

Pay Attention: ADHD Through the Lifespan

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Week 6: Functional Impact of ADHD



Homework Review

Current Understanding of ADHD

ADHD is a complex, heterogeneous neurodevelopmental, lifespan disorder affecting patient, family & community:

- Different trajectories of development – generally ~3 year lag
- High degree of overlap with learning difficulties and co-morbid psychiatric conditions (anxiety, depression)
- Multiple determinants of clinical course (bio-psycho-social)
- Many promising approaches to promoting function/adaptation
- Unknown: what works for whom and how to combine different interventions to promote optimal functioning

Current Understanding of ADHD

- No single neuropsychological theory can explain the heterogeneity seen in ADHD; no single test can be used to diagnose ADHD – it is a *clinical* diagnosis
- Newer definitions emphasize impairments in executive functioning including behavioral, cognitive and emotional consequences
- The interactions between ADHD with other developmental difficulties (e.g. LD) are multiplicative (rather than additive)
- Integrative treatments utilize both “bottom up” and “top down” approaches (Brain-Mind Unity)

Behavioral Symptoms of ADHD

- Core symptoms
 - Hyperactivity / restlessness
 - Impulsivity / disinhibition
- Problems with self-control (“discipline”)
 - Diminished self-regulation
 - Novelty-seeking / risk behaviors
 - Addictive tendencies (“reward dependence”)

Cognitive Symptoms of ADHD

- Organizational difficulties
 - Disorganization, lack of readiness
 - Poor planning and execution skills
- Information processing problems
 - Inattention, distractibility
 - Slower processing speed
 - Poor time management

Cognitive Symptoms of ADHD

- Inconsistent effort and follow through
 - Poor persistence at effortful tasks
 - More sensitive to interruption
 - Slower to resume task once interrupted
- Memory deficits
 - Forgetfulness
 - Impaired verbal memory, recall
- “Problem-solving” impairments

Social-Emotional Symptoms of ADHD

- Emotional dysregulation (“emotional impulsivity”)
 - Emotional lability / instability
 - Negative emotions, “dysphoria”
 - Anger, temper outbursts
 - Anxiety , panic attacks
- Interpersonal (social interaction) problems
 - Reading social cues
 - Responding appropriately
 - Making and keeping friends

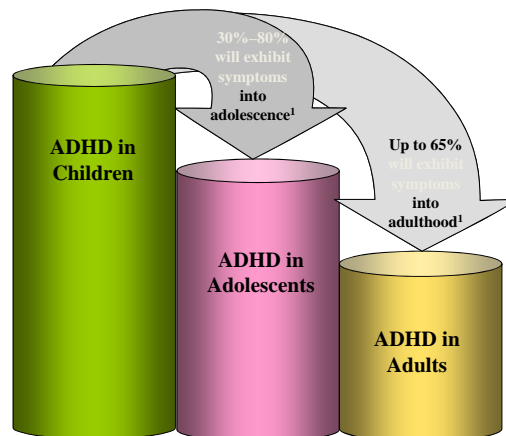
Deficient Emotional Self Regulation (Emotional Dysregulation)

- Deficits in self-regulating the physiological arousal caused by emotions
- Difficulties inhibiting inappropriate behavior in response to positive or negative emotions
- Problems refocusing attention from strong emotions
- Disorganization of coordinated behavior in response to emotional activation

ADHD: A Lifelong Disorder

- Attention-deficit/hyperactivity disorder (ADHD) is a common psychiatric disorder of childhood, which often persists into adolescence and adulthood
 - The essential feature is a persistent pattern of inattention and/or hyperactivity-impulsivity
 - Symptoms (particularly motor hyperactivity) lessen during late adolescence and adulthood
 - Adolescents diagnosed with ADHD may present with comorbid disorders, including major depressive disorder, anxiety disorders, oppositional defiant disorder, and conduct disorder

ADHD: A Lifelong Disorder

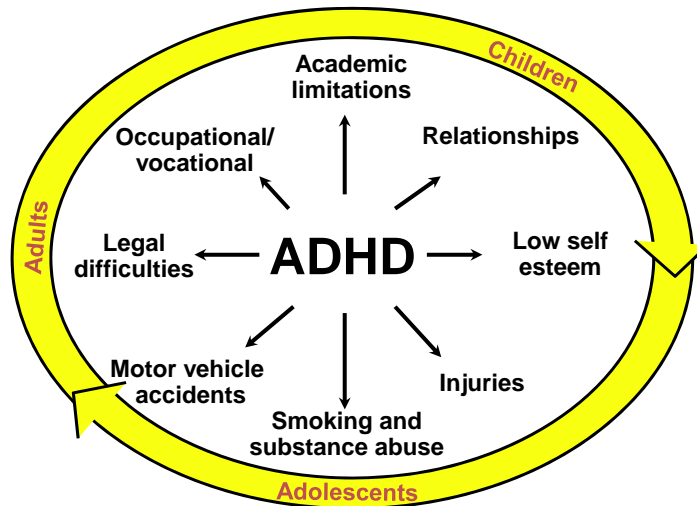


*According to results from the National Comorbidity Survey Replication in 3199 respondents aged 18 to 44 years.

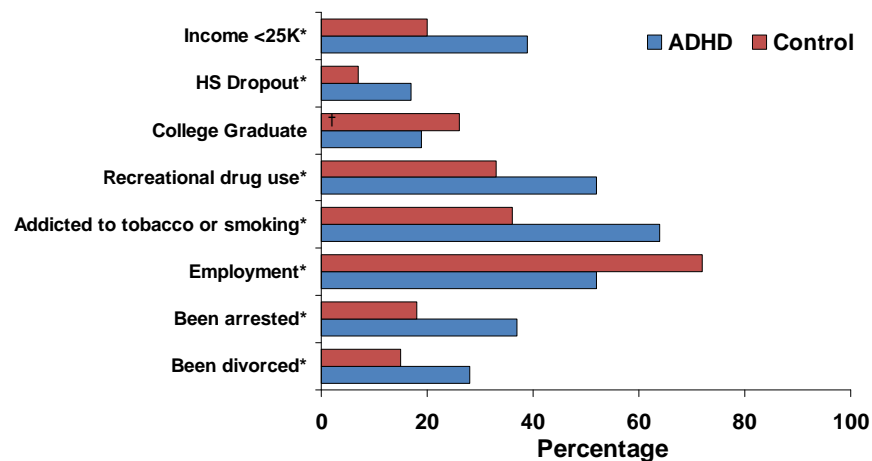
¹Dulcan M, et al. *J Am Acad Child Adolesc Psychiatry*. 1997;36(10, suppl):85S-121S.

²Kessler RC, et al. *Am J Psychiatry*. 2006;163:716-723.

ADHD: Potential Areas of Impairment



Real-Life Consequences of ADHD



Survey of 500 community adults with ADHD compared with 501 age- and gender-matched controls; 36% of ADHD patients reported medication use

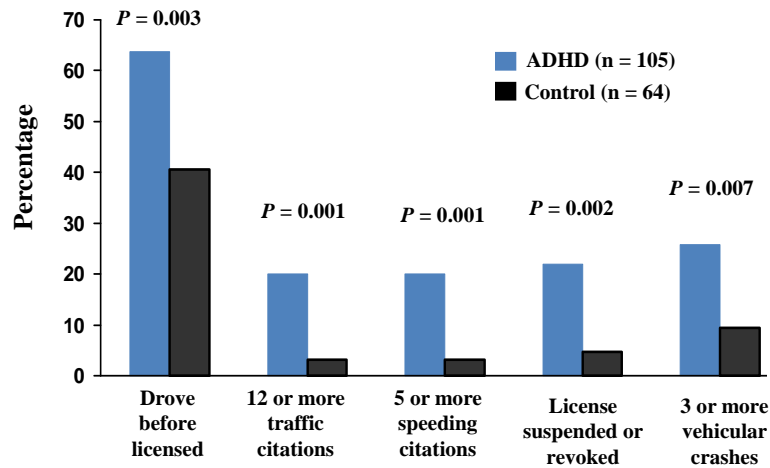
* $P \leq 0.001$; † $P < 0.01$

Biederman et al. *J Clin Psychiatry*. 2006;67:524-540. Biederman, Faraone. *MedGenMed*. 2006;8(3):12.

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Traffic Accidents and Violations

Negative Driving Outcomes From Driving History Interviews
With Young Adults Aged 17-28



Barkley et al. *J Int Neuropsychol Soc.* 2002;8:655-672.

Mid-Lecture Questions

Impact of ADHD on Learning

Childhood Developmental Risks

- Greater Risk for Language Disorders
 - Expressive: 10-54% Pragmatic deficits in 60%
 - Excessive speech, reduced fluency, less logical, coherent, & organized
 - Delayed internalization of language
 - Reduce capacity for rule-governed behavior
- Low Average Intelligence (7-10 point deficit)
 - An apparent failure to keep pace with peers but could also result from poor executive functioning that partly affects IQ
- More Adaptive Disability – 1 to 2 SD difference between IQ and adaptive functioning (self-sufficiency), particularly in communication and socialization domains
- Positive illusory bias in self-evaluations of competence
 - Not evident in their evaluations of other children's abilities

Prerequisites for school learning

- Attention, persistence, goal-directed action
- Orientation and perception
- Storage and retrieval of knowledge
- Interpretation and generalization
- Expression and production of images, thoughts and language
- Achievement motivation

Childhood Academic Impairments

- Poor School Performance (90%+)
 - greater inattention to class work
 - reduced productivity is greatest problem
 - accuracy is only mildly below normal (85%)
 - more hyperactive & disruptive behavior
- Low Academic Achievement (10-15 pt. deficit)
 - May be deficient even in preschool readiness skills
- Learning Disabilities (24-70%)
 - Reading (8-39%); (effect size (ES) = 0.64)
 - Spelling (12-30%) (ES = 0.87)
 - Math (12-27%) (ES = 0.89)
 - **Handwriting (60%+)**
 - **Reading, viewing, & listening comprehension deficits**
 - Likely due to impact of ADHD on working memory

Treatment Impact of LDs

- Comorbid Reading, Spelling and Math Disorders do not improve from stimulants
 - Reading ability improves on atomoxetine
- Additional educational interventions will be needed for these comorbid disorders
- Comorbid handwriting and comprehension deficits are likely to improve from stimulants if secondary to ADHD itself
- ADHD cases with comorbid math disorder may be less likely to respond to stimulants (37%) than those with reading disorder (67%) or no LD (75%)*

*Grizenko et al. (2006). *Journal of Psychiatry & Neuroscience*, 31(1), 46-51.

Neuropsychological Deficits in ADHD

Impaired performance on tasks measuring:

- vigilance (continuous performance task)
- reaction time (switching task)
- response inhibition (go – no go)
- perceptual motor speed (trail making, copying)
- verbal learning (selective reminding task, CVLT)
- working memory (counting stroop, 2-back test)
- executive function / planning (Tower of Hanoi)

Neuropsychological Deficits in ADHD

- There is no specific neuropsychological test profile for ADHD other than identifying “executive dysfunction”
- Performance of ADHD individuals on neuropsychological tests is *variable*
- Impairment in any single neuropsychological test does not differentiate ADHD individuals from those without ADHD
- Neuropsychological test results have not been useful in identifying subtypes of ADHD (as defined by DSM criteria)

Achievement motivation

- Learning orientation (intrinsic)
- Performance orientation (extrinsic)
- Mastery orientation (learned optimism)
 - Seeking challenges, expecting success
 - Persistence in face of obstacles
 - Ability to take failure in stride
- Avoidance orientation (learned helplessness)
 - Premature “giving up” in face of obstacles
 - Assumption problem can’t be solved before trying it

Mid-Lecture Questions

Executive Functioning - working
memory, organization, planning

ADHD = “Impaired Executive Functions”

“ADHD is a label for a *heterogeneous* group of dysfunctions related to each of several nodes along the attentional/intentional network... from cerebellum up to and including prefrontal cortex... includes neural substrates of activation, orientation, motivation and vigilance as these connect with and influence executive function...”

Denckla, 1991

What are Executive Functions?

- Wide range of central control processes (previously known as “frontal lobe functions”) that evolve over course of development
- They connect, prioritize and integrate our cognitive functioning - moment by moment over a given time (“event”) horizon
- Brain structures and interconnections are not fully developed at birth and show continuous development into early adulthood
- They are dependent upon neuronal myelination, synaptic pruning, elaboration of dopamine & norepinephrine systems, etc.
- They can become impaired developmentally, traumatically and/or secondary to disease processes
- Environmental demands for Executive Functions increase with age from preschool through adulthood

Key Executive Functions

- Self-regulation
- Sequencing behaviors
- Planning and organization
- Working memory
- Internalized speech
- The ability to regulate your affect, motivation, or arousal in service of a goal directed action
- The ability to temporally organize behaviors into a proper sequence
- The ability to store and manipulate information in your mind
- “Self-talk” used to guide behavior in accordance to internalized rules

“Right now I’m having amnesia and déjà vu at the same time. I think I’ve forgotten this before.”

Steven Wright, comedian

Executive Dysfunction in ADHD

Cognitive flexibility	Difficulty switching to an alternate strategy when current approach fails
Initiation	Procrastinating (starting or finishing)
Interference control	Easy distractibility; extraneous information recalled
Planning / organization	Underestimating time; disorganized approach to tasks; messy desk
Response inhibition	Trouble inhibiting impulses (e.g. frequently interrupting others)
Self-monitoring	Failure to notice errors while completing tasks
Working memory	Forgetting what's just been said or forgetting someone's phone number

Developmental Transitions in Behavioral Control (Maturation)

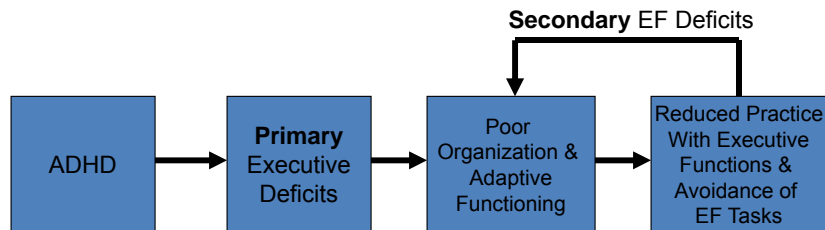
- External \longrightarrow Mental (private)
- Others \longrightarrow Self
- Temporal now \longrightarrow Anticipated future
- Immediate \longrightarrow Delayed gratification

Social-Emotional Executive Functions

- ***Social perception / cognition*** – awareness of social rules, conventions, visual cues
- ***Empathy / attunement*** – perspective taking
- ***Self regulation / impulse control*** – thinking through consequences of actions
- ***Problem solving / flexibility / set shifting*** – considering alternative responses to given situation and persisting despite obstacles or challenges

Mid-Lecture Questions

Lack of EF use can lead to secondary deficits in ADHD



The older the ADHD case is, the more likely that some EF deficits may be secondary deficits that could be amenable to some forms of EF training, but such training would not solve the problems arising from the primary EF deficits

Understanding ADHD

- ADHD Creates “Time Blindness” or “Temporal Neglect Syndrome” (Myopia to the Future)
- Those with ADHD Live in the Moment
- It’s a Disorder of:
 - Performance, not skill
 - Doing what you know, not knowing what to do
 - The when and where, not the how or what
 - Using your past to guide you at the “point of performance”

The “point of performance” is the place and time in your natural settings where you should have used what you know but did not
- Its Not an Attention Deficit but an Intention Deficit Disorder (Inattention to mental events & the future)

Impact of Executive Function Deficits on Adult Functioning (1)

- Poor persistence towards tasks/goals
- Failing to plan ahead or anticipate future consequences
- Poor time management
- Poor emotional self-control
- Impulsive decision making
- Disorganization

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Impact of Executive Function Deficits on Adult Functioning (2)

- Problems keeping promises and commitments to others
- Difficulty keeping track of several things at once and seeing them to completion
- Inability to stop an ongoing enjoyable activity to shift to a more important or urgent task
- Depending on others for maintaining order and goal direction

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Impact of Executive Function Deficits on Adult Functioning (3)

- Underachievement in school and work
- Loss of jobs/impaired work performance
- Unsatisfactory relationships
- Poorer driving performance/outcomes
- Poor money management
- Trouble organizing a household and raising children

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Implications for Interventions

- A *chronic disability perspective* is the most useful and least judgmental way to view ADHD and related neurodevelopmental disorders
- Does this excuse accountability?
 - (No!, the problem is **time**, not consequences)
- Behavioral treatment is essential for restructuring natural settings and externally assisting EF
 - But it does not generalize or endure after removal

Implications for Interventions

- Teaching organizational skills alone is inadequate
- We have to design *prosthetic environments* for the EF problems seen with neurodevelopmental disorders
- Effective interventions are at the *point-of-performance*
- Medications may be essential for most (not all) cases
- The compassion and willingness of others to make and maintain accommodations are vital to success

“Reverse Engineer” the EFs

- Externalize important information
 - Use lists, posters, signs, other cues of critical reminders and post these at the point of performance
- Externalize time periods related to tasks
 - Use timers, clocks, counters, that signal time’s passing
- Break up future tasks into many small steps
 - Do 1 step each day; keep the Event-Response-Outcomes close in time
- Externalize sources of motivation
 - Quick praise, token/point systems, tangible rewards
- Permit more external manipulation of task components
 - Manualize the problem as much as you can

Quiz Questions