

ADHD AND LEARNING: *A Perfect Storm*

Eric Tridas, MD, FAAP

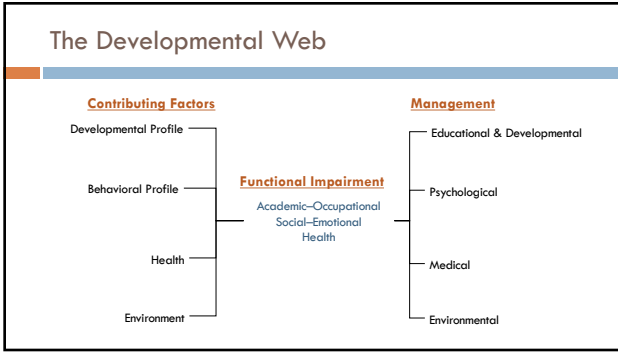
Disclosures

- Dr. Tridas is a speaker for:
 - ▣ Tris Pharma
- Dr. Tridas is a consultant for:
 - ▣ Tris Pharma

The Developmental Web

It is all about IMPAIRMENT

- Symptoms
- Syndromes
- Diagnoses



ADHD

What it is and what is not!

Diagnostic Criteria for ADHD: DSM- 5

- Persistent symptoms of inattention and/or impulsivity and hyperactivity
- Onset of symptoms before age 12 years
- Impairment in 2 or more settings (school, work, home)
- Evidence of clinically significant impairment in social, academic, or occupational functioning
- Symptoms not a result of other disorders

Diagnostic and Statistical Manual of Mental Disorders, 5th ed., Text Revision. Washington, DC: American Psychiatric Association; 2000, 2013.

Inattention

- Inability to pay attention...
 - to the right thing (selectivity),
 - at the right time (timing),
 - for the appropriate amount of time (duration),
 - Requires inhibition of distractions
 - as in depth as needed (intensity)

Impulsivity

- Inability to sustain inhibition
 - Stop to...
 - Think about consequences
 - Formulate a plan
 - Think about previous experiences or rules
 - Block away distractions
 - Wait for...
 - Question to be finished
 - Turn

Hyperactivity

- Overactive
 - Can't stay seated
 - Runs rather than walking
 - Can't stay on line
 - Driven by a motor
 - Can't keep hands to self
- Fidgety
 - Can't sit still
- Talkative

DSM-5 Inattention

- Is careless
- Has difficulty sustaining attention in activity
- Does not listen
- Does not follow through with tasks
- Is disorganized
- Avoids/dislikes tasks requiring sustained mental effort
- Is forgetful in daily activities
- Is easily distracted
- Loses important items

Diagnostic and Statistical Manual of Mental Disorders, 5th ed., Text Revision, Washington, DC: American Psychiatric Association, 2000, 2013.

DSM-5 Impulsivity/Hyperactivity

- Impulsivity
 - Blurts out answers
 - Cannot wait turn
 - Intrudes/interrupts others
- Hyperactivity
 - Squirms and fidgets
 - Cannot stay seated
 - Runs/climbs excessively
 - Cannot play/work quietly
 - Is on the go/driven by a motor
 - Talks excessively

Diagnostic and Statistical Manual of Mental Disorders, 5th ed., Text Revision, Washington, DC: American Psychiatric Association, 2000, 2013.

ADHD: DSM- 5 Subtypes

- ADHD Combined Presentation
 - Criteria are met for both inattention and impulsivity/hyperactivity (> 6 of each in children – 5 in adolescents and adults > 17 y/o)
- ADHD Predominantly Inattentive Presentation
 - Criteria met for inattention but not for impulsivity/hyperactivity (> 6 in children – 5 in adolescents and adults > 17 y/o)
- ADHD Predominantly Hyperactive-Impulsive Presentation
 - Criteria met for impulsivity/hyperactivity but not for inattention (> 6 in children – 5 in adolescents and adults > 17 y/o)

Severity Criteria

- Mild
 - Only minimal number of symptoms
 - Occupational and/or social impairment is mild
- Moderate
 - Number of symptoms or functional impairment between mild and severe
- Severe
 - Many of the symptoms are severe
 - Impairment is severe

AAP: Guidelines for ADHD Assessment

- Evaluate children who exhibit the following:
 - Inattention
 - Hyperactivity
 - Impulsivity
 - Academic underachievement
 - Behavioral problems
 - DSM-IV criteria
- Evidence from parents/caretakers and teachers/school professionals of core symptoms of ADHD in school, home, and social settings
- Assessment for co-existing conditions
- Other diagnostic tests are not routinely indicated

AAP, Pediatrics. 2005;105:1158-1170.

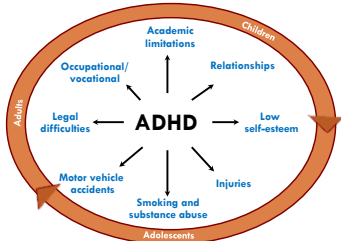
Impairment Caused by ADHD

How does it present?
Impact on quality of life

Impairment – Functional Impact

- Academic
 - Affects productivity and accuracy of work
- Behavioral
 - Disruptive, non-compliant
- Social interaction
 - Socially unaware, in-your-face
- Health
 - High risks behaviors and habits
 - Smoking, SUD, motor vehicle accidents/citations

ADHD: Lifetime impairment



ADHD: Impact on Family

□ Parents of children with ADHD experience higher levels of:



- Stress
- Self-blame
- Social isolation
- Depression
- Marital discord

Mash and Johnston. J Clin Child Psychol. 1990;19:213. Mastey and Barkley. Am J Orthopsychiatry. 1986;56:83

ADHD Affects Socialization

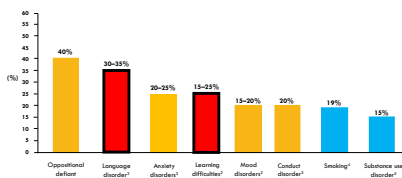
- Children are stigmatized by their behavior leading to peer rejection
 - Lack of friendships
 - Lower peer status
- Adolescents continue to demonstrate social problems
 - Poor participation in group activities
 - Few friends
 - Vulnerable to antisocial groups, drug abuse

AACAP. J Am Acad Child Adolesc Psychiatry. 1997;36:858-1215. Barkley RA. J Am Acad Child Adolesc Psychiatry. 1991;30:752-761.

Comorbidity Associated with ADHD

What else is going on?

ADHD: Comorbid Conditions



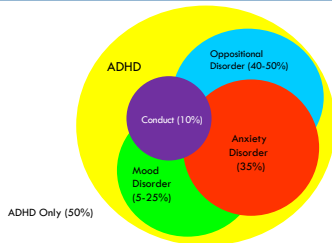
APA. Comorbidity. In: Diagnostic and Statistical Manual of Mental Disorders, 4th Edition. Washington, DC: American Psychiatric Association; 1994:108-110. Barkley RA. Comorbidity. In: Barkley RA, Murphy KR, Fischer M, eds. Attention Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment. San Francisco: Jossey-Bass; 1998:108-110. Barkley RA, Murphy KR, Fischer M, eds. Attention Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment. San Francisco: Jossey-Bass; 1998:108-110. Barkley RA, Murphy KR, Fischer M, eds. Attention Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment. San Francisco: Jossey-Bass; 1998:108-110.

ADHD: Psychiatric Comorbid Conditions

- Psychiatric Comorbidities *in a Developmental Clinic* (70%)
 - ODD (64%)
 - Conduct Disorder (14%)
 - Depression (36%)
 - Anxiety (46%)

Kosteleck et al. J Dev Psychol. 55:591-597, 2014

Behavioral Comorbidities with ADHD



ADHD: Academic Comorbid Conditions

- Learning Disorders *in a Developmental Clinic*
 - Reading Disorder (26%-51%)
 - Math Disorder (18%-51%)
 - Academic Underachievement
 - 3 times as likely to repeat a grade
 - 2.7 times as likely to drop out

Kosteleck et al. J Dev Psychol. 55:591-597, 2014

ADHD: Medical Comorbid Conditions

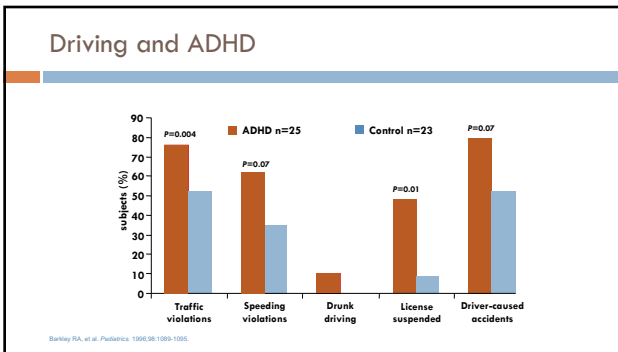
- Risk for substance abuse – 27%
- Sleep Disorders (25%-50%)

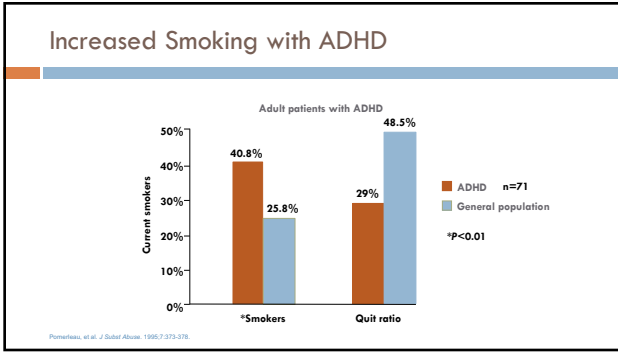
Konold et al. M J Div Pediatr 38:591-597, 2014

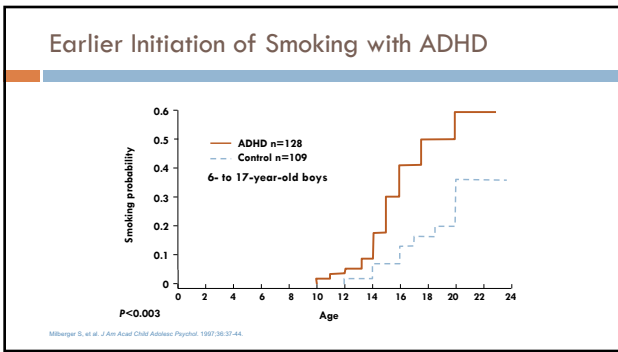
ADHD : Adults

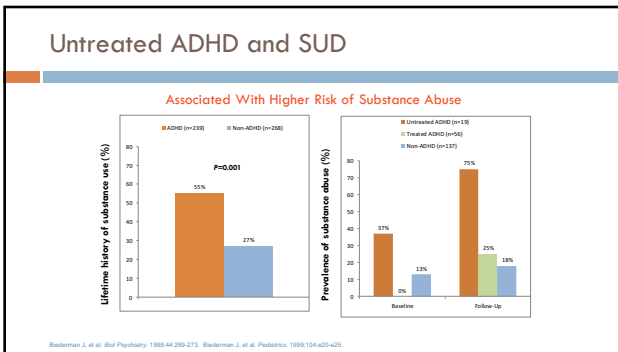
- Performance Limitations
 - Despite similar educational levels and IQ scores, non-medicated adults with ADHD display:
 - Significantly more academic difficulty in school (25% repeat a grade)
 - Lower levels of occupational advancement

Faraone S, et al. Biol Psychiatry 2000;48:9-20. Biederman, et al. Am J Psychiatry. 1993;150:1792-1798.

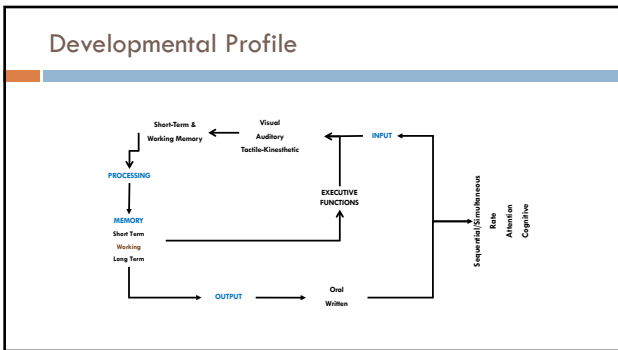








Dyslexia



- ### Dyslexia: Definition
- One of several distinct learning disabilities
 - Neurobiological in origin
 - Symptoms
 - ▣ Poor decoding and spelling abilities
 - ▣ Problems with accurate and/or fluent word recognition
 - ▣ Inconsistent with age and/or cognitive ability
 - ▣ Inconsistent with educational experience

Dyslexia: Definition

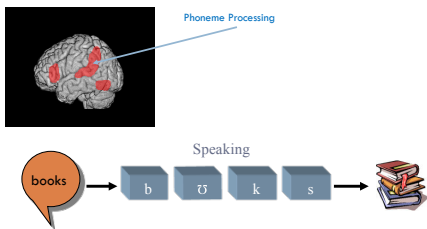
- Etiology
 - Deficits in phonological processing
- Unexpected
 - In spite of typical instruction/opportunity to learn
 - Adequate intelligence
- Secondary Consequences
 - Poor reading comprehension
 - Poor vocabulary and general knowledge development

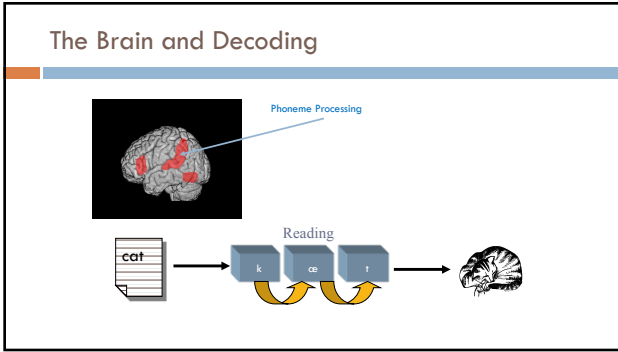
The Brain and Listening: Co-articulation

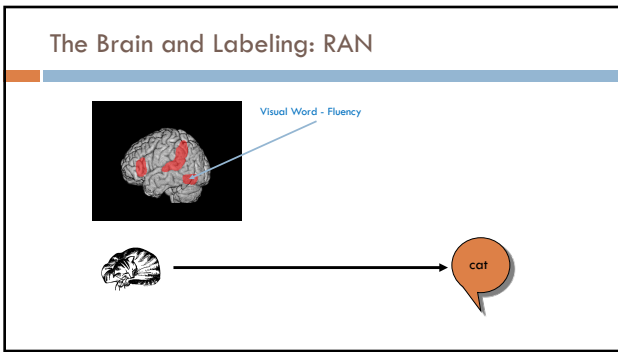
- The ability to compress and overlap several phonemes into a single sound burst
 - Speech sounds are unsegmented
- Allows sound to be compatible with the capacity of the auditory system (working memory)
 - 1 to 2 secs. (5 – 7 words before it leaves short term memory)
- Brain
 - Distinguishes speech from noise
 - Attends to **meaning** not specific sounds in words

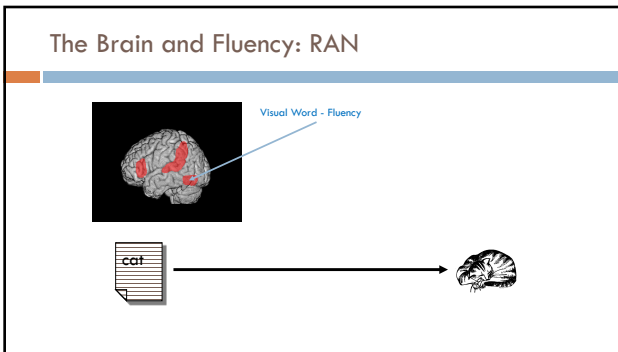
Shawwels, S. (2003). Overcoming Dyslexia: A new and complete, Science-Based Program for Reading at Any Level. A. Knopf, NY.

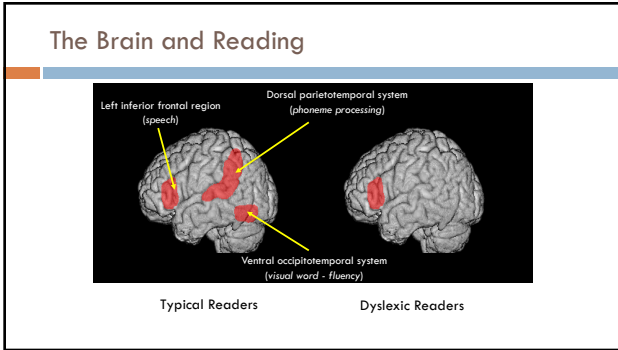
The Brain and Phonology

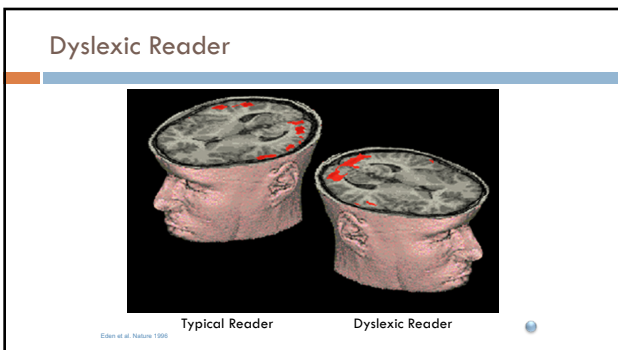


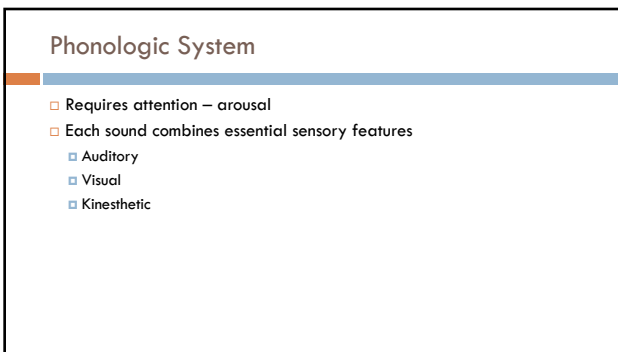


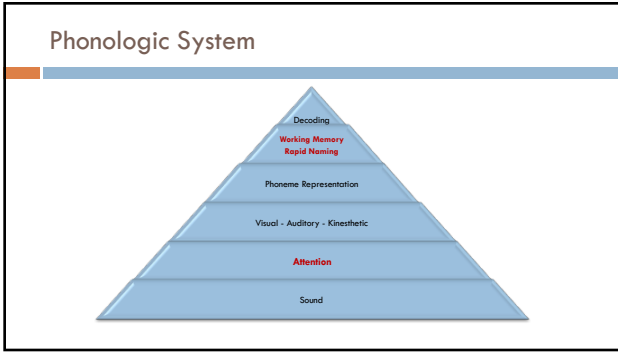












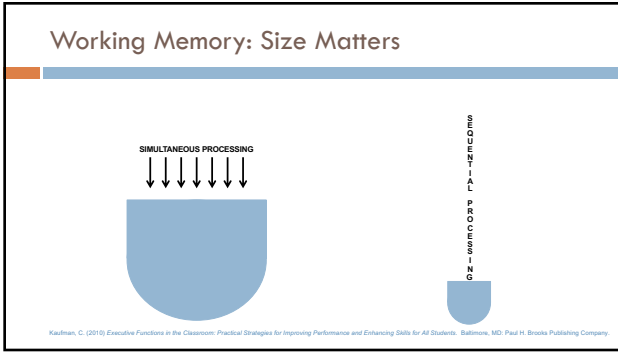
Working Memory

- Memory for **intermediate** results that must be **held** during **thinking**¹
- Memory system used for **holding** and **manipulating** information while various mental tasks are carried out.²
- A system for **temporarily storing** and **managing** the information required to carry out complex cognitive tasks such as learning, reasoning, and comprehension³.
- Working memory is the **executive** and **attentional** aspect of short-term memory involved in the interim integration, processing, disposal, and retrieval of information.

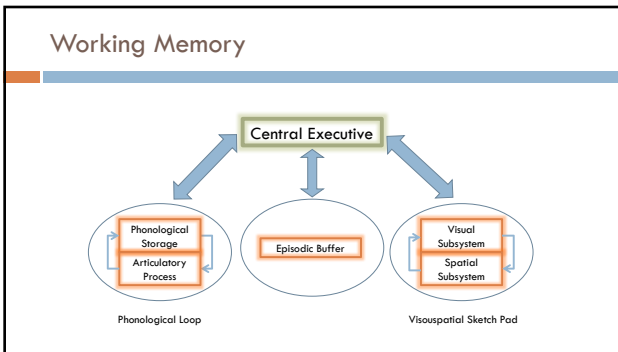
¹ wordreference.com/define/working-memory/ ² homepage.nfworld.com/ivan_c/Linguistics/LinguisticsGlossary.htm ³ www.brainmhab.org/NeurospychTerms.htm

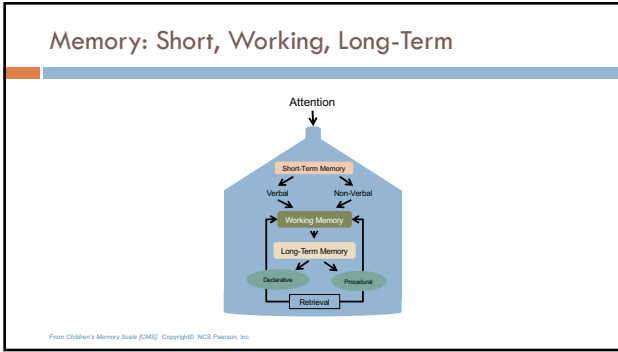
Working Memory

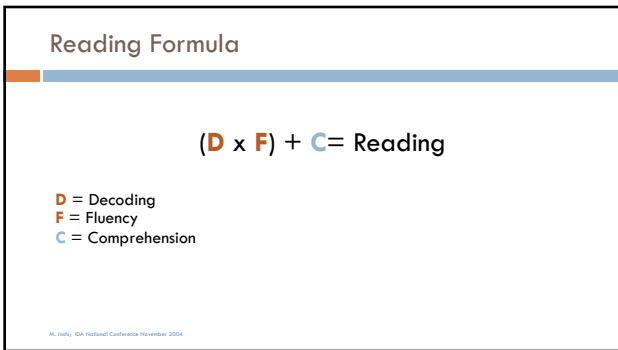
- **Requirements**
 - Simultaneous storage and processing of information.
 - Goal orientated
 - Active monitoring or manipulation of information or behaviors
 - In the face of interfering processes and distractions.

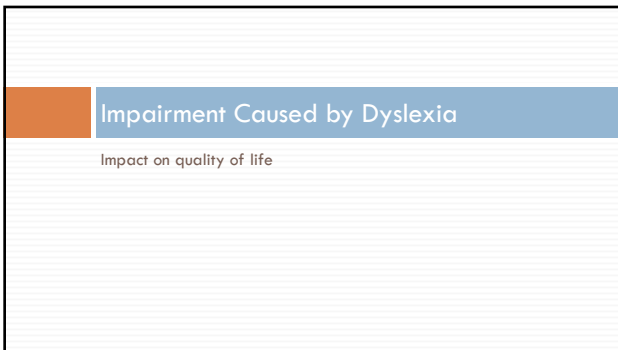


- ### Working Memory
- Four subcomponents:
 - Central executive
 - Attentionally-limited control system
 - Regulates the three other components
 - Visuospatial sketch pad
 - Phonological loop
 - Episodic Buffer









Clinical Impact of Dyslexia

- 5th grade reader
 - 10th %ile
 - 50,000 words/year
 - 50th %ile
 - 600,000 words/year
 - 11 x more practice/year
 - 90th %ile
 - 2,357,000
 - 46 x more practice per year

Percentile Rank	Minutes Per Day		Words Read Per Year	
	Books	Text	Books	Text
98	65.0	67.3	4,368,000	4,733,000
90	21.2	33.4	1,803,000	2,357,000
80	14.2	24.6	1,146,000	1,697,000
70	9.6	16.9	622,000	1,168,000
60	6.5	13.1	432,000	722,000
50	4.6	9.2	292,000	601,000
40	3.2	6.2	200,000	421,000
30	1.8	4.3	106,000	251,000
20	0.7	2.4	21,000	134,000
10	0.1	1.0	8,000	51,000
2	0	0	0	8,000

Clinical Impact of Dyslexia

- Decrease vocabulary development
- Poor spelling
- Poor reading comprehension
- Increased dropout rates

Anxiety

Characteristics of Anxiety

- Symptoms
 - Subjective
 - Discomfort, fear, dread
 - Overt Behaviors
 - Avoidance, withdrawal
 - Physiological responses
 - Sweating, nausea, arousal, shaking
- Fears/Phobias
 - Specific reaction to a specific situation
- Anxiety
 - General apprehension or discomfort to a vague situation

Mervis, E. (2007) *Thinking: Making connections, deepening and creating a practical guide*. New York, NY: Guilford Press.

Anxiety Symptoms

- Negative, unrealistic thinking
 - The half empty glass of water.
- Worry excessively about many things
 - What if....
- Fret over unimportant things
 - Selectively pay attention to physical symptoms
- Misinterpret symptoms and events in a negative way
 - Feel they are going crazy when having a panic attack

Social Withdrawal

- A main component of several disorders
- Unrealistic self-appraisal of social performance
- Lack of interest in social interaction
- May be complicated by excessive fear
- May involve a deficit in social approach behavior

Somatization

- Often associated with anxiety disorders
- Oversensitivity to physiological clues
- Common complaints
 - ▣ Lack of energy
 - ▣ Stomach aches
 - ▣ Nausea
 - ▣ Headaches
 - ▣ Pain in eyes, limbs, joints
 - ▣ Tingling/numbness

Anxiety – Definition

- Daily, excessive, persistent worries without logical basis
- Restlessness
- Somatization – tiredness, shakiness, muscle tension, dry mouth, palpitations, shortness of breath, trouble swallowing, nausea, diarrhea
- Panic symptoms that leads to worrying about future attacks
- Hypervigilance, on edge, irritable
- Concentration difficulties
- Trouble with sleep onset and/or maintenance
- Avoidance of situations that may trigger anxiety/panic
- Lacks confidence in ability to cope with new situations
- Needs reassurance from significant others being present

Jorgensen, A. (2004). The Complete Anxiety Treatment and Homework Planner. Hoboken, New Jersey: Wiley & Sons, Inc.

DSM 5 Anxiety Disorders

- Separation Anxiety Disorder
- Selective Mutism
- Specific Phobia
- Social Anxiety Disorder
- Panic Disorder
- Agoraphobia
- Generalized Anxiety Disorder
- Anxiety Due to Another Medical Condition
- Obsessive-Compulsive Disorders
- Post Traumatic Stress Disorder

Anxiety Prevalence

- Affects 20% of children and adolescents at some point in their lives
- 3-4% of children have a diagnosis of anxiety
- 20-35% of children with ADHD have comorbid anxiety disorders

Impairment Caused by Anxiety

Impact on quality of life

Anxiety Related Impairment

- Academic
 - Decrease production/shut down/avoidance
 - Avoidance leads to lack of practice and ultimately poor skill mastery/fluency
 - Decrease concentration/focus, mental energy
 - Decrease comprehension
 - Working memory
 - Retrieval Fluency
 - Processing speed
- Behavioral
 - Low self esteem
 - Irritable/Aggressive

Revised, 9-2007 (Please indicate whether this is a personal or professional copy.) © 2007 Guilford Press

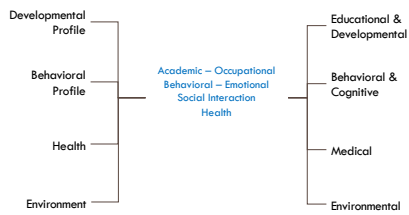
Anxiety Related Impairment

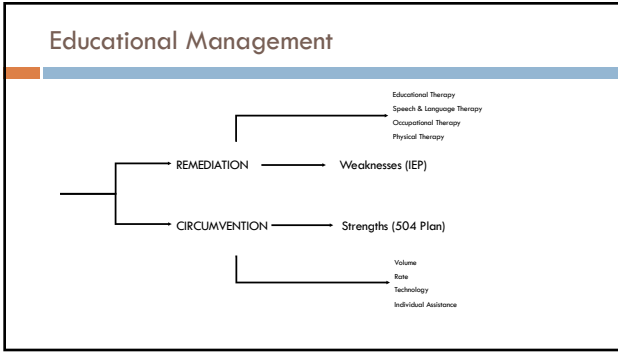
- Social Interaction
 - Isolation and withdrawal
 - Inflexibility/Irritability
- Health
 - Somatization/Sleep disturbances
 - Substance use disorders
 - Suicidality/Substance use and abuse

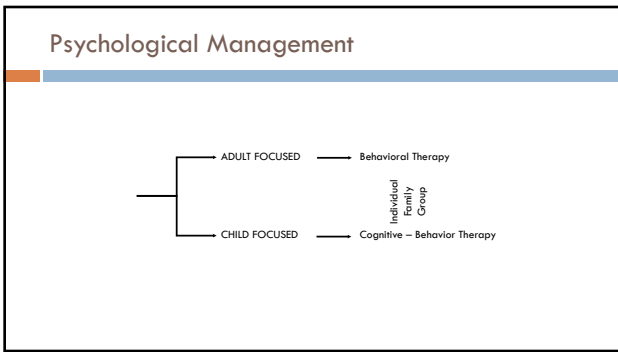
Management

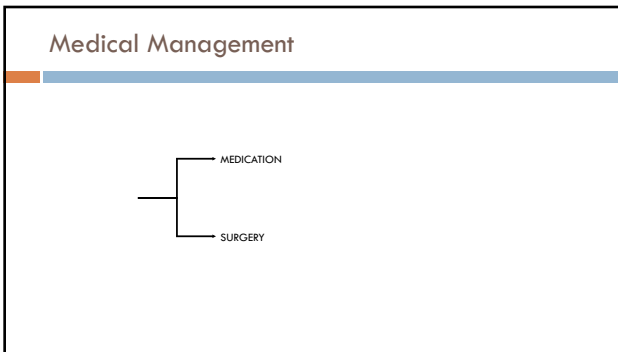
The Developmental Web

The Developmental Web









Environmental Management

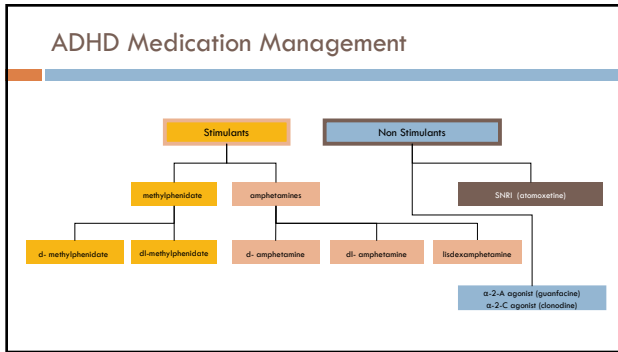
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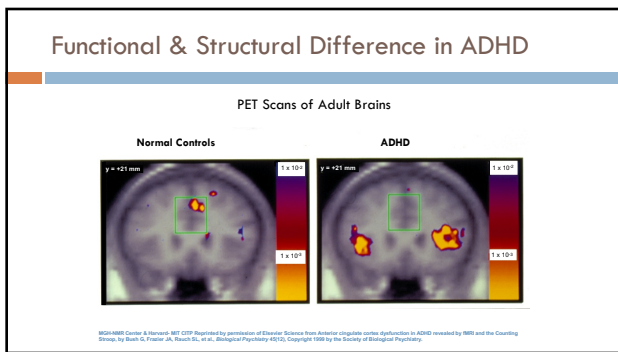
Management of ADHD

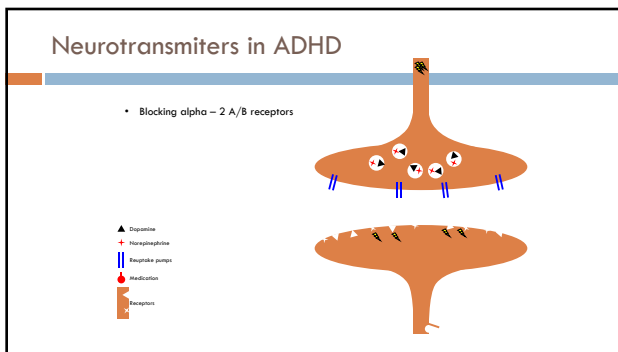
Focus on Impairment

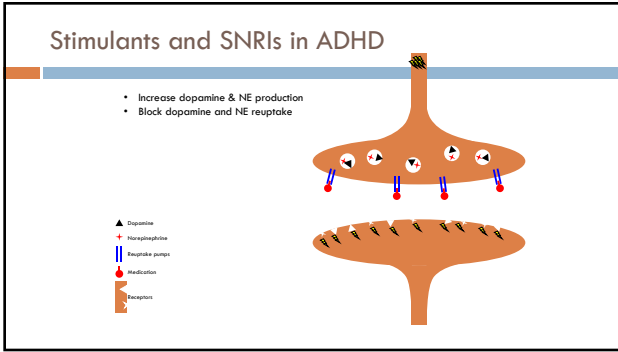
Multimodal Management of ADHD

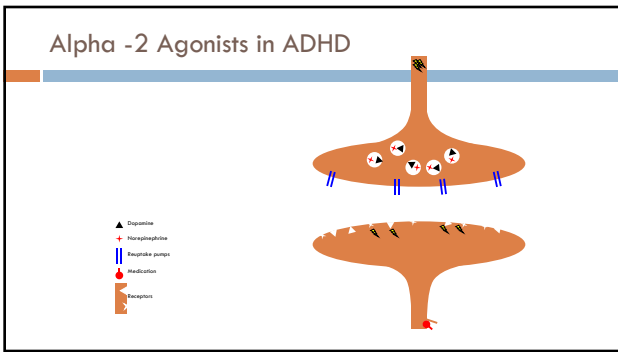
- Medication Management
 - Stimulants
 - Non Stimulants
- Psychosocial Interventions
 - Parent Training
 - School Based Interventions
 - Child Based Interventions

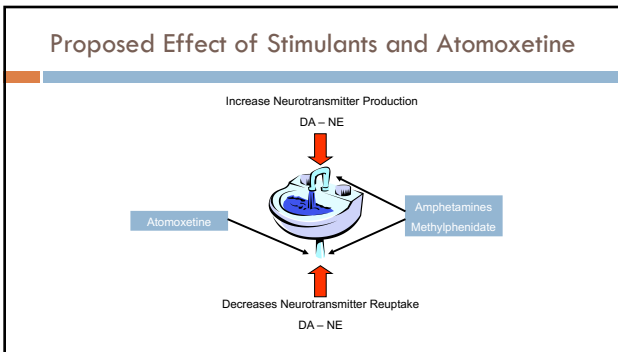












Stimulant Medications

- Side Effects
 - Insomnia (50-60%)
 - Anorexia (50-60%)
 - Irritability (30%)
 - Headache
 - Stomachache
 - Nausea
 - Tics

Atomoxetine

- Side Effects
 - Anorexia
 - Dizziness
 - Dyspepsia
 - Dermatitis
 - Constipation
 - Mood Swings
 - Transient elevation of liver enzymes
 - Suicidality
 - Dry mouth
 - Sexual dysfunction

Alpha – 2 Agonists

- Side effects
 - Sedation
 - Fatigue
 - Dizziness
 - Low blood pressure
 - Low heart rate
 - Stomach aches
 - Insomnia (guanfacine)

Medications: Duration of Action

- Short Acting: 4 hours
- Intermediate Acting: 6 – 8 hours
- Long Acting: 8 – 12 hours
24 hours

Medications

Duration of Action	Name Brand
□ Short-Acting – 4 hours	□ Ritalin, Dexedrine, DextroStat, Focalin Methylin (Tablet, Chewable & Liquid)
□ Intermediate-Acting – 8 hours	□ Ritalin SR, Metadate ER, Adderall, Ritalin LA, Metadate-CD, Methylin ER, Focalin XR
□ Long-Acting – 12 hours	□ Dexedrine Spansules, Adderall-XR, Concerta, Daytrana, Vyvanse, Quillivant
□ Non-Stimulants – 24 hours	□ Strattera, Intuniv, Kapvay

In Summary

- Identify target symptoms & impairment
- Decide the hours of desired medication coverage
 - 4 - 8 - 12 - 24 hours
- Decide type of medication
 - Stimulant (4 - 8 - 12 - 16 hours)
 - Non-Stimulant (24 hours)
- Follow up and monitoring
 - Clinical response (Target symptoms & impairment)
 - Tolerability (Side effects)

Behavior Modification

- Training the adults to change the way that they deal with the child so that the child will change the way that they respond to the adult.
- Control is external to the child.

Core Principles for Behavior Management

- Immediacy of Consequences
- Frequency of Consequences
- Saliency of Consequences
- Frequent Changes in Rewards
- Act, Don't Yack
- Positives Before Negatives
- Anticipate Problems
- Pick Your Fights - Prioritize
- Expect Variability
- Practice Forgiveness

Management of Dyslexia

Educational Remediation

Research Based Reading Instruction

- Essential Components – National Reading Panel
 - Phonemic awareness
 - Recognize, remember and manipulate individual sounds
 - Phonics and word recognition
 - Sound – symbol relationship, word meaning
 - Reading Fluency
 - Read with sufficient speed and accuracy to support comprehension
 - Vocabulary development
 - Individual word meanings
 - Reading comprehension
 - Verbal reasoning, background knowledge, comprehension strategies

Reading Instruction

- Other components
 - Basic writing skills
 - Compose English with accuracy, fluency and clarity of expression
 - Comprehending and using language
 - The ability to listen and understand the meaning of what someone is saying

Effective Reading Instruction

- Explicit
 - Clearly and directly explained not left to discovery
- Systematic
 - The speech sounds, spelling patterns, sentence structures, text genre and language conventions
- Cumulative
 - Continual review one skill builds on another
- Sequential and Incremental
 - Manageable steps
- Data driven
 - Emphasis, speed of instruction and support are determined by student's progress

Effective Reading Instruction – The 4 I's

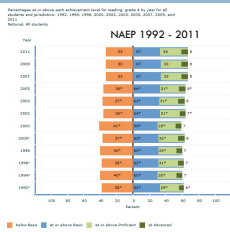
- Informed methodology
- Informed instructor
- Intensity and fidelity
- Involved administrators

Adapted from Emerson Dickman, SWIDA April 2012

Dyslexia: Management

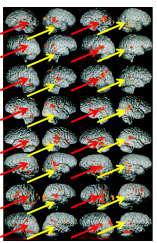
- Critical to start before 3rd grade
- It is very difficult to remediate after 4th grade
 - ▣ Educational focus changes from skills to content
 - From *learning to read* to *reading to learn*

What we are doing in our schools is not working!



Dyslexia: Management

Before Remediation After Remediation



□ Dyslexia-specific brain activation profile becomes normal following successful remedial training

Source: Fiez et al., November 2000

Dyslexia Management: IDA Recommendations

- **Knowledge and Practice Standards for Teachers of Reading**
 - Applicable for all teachers of reading
 - What they need to know and do to teach all students to read proficiently
 - Two strands
 - Classroom educators
 - Dyslexia specialists
 - Provides the foundation for teacher certification examination
 - <https://dyslexiaida.org/knowledge-and-practices/>

Management of Anxiety

Cognitive – Behavior Therapy

- Training the child
 - Change the way he/she thinks about how he/she feels.
 - Increases self control
 - Requires adult support

Mennel, K. (2001) Helping students overcome depression and anxiety: a practical Guide. New York, NY: Guilford Press

Cognitive – Behavior Therapy

- Systematic Desensitization
 - Relaxation training
 - Development of anxiety hierarchy
 - Desensitization proper (graded exposure)
- Self -Control Training (older children and adolescents)
 - Monitor thoughts, activities and feelings
 - Attend to consequences in a realistic and effective manner
- Self-Instructional Training
 - Alter maladaptive thoughts and behaviors through scripted talk
- Transfer Control Training (older children and adolescents)
 - Reduce symptoms by increasing exposure and transfer control from therapist to patient
- Social Skills Training

Mennel, K. (2001) Helping students overcome depression and anxiety: a practical Guide. New York, NY: Guilford Press

Medication Management

- SSRI
- Tricyclic antidepressants
- Benzodiazepines
- Antihistamines
- Antipsychotics

Controversial Therapies

- I researched it on the internet...
- My neighbor told me about it ...
- It's natural

What To Look For

- If it sounds too good, it probably is
- Beware of the word **NATURAL**
 - It is simply marketing
 - Hemlock, arsenic, tobacco, marijuana and many other toxic substances are natural
- Difference between safe and dangerous
 - Dose
 - Route of administration
 - Speed of administration

Evidenced Based Treatments

- Formulate a theory
- Design an experiment with control subjects
- Analyze the data
- Publish results
- Replicate findings
- Then it becomes the standard of care

It is not your fault...

But it is your problem
