were significantly more impaired on both executive and non-executive functions than ADHD children without LD

ADHD, Learning Disabilities (LDs), and Executive Function in Females

- Assess neuropsychological performance in girls with ADHD and evaluate the role of comorbid learning disabilities
- 140 girls with ADHD and 122 girls without ADHD (ages 6-17 years)
- Neuropsychological deficits were most pronounced in girls with both ADHD+LD and in those without medications

EF Associated With Other Disorders

ADHD 30-50% with EF
Bipolar Disorder
Schizophrenia
Major Depression
GAD
General Population 5-10% with EF

Autism
Learning Disorders
Chronic SUD
Neurological Disorders
TBI, MCI, CVA, CNS tumors, Degenerative

Genetic Disorder
Klinefelter's (47, XXY)
## Heterogeneity of ADHD

<table>
<thead>
<tr>
<th>Neural Networks</th>
<th>ADHD symptoms</th>
<th>Inattention</th>
<th>Executive Function</th>
<th>Impulsivity</th>
<th>Hyperactivity</th>
</tr>
</thead>
</table>

**Metric**: (Behavioral scales and/or neuropsychological testing)

- Treatment
- Biomarkers

**Metric**: (i.e., Neuroimaging)

- Treatment
- Biomarkers

**Metric**: (Functional scales and/or quality of life scales)

- Treatment
- Biomarkers

David W. Goodman, M.D.
Neurocircuitry

• Executive Function
  – Prefrontal (dorsolateral and lateral orbital) regions
• Regulation of affect
  – Orbitofrontal and ventromedial regions
• Attention and inhibitory control
  – Frontostriatal structures (ventrolateral prefrontal cortex, dorsal anterior cingulate cortex, caudate, and putamen)

Executive Function Impact Beyond ADHD
## EF Impact Beyond ADHD

### TABLE 5. Academic Functioning in Comparison Subjects and in Adults With Attention Deficit Hyperactivity Disorder (ADHD), Stratified by Deficits of Executive Functioning

<table>
<thead>
<tr>
<th>Variable</th>
<th>Comparison Subjects (N=122)</th>
<th>Comparison Subjects With Deficits of Executive Functioning (N=23)</th>
<th>Subjects With ADHD and Deficits of Executive Functioning (N=66)</th>
<th>Analysis</th>
<th>Odds Ratio of Deficits of Executive Functioning in Subjects With ADHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra help&lt;sup&gt;a&lt;/sup&gt;</td>
<td>19%</td>
<td>35%</td>
<td>42%</td>
<td>p &lt;0.001</td>
<td>2.8**</td>
</tr>
<tr>
<td>Special class&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1%</td>
<td>2%</td>
<td>11%</td>
<td>p 0.001</td>
<td>2.6*</td>
</tr>
<tr>
<td>Repeated grade&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2%</td>
<td>22%</td>
<td>17%</td>
<td>p &lt;0.001</td>
<td>2.3*</td>
</tr>
<tr>
<td>Learning disability&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6%</td>
<td>22%</td>
<td>16%</td>
<td>p 0.002</td>
<td>2.0 (n.s.)</td>
</tr>
</tbody>
</table>

### EF Impact Beyond ADHD

**TABLE 4. Socioeconomic Status and Functional Impairments in Comparison Subjects and in Adults With Attention Deficit Hyperactivity Disorder (ADHD), Stratified by Deficits of Executive Functioning**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Comparison Subjects (N=122)</th>
<th>Comparison Subjects With Deficits of Executive Functioning (N=23)</th>
<th>Subjects With ADHD (N=147)</th>
<th>Subjects With ADHD and Deficits of Executive Functioning (N=66)</th>
<th>Analysis</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.7</td>
<td>1.8</td>
<td>2.0&lt;sup&gt;*&lt;/sup&gt;</td>
<td>2.41&lt;sup&gt;**<em>2,3,</em>&lt;/sup&gt;</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Education&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.2</td>
<td>5.61&lt;sup&gt;***&lt;/sup&gt;</td>
<td>5.61&lt;sup&gt;***&lt;/sup&gt;</td>
<td>5.11&lt;sup&gt;<em><strong>3,</strong></em>&lt;/sup&gt;</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Occupation&lt;sup&gt;a&lt;/sup&gt;</td>
<td>6.8</td>
<td>6.6</td>
<td>6.01&lt;sup&gt;**&lt;/sup&gt;</td>
<td>5.31&lt;sup&gt;**<em>2,3,</em>&lt;/sup&gt;</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Traffic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tickets&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.5</td>
<td>2.8</td>
<td>3.51&lt;sup&gt;***&lt;/sup&gt;</td>
<td>4.01&lt;sup&gt;**<em>2,</em>&lt;/sup&gt;</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Accidents&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.0</td>
<td>2.9</td>
<td>3.3&lt;sup&gt;***&lt;/sup&gt;</td>
<td>3.91&lt;sup&gt;**<em>2,</em>&lt;/sup&gt;</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Legal</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>p</td>
<td></td>
</tr>
<tr>
<td>Ever arrested&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8</td>
<td>2</td>
<td>431&lt;sup&gt;***&lt;/sup&gt;</td>
<td>201&lt;sup&gt;**<em>2,</em>&lt;/sup&gt;</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Ever convicted</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>&lt;0.06&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Ever imprisoned</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>2</td>
<td>0.18&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Versus comparison subjects<sub>1</sub>; versus comparison subjects with deficits of executive functioning<sub>2</sub>; versus subjects with ADHD<sub>3</sub>.

<sup>b</sup> Exact logistic regression.

<sup>*</sup>p≤0.05. <sup>**</sup>p≤0.01. <sup>***</sup>p≤0.001.
EF Predicts Negative Outcomes

- Childhood EF significantly predicted outcomes in academic achievement and employment status.
- ADHD/low digit span in childhood had lower follow-up reading scores than ADHD/high digit span (not found in controls).
- ADHD/worse ROCF in childhood was associated with suspensions/expulsions.
- Working memory and ROCF were the strongest predictors for young adult outcomes.

ROCF: Rey-Osterrieth Complex Figure
Defining Executive Function

• Behavioral rating scales
  – Self, observer, clinician
  – ADHD scales, EF scales, impairment scales

• Neuropsychological testing
  – Which tests?
  – Ecological validity concept

• Neuroimaging

• Genetics
Executive Function Rating Scales

- Behavior Rating Inventory of Executive Function (BRIEF)\(^1\)
- Behavioral Assessment of the Dysexecutive Syndrome (BADS)\(^2\)
  - 6 subtests, score out of 4
- Dysexecutive Questionnaire (DEX)\(^2\)
  - 20 items on everyday executive problems
- Barkley Deficits in Executive Functioning Scale (BDEFS)\(^3\)
  - 88 items in 5 dimensions of EF

## Neuropsychological Tests for Executive Function

<table>
<thead>
<tr>
<th>Task Name</th>
<th>EF Construct Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop signal reaction time</td>
<td>Response inhibition</td>
</tr>
<tr>
<td>Continuous Performance Test commission errors</td>
<td>Response inhibition</td>
</tr>
<tr>
<td>Continuous Performance Test omission errors</td>
<td>Vigilance</td>
</tr>
<tr>
<td>Wisconsin Card Sorting Test</td>
<td>Set shifting</td>
</tr>
<tr>
<td>Trail Making Test Part B</td>
<td>Set shifting</td>
</tr>
<tr>
<td>Tower of Hanoi/London</td>
<td>Planning</td>
</tr>
<tr>
<td>Porteus Maze</td>
<td>Planning</td>
</tr>
<tr>
<td>Rey-Osterrieth Complex Figure Test</td>
<td>Planning/organization</td>
</tr>
<tr>
<td>Working Memory Sentence Span</td>
<td>Verbal working memory</td>
</tr>
<tr>
<td>Digits Backward</td>
<td>Verbal working memory</td>
</tr>
<tr>
<td>Self-Ordered Pointing</td>
<td>Spatial working memory</td>
</tr>
<tr>
<td>CANTAB Spatial Working Memory</td>
<td>Spatial working memory</td>
</tr>
</tbody>
</table>

Psychometric Approach to Assessing EF Relies on Testing Cold Cognition

**EF Constructs Typically Assessed by Tests**

- **Inhibition and Interference Tasks**
  - CPT, Go/No-Go, Stop Signal, Stroop Color and Word Test

- **Working Memory Tasks (Verbal and Nonverbal)**
  - Digit span, mental arithmetic, n-back, spatial memory, sequence memory, Simon game, Kaufman Hand Movements Test

- **Fluency Tasks**
  - F-A-S Test, Five-Point Test, ideational fluency

- **Planning and Problem Solving Tasks**
  - Tower of London, Tower of Hanoi, Wisconsin Card Sorting Task

Slide courtesy of Russell Barkley, PhD
# EF Effect on Neuropsychological Measures

## Table 1. Measures of Executive Function in Adults With and Without Attention Deficit Hyperactivity Disorder (ADHD), Stratified by Deficits of Executive Functioning

<table>
<thead>
<tr>
<th>Measure</th>
<th>Comparison Subjects (N=122)</th>
<th>Comparison Subjects With Deficits of Executive Functioning (N=23)</th>
<th>Subjects With ADHD (N=147)</th>
<th>Subjects With ADHD and Deficits of Executive Functioning (N=66)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroop Color-Word Test</td>
<td>Mean 47.5</td>
<td>Mean 37.1</td>
<td>Mean 42.5</td>
<td>Mean 34.9</td>
</tr>
<tr>
<td>Wisconsin Card Sorting Test: preservative errors</td>
<td>8.9</td>
<td>21.7</td>
<td>10.4</td>
<td>23.3</td>
</tr>
<tr>
<td>Wisconsin Card Sorting Test: failure to maintain set</td>
<td>0.5</td>
<td>1.0</td>
<td>0.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Rey-Osterrieth Complex delay organization</td>
<td>9.5</td>
<td>5.0</td>
<td>8.6</td>
<td>5.8</td>
</tr>
<tr>
<td>Rey-Osterrieth copy organization</td>
<td>10.7</td>
<td>7.1</td>
<td>10.3</td>
<td>7.2</td>
</tr>
<tr>
<td>Auditory Continuance Performance Test mistakes</td>
<td>16.8</td>
<td>30.0</td>
<td>19.5</td>
<td>33.7</td>
</tr>
<tr>
<td>California Verbal Learning Test: words learned</td>
<td>59.0</td>
<td>48.1</td>
<td>55.6</td>
<td>47.5</td>
</tr>
<tr>
<td>Estimated freedom from distractability⁴</td>
<td>112.6</td>
<td>96.7</td>
<td>109.1</td>
<td>96.8</td>
</tr>
</tbody>
</table>

⁴ Index estimated using linear combination of oral arithmetic and digit span subtests.
EF in Low and High Neuropsychological Functioning ADHD

Figure 2. Mean (± SEM) percentage of correct, omitted, and incorrect responses on the inhibitory control and working memory computerized subtests of the Test of Attentional Performance battery.

Note: The groups differed significantly on the three measures of performance on the working memory subtest (asterisks).
CTR = control; HI-ADHD = high-functioning neuropsychological profile; LO-ADHD = low-functioning neuropsychological profile.
The task consists of recreating the scenario of a job interview at a hotel. The examiner instructs the participant as follows: "In this task, you are asked to imagine that you are working in a hotel. Your manager is keen for you to try each of these 5 everyday activities during the next 15 min so that you can get a "feel" for the tasks and make an informed estimate of how long each task would take to complete. Your main goal is to attempt to do each of these 5 tasks over the next 15 min. Each of the tasks may take longer than 15 min to complete on its own, so there is no way that you will be able to complete all of them. The most important thing is to try to do a little of each task, spending as much time on each as possible within the total time available."

Note: Hi-ADHD = high-functioning neuropsychological profile; Lo-ADHD = low-functioning neuropsychological profile CTR = control. A significant difference was found between controls and Hi-ADHD, and Lo-ADHD on both measurements of task achievement (asterisks). 

Can EF Tests Detect ADHD?

These studies examined male and female youth as well as adults and found that most measures of EF have good positive predictive power for ADHD (characterized by adequate sensitivity) but poor negative predictive power (poor specificity).

That is, abnormal scores on measures of EF are generally predictive of the diagnosis; however, normal scores cannot rule out the diagnosis.

Problems With the EF Construct

- Lacks any consensus definition (20+ definitions exist)
- Considered to be a meta-construct serving as an "umbrella" term for a set of more specific components (33+)
- Assessment of EF nearly always employs "cold" and relatively brief cognitive psychometric tests
- Test limitations
  - Unreliable and often poorly normed
  - Lack ecological validity
    - Do not correlate with EF rating scales or observations
  - Do not predict impairment in major domains of life in which EF is important for effective functioning

Slide courtesy of Russell Barkley, Ph.D.
Criteria for a Primary Neurocognitive Deficit

• ADHD groups must consistently exhibit weaknesses on EF measures after controlling for confounding variables

• EF weaknesses must account for a substantial proportion of the variance in ADHD symptoms in the population

• EF weaknesses must be present in most individuals with ADHD

• EF weaknesses and ADHD symptoms must be attributable to common etiological influences

Clinic-Referred Adults With ADHD

Self-rated

WCSD: Wisconsin Card Sorting Test. CPT: Conners’ Continuous Performance Test.
EF Scales and Tests in Adult ADHD

Comparison of groups on percentage impaired

ADHD-P = Persistent ADHD
ADHD-NP = Non-persistent ADHD
Control = Community Control Group

All p-values < .001

Ecological Validity of EF Tests

- Virtual reality
- Multitasking in a City Test
- Virtual supermarket
- Virtual library
- Multiple Errands Test
- Executive Secretarial Task
Ecological Validity of EF Tests

- 92 mixed etiology neurological patients
- 216 controls

Different tests measure different cognitive processes, and there may be limits to the fractionation of the executive system on the basis of neuropsychological tests.

- Factor analysis of symptoms suggested a fractionation of dysexecutive functions into 3 cognitive factors
  - Inhibition, intentionality, working memory

Testing in a Distraction Setting: Mild TBI, MDE, and Controls

- N=240: TBI=80, MDD=80, Controls=80
- Subtests on Wechsler Adult Intelligence and Wechsler Memory Scales
- In standard (quiet) and distraction conditions

MDE: Significant improvement in the distraction setting although reported more distressed than mTBI and control groups.
Testing in a Distraction Setting: Adult ADHD vs. Controls

Pelletier MF et al. 2013. Characterisation of Attention and Short Term Memory Processes in Adult ADHD with the Irrelevant Sound Paradigm. Poster Presentation.
Testing in a Distraction Setting: Adult ADHD vs. Controls

Pelletier MF et al. 2013. Characterisation of Attention and Short Term Memory Processes in Adult ADHD with the Irrelevant Sound Paradigm. Poster Presentation.
Rating Scales vs. Tests: Contribution Variance to Impairment

- EF *scales* predict up to 45% of variance in global self-rated impairment and 20% in other-rated impairment

- EF *tests* predict up to 6% in global self-rated impairment and 7% in other-rated impairment

Rating Scales vs. Tests: Contribution Variance to Impairment

- EF tests show their best (albeit weak) relationships with academic achievement tests, but not when IQ is removed.
- Overall, EF scales predict 2-20% of variance in work history measures, averaging 11%.
- Overall, EF tests predict 2-18% of variance in work history measures, averaging 6.8%.
- EF scales predict a wider array of occupational problems than EF tests.
- If predicting impairment is an index of validity of measurement, EF scales out-predict EF tests.

ADHD Symptoms Correlate Poorly to Impairments

- Average correlation between symptoms and impairment is less than 10% of the variance
- Symptoms never predicted more than 25% of the variance in impairment
- When the measure of impairment was added to symptoms, the sample size shrunk by 77% for an ADHD diagnosis
- Strongest relationship between symptoms and impairment is between inattention and school functioning

Defining Executive Function

- Behavioral rating scales
  - Self, observer, clinician
  - ADHD scales, EF scales, impairment scales

- Neuropsychological testing
  - Which tests?
  - Ecological validity concept

- Neuroimaging

- Genetics
Neurocircuitry

• Executive Function
  – Prefrontal (dorsolateral and lateral orbital) regions

• Regulation of affect
  – Orbitofrontal and ventromedial regions

• Attention and inhibitory control
  – Frontostriatal structures (ventrolateral prefrontal cortex, dorsal anterior cingulate cortex, caudate, and putamen)

Genes and Executive Function

- Evaluate 5 functional SNPs in specific genes related to DA on executive function in a general population
- Use Frontal Assessment Battery (FAB)
- Flexibility subset of FAB was associated with the SNP in COMT after adjusting for confounding variables
- Combination of 2 SNPs in the COMT gene and the dopamine D4 receptor gene had a significant effect on FAB score

Executive Function:
Does it persist over time?
Does it develop over time?
Persistence of EF in ADHD Girls

- ADHD girls (n=140), controls (n=88)
- Follow-up assessments 10 years later
- Neuropsych measures of EF
- Childhood dx ADHD displayed medium to large EF deficits
- No differences between inattentive and combined subtypes in EF persistence
- EF deficits persisted even when ADHD symptoms subsided

Development of EFD Over Time?

- 435 subjects at 5-year follow-up (ADHD n=232)
- Mean age 15.4 ± 3.43, then 5 years later
- EFD defined by at least 2 of 6 abnormal neuropsych tests
- EFD didn't predict SUD/TOB
- Stable TOB smoking was associated with subsequent EFD

Executive Function Treatment: Focus on Psychopharmacological Options
Stimulant Effect on EF in ADHD

- Age 15-25, 3 groups: ADHD stim tx (n=26), ADHD no stim (n=94), non-ADHD controls (n=133)

Subjects with ADHD who took stimulant medication had higher neuropsychological measures of attention compared to subjects with ADHD who did not take stimulant medication, but differences were not found for other measures of executive function.

- ADHD stim: significantly higher on sustained attention and verbal learning compared to ADHD no stim
- ADHD stim: significantly poorer scores on interference control and processing speed compared to controls

Methylphenidate Effects on Cognition in ADHD

• Pietrzak et al. (2006) provides a meta-analysis of the recent literature on placebo-controlled studies of the effects of MP on a variety of neuropsychological tasks and studies comparing effects for more than 1 clinical dose:
  - Higher doses produced greater improvements than lower doses on some tasks (attention, vigilance, memory, and working memory), but no additional improvements on others (planning, cognitive flexibility, inhibitory control, naming, and motor speed)

Understanding the Cognitive Effects of Stimulants

• In well-controlled studies using batteries, stimulant-related cognitive enhancements were more prominent on tasks without an executive function component (complex reaction time, spatial recognition memory reaction time, and delayed matching to sample) than on tasks with an executive function component (inhibition, working memory, strategy formation, planning, and set shifting)

Understanding the Cognitive Effects of Stimulants

• These reviews marked a watershed in the literature on cognitive deficits in ADHD

  ✓ Pointed out that few children with ADHD showed pervasive deficits across tests

  ✓ Concluded that executive function deficits were not necessary and sufficient causes of ADHD

  ✓ Contributed to the shift from core deficit to multiple deficit theories

• In addition, this approach has uncovered ADHD–control group differences (deficits) on tests of temporal and parietal lobe function (spatial recognition and span, pattern recognition, and delayed matching to sample) as well as frontal lobe function (working memory, planning and strategy formation, and set shifting)

Regions Where Age of Attaining Peak Surface Area Was Delayed by More Than 1 Year: ADHD Compared With Typically Developing Participants

Understanding the Cognitive Effects of Stimulants

- Dose response studies of stimulant medications suggest that the optimal dose varies across individuals and depends somewhat on the domain of function, with high doses tending to produce greater enhancement of some domains (e.g., vigilance) but not others (e.g., planning), without clear evidence of completely correcting the cognitive deficits associated with ADHD.

Conclusions

• Executive function is conceptually understood but operationally ill defined

• Definitional constructs are poorly correlated with each other (scales vs. tests)

• Positive predictive validity for impairments increases further in the presence of executive dysfunction and learning disorders

• Medications seem to have selective effects in ADHD and executive dysfunction, so…

• Don't overdose your patients!
Tom is a 37-year-old MWM who was diagnosed with ADHD-inattentive type at age 19 while in college.

Having stopped his ADHD medication "years ago," he now seeks treatment because of declining work performance since his promotion 7 months ago.

He complains of inattention in meetings and difficulty finishing paperwork; he states that "things are falling through the cracks" and that his "boss is getting annoyed."
Case Report Posttest Question 1

At this point, you recommend:

A. Discuss the stressors of work demands

B. Refer for neuropsychological testing since he's "been OK" for years

C. Start on ADHD medication

D. Have the patient complete an Adult Self-Report ADHD Symptom Checklist
He completes the Adult Self-Report ADHD Scale (ASRS) (18 items) for baseline symptoms.

You start him on a long-acting stimulant, see him over 2 months, and titrate the dose to reduce symptoms.

He states that his focus, sustained attention, and distractibility are much better.

But he complains that he still can't get organized and that it takes him longer to complete tasks than it should.
Case Report Posttest Question 2

At this point, you recommend:

A. Increase ADHD medication dose since symptoms are not optimally controlled
B. Neuropsychological testing to clarify the deficits
C. Start skill based therapy for organizational techniques
D. Pursue workplace accommodations
Case Report Question

If you ordered neuropsychological testing, you received a report that says, "Patient has some inattention and distractibility, but deficits in organization, task shifting, and prioritizing were significantly compromised."

Do you:

A. Ask if the testing was done on or off medication
B. Increase medication to improve residual ADHD symptoms
C. Start organizational skill therapy
D. Apply for workplace accommodations
Suggested References

