

PSYCHOPHARMACOLOGY

ADHD

PSYCHOPHARMACOLOGY MODULE 2: Overview of Psychopharmacology and Childhood Disorders

April 14, 2021

MODULE 2

Presenters:

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1. Mark L. Wolraich, MD, FAAP et. Al (2019) , Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit Hyperactivity Disorder in Children and Adolescents. Pediatrics Volume 144, Number 4
2. Reading And Life Success: One of the least expected predictors of life success is one's reading ability in primary school - https://www.huffingtonpost.ca/jerry-diakiw/reading-and-life-success_b_16404148.html

Subject Matter Expert

Dr. Ronald Brown, PhD
Professor and Dean
School of Allied Health Sciences
University of Nevada

Dr. Ronald Brown, a noted expert on the topic of ADHD has served as the Associate Vice-Chancellor for Academic (Health Affairs) at the University of North Texas System.

Dr. Brown completed his Ph.D. from Georgia State University and has been the past President of the Society of Pediatric Psychology and the Association of Psychologists of Academic Health Centers.

He is a board-certified clinical health psychologist and has been an active clinician, teacher, advocate and investigator. He served as a member of the Behavioral Medicine study section of the NIH and chaired several special panels at NIH. He currently serves as the Editor of Professional Psychology: Research and Practice.

Dr. Ronald Brown's area of specialization includes behavioral sciences, pediatric psychology, attention deficit disorders, neuropsychology, psychopharmacology, learning disabilities and psychosocial oncology.



Subject Matter Expert

Deborah P. Coehlo, PhD, CPNP, CPMHS, CFLE
Founder and Director
Juniper Pediatrics

Dr. Debbie Coehlo is a certified Pediatric Nurse Practitioner and Pediatric Mental Health Specialist with a Doctoral Degree in Family Sciences and Human Development. She is the Founder and Director of Juniper Pediatrics, a clinic modeled after John F Kennedy's multidisciplinary system of care. Using a holistic, integrated care model, Juniper provides counseling, medication management and family therapy for children with ASD, ADHD and other childhood mental health disorders.

Dr. Coehlo completed her Master's in Nursing with a specialty in parent-child nursing. She spent 10 years working at the Child Development Center at the University of Washington in the Genetics Clinic and Multidisciplinary Clinic. In 1999, she completed her Doctorate degree in Human Development and Family Studies.

She continues to teach at the undergraduate and graduate level and had pursued research in the area of social networking, transitioning to out of home care for families, and child development.

Dr. Coehlo is a co-editor for the 4th and 5th edition of Family Health Nursing (F.A. Davis, 2010/2013) and has published several journal articles in the areas of families choosing residential care, families in transition, family health nursing, and care of children with special health care needs.





Panelist

Manya C. Ralkowski, EdS, BCBA, LBA
Instructional Leadership – Curriculum Specialist
Board Certified Behavior Analyst
Licensed Behavior Analyst

Ms. Manya Ralkowski has been practicing in the field of applied behavior analysis for over 25 years. Her training began under direct education and training from consultants from the Lovaas Clinic in Los Angeles while completing her bachelor of arts in Communication Disorders with endorsements in special education and psychology at Western Washington University. Ms. Ralkowski continued her education and training with a master's degree in Education from Lesley University and a graduate certificate in Applied Behavior Analysis from the University of Washington while working as an assistant teacher on the Project DATA grant at the Haring Center-Professional Training Unit. She also possesses a doctorate degree in Instructional Leadership.

Her extensive educational and clinical background has afforded her many opportunities to build programs where there were none. Ms. Ralkowski has brought many programs and change to the PNW as a Design Team member for Seattle Public Schools creating the first STEM school for the district, a district consultant creating and replicating inclusion programs across the region, and most recently a Clinical Director, starting up a school and home-based ABA program serving 10+ districts and over 20 communities regionally.

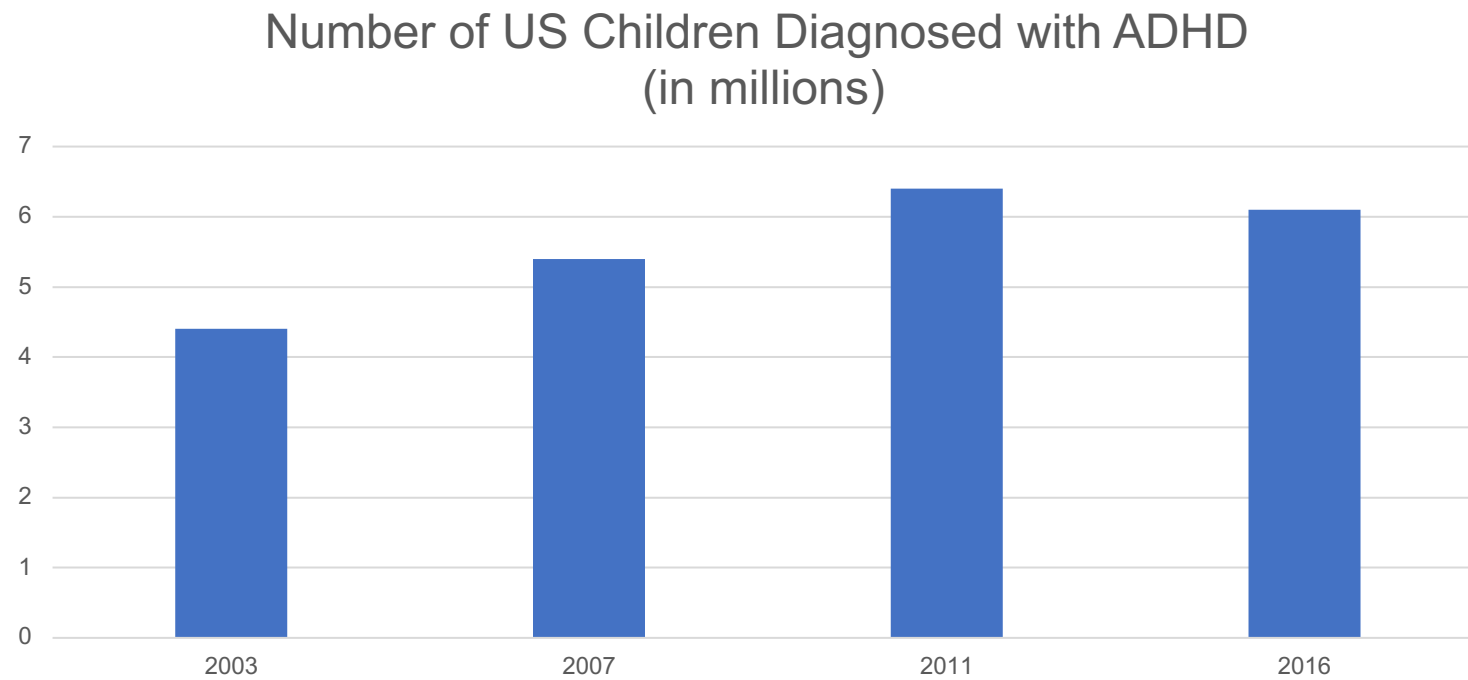
- Since 1994, Ms. Ralkowski has been creating and designing ABA programs and educational services from San Diego up the coast and into BC, Canada. She has been trained in many ABA based methodologies including PRT, DTT, NET, Verbal Behavior, Precision Teaching, PECS, and naturalistic ABA. She brings together disciplines such as ABA, special education, speech pathology, psychology, and remedial reading instruction for a comprehensive program for each student, each family, each teacher, and each school to create stronger and more inclusive communities. ⁷

Learner Objectives

1. Recognize specific target behaviors associated with ADHD for which psychopharmacology is effective.
2. Identify classes of psychotropic agents which have demonstrated effectiveness in the treatment of ADHD.
3. Understand common medications used in the treatment of ADHD, including the indication, mechanism of action, adverse and side effects, and monitoring criteria.
4. Explore and discuss the most effective behavior strategies that are seen throughout various developmental stages of treatment for ADHD.
5. Apply knowledge to specific case studies including assessment, diagnosis, treatment, and evaluation of outcomes.
6. Identify skills required to approach parents about the potential benefits of psychotropic medication for their children.
7. Discuss and analyze ethical dilemmas facing professionals and parents when treating ADHD.

ADHD Today

- The most common neurodevelopmental disorder in childhood
- 15 million individuals in the United States have been diagnosed with ADHD in the United States. This rate has shifted across time.



CDC.gov, 2021

Note. 2016 data 2-17 yrs of age.

ADHD Today

American Academy of Pediatrics Technical Report October 2019

Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit Hyperactivity Disorder in Children and Adolescents

Mark L. Wolraich, MD, FAAP, Joseph F. Hagan, Jr, MD, FAAP, Carla Allan, PhD,^d Eugenia Chan, MD, MPH, FAAP, Dale Davison, MSpEd, PCC, Marian Earls, MD, MTS, FAAP, Steven W. Evans, PhD, Susan K. Flinn, MA, Tanya Froehlich, MD, MS, FAAP, Jennifer Frost, MD, FAAFP, Joseph R. Holbrook, PhD, MPH, Christoph Ulrich Lehmann, MD, FAAP, Herschel Robert Lessin, MD, FAAP, Kymika Okechukwu, MPA, Karen L. Pierce, MD, DFAACAP, Jonathan D. Winner, MD, FAAP, William Zurhellen, MD, FAAP
SUBCOMMITTEE ON CHILDREN AND ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVE DISORDER

CLINICAL PRACTICE GUIDELINE



Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents

Mark L. Wolraich, MD, FAAP;^a Joseph F. Hagan, Jr, MD, FAAP;^{b,c} Carla Allan, PhD;^{d,e} Eugenia Chan, MD, MPH, FAAP;^{f,g} Dale Davison, MSpEd, PCC;^{h,i} Marian Earls, MD, MTS, FAAP;^{j,k} Steven W. Evans, PhD;^{l,m} Susan K. Flinn, MA;ⁿ Tanya Froehlich, MD, MS, FAAP;^{o,p} Jennifer Frost, MD, FAAFP;^{q,r} Joseph R. Holbrook, PhD, MPH;^s Christoph Ulrich Lehmann, MD, FAAP;^t Herschel Robert Lessin, MD, FAAP;^u Kymika Okechukwu, MPA;^v Karen L. Pierce, MD, DFAACAP;^{w,x} Jonathan D. Winner, MD, FAAP;^y William Zurhellen, MD, FAAP;^z SUBCOMMITTEE ON CHILDREN AND ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVE DISORDER

Scope

- The American Academy of Pediatrics' Committee on Quality Improvement, Subcommittee on Attention-Deficit/Hyperactivity Disorder, reviewed and analyzed the current literature for the purpose of developing an evidence-based clinical practice guideline for the treatment of the school-aged child with attention deficit/hyperactivity disorder (ADHD) and diagnosis and treatment of comorbid conditions in children and adolescents with ADHD.
- This review summarized recommendations for assessment, treatment, medication considerations, and expected outcomes.
- Systemic barriers were identified that restrict and/or hamper pediatric clinicians' ability to adopt recommendations. To address this issue, the subcommittee created a companion article on systemic barriers to the care of children and adolescents with ADHD to present recommendations to address those barriers.

Findings and Recommendations

- ADHD is considered a chronic condition and should be approached as such.
- The evidence strongly supports the use of **stimulant medications** for treating the core symptoms of children with ADHD and to improve functioning.
- **Behavior therapy** alone has only limited effect on symptoms or functioning of children with ADHD, although combining behavior therapy with medication seems to improve functioning and may decrease the amount of (stimulant) medication needed.
- Comparison among stimulants (mainly methylphenidate and amphetamines) did not indicate that one class outperformed the other.; attention deficit hyperactivity disorder, stimulant medication, multimodal treatment, behavior management, co-occurring.

Aggregate Evidence Quality	Benefit or Harm Predominates	Benefit and Harm Enhanced
Level A Intervention: well-designed and conducted trials, meta-analyses on applicable populations Diagnosis: independent gold standard studies of applicable populations	Strong recommendation	Weak recommendation (based on balance of benefit and harm)
Level B Trials or diagnostic studies with minor limitations; consistent findings from multiple observational studies	Moderate recommendation	
Level C Single or few observational studies or multiple studies with inconsistent findings or major limitations.	Weak recommendation (based on low-quality evidence)	
Level D Expert opinion, case reports, reasoning from first principles		No recommendation may be made.
Level X Exceptional situations in which validating studies cannot be performed, and there is a clear preponderance of benefit or harm	Strong recommendation Moderate recommendation	

FIGURE 1
AAP rating of evidence and recommendations.

Case Study: Maya, With Medication Implementation

Demographics, background and environments: kindergarten, 5 years old

- New to the district, no school previously, no evaluations
- General education classroom, 28-30 students, one teacher and occasional paraeducators in room
- Rural community
- Divorced family, guardian ad litem/court liaison for facilitation of IEP communication

Education planning and teaming:

Prior to medication

- ***Individual challenges*** - Could not remain at desk in pod or isolated for longer than 1-2 minutes, minimal interest in kindergarten academic tasks (coloring, drawing, file folder games, puzzles, arts and crafts, etc.), unable to sit on carpet at circle time, elopement, challenges with transition
- ***Classroom challenges*** - Roaming the room, property destruction, peers were increasingly afraid of her, disrupting classroom activities, required multiple adult support for safety of self and others, numerous classroom evacuations, in principal's office daily
- ***Behavior Interventions*** – Environmental changes, small group, 1:1 learning desk away from distractions, slightly darker and quiet corner of classroom, reinforcement schedules, behavior contracts, sensory and exercise breaks, functional communication cards, visuals, etc.
- ***Recommendations from IEP team*** – Behavior analyst (along with IEP team) recommended medical consult

After medication

- ***Individual successes*** – able to sit for longer and longer periods of time at desk in her pod, able to attend circle times, able to stay with the class during transitions to other classes (PE, music, recess, lunch), increased work production
- ***Classroom community*** – building trust and developing peer relationships and friendships, group participation, classroom community improvements



CAUSES OF ADHD

- ❑ **70-90% of ADHD** cases are genetically or constitutionally based.
 - ❑ **More predictable than height**
 - ❑ **Environmental risks**
 - ❑ **Stress**
 - ❑ **Trauma**
 - ❑ **Chaotic environment**
 - ❑ **Poor nutrition**
 - ❑ **Toxins** (i.e., lead, 2nd hand smoke)
 - ❑ **Health Risks**
 - ❑ **Parental drug use/ smoking/ medications**
 - ❑ **Low birth rate**
 - ❑ **Prematurity**
 - ❑ **Head injury**
 - ❑ **Drug use**
-

Other Facts

- More common in boys than girls
- ADHD is diagnosed more frequently among Black youth in the US (14%)
- Present globally
- Neuroimaging shows small differences between people with and without ADHD
- ADHD is diagnosed across cultural groups and across intellectual groups
- People with ADHD are at risk for accidental death, underachievement, underemployment, early job termination, teen pregnancy, delinquency, suicide and premature death, smoking
- Correlation between educational performance and lifelong success

TYPES OF ADHD



- ❑ **Attention deficit disorder:
predominantly inattentive**
- ❑ **Attention deficit disorder:
predominantly hyperactive and
impulsive**
- ❑ **Attention deficit disorder: Combined**

DSM-5

Target Symptoms (DSM 5)

INATTENTION

- Fails to give close attention to details
- Difficulty sustaining attention
- Does not seem to listen
- Difficulty following through
- Difficulty organizing tasks
- Reluctant to engage in tasks that require mental effort
- Often loses things
- Easily distracted
- Forgetful

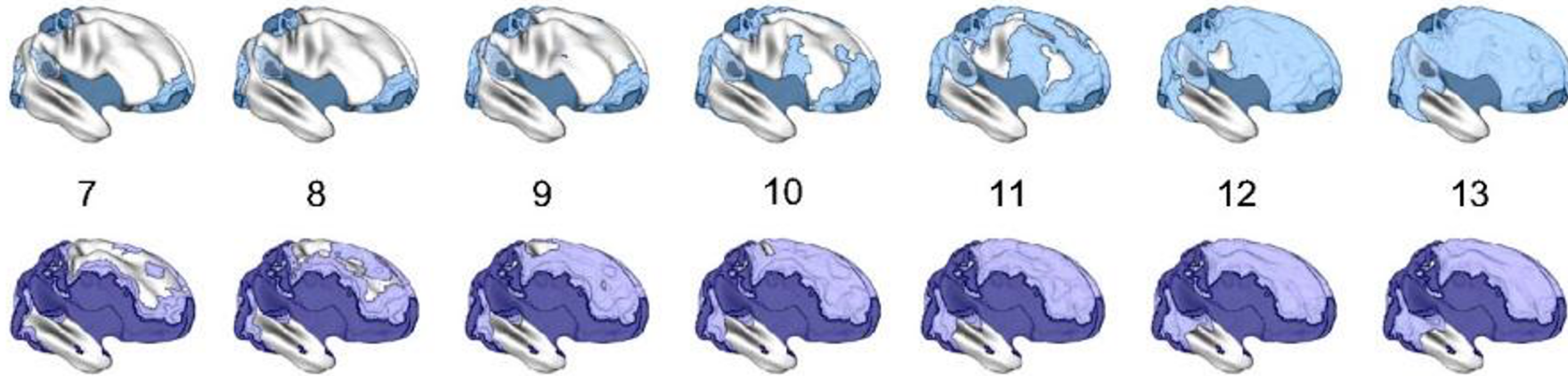
HYPERACTIVITY/IMPULSIVITY

- Fidgets or taps
- Leaves seat
- Runs and climbs excessively
- Cannot be quiet in leisure activities
- Is often “on the go”
- Talks excessively
- Blurts out the answer
- Difficulty waiting
- Interrupts

“Children with ADHD appear to be immature in their ability to engage in self regulation” (Barkley, ND)

Delayed Maturity in ADHD

ADHD



Typically developing controls

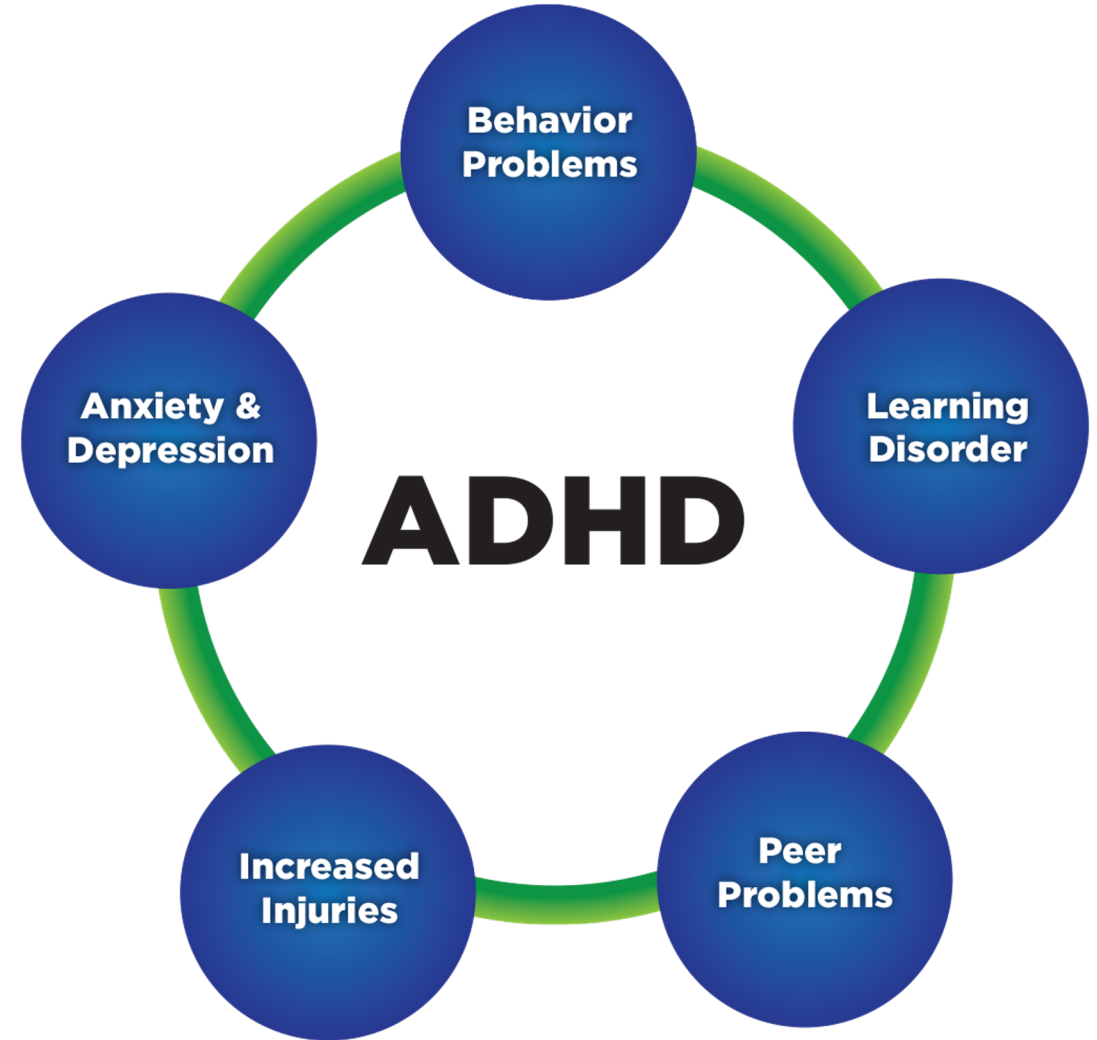
Other Diagnostic Criteria (DSM 5)

- Symptoms must be present 6 months or longer
- Symptoms must occur across settings
- Symptoms must have emerged before age 12 years
- Functional impairments: the symptoms must interfere with social and/or academic functioning
- The symptoms are not better explained by other diagnoses (i.e., oppositional defiance, mood disorders, anxiety, depression).
- Specify mild, moderate, or severe



Other Common Symptoms

- Mild delays in speech, social, and fine motor development
- Difficult temperament: Irritability and low frustration level/ mood disorders
- Learning disorders
- Behavioral problems
- Anxiety
- Depression
- “Demoralization Syndrome”



CDC.gov, 2021

Assessment

- Interview with parents
 - History of symptoms
 - Environmental factors
 - Risk factors
 - Low birth weight
 - Genetics
- Physical Examination/Labs
- Interview/school assessment
- Developmental and Behavioral Assessment
- Cognitive Testing
- Motor Testing
- Functional Testing
 - Academic
 - Social
- Rating Scales



Differential Diagnosis

- Oppositional defiant disorder (ODD): More negativity and hostility
- Intermittent explosive disorder: More aggression
- Neurodevelopmental disorders: Movements are more fixed and repetitive
- Specific learning disorders: Narrow area of inattention
- Intellectual disabilities: Symptoms appropriate for a younger developmental age.
- Preschoolers
- Autism Spectrum Disorder: More difficulty recognizing non-verbal cues, poor eye contact, transitions more rigid
- Reactive attachment disorder: Poor social skills and lack of friendships, but no other symptoms of ADHD
- Anxiety disorders: Inattention due to worry rather than attracted to desired activities or objects
- Depressive disorders: Inattention related to low mood rather than distraction
- Other mood disorders: Symptoms of hyperactivity are episodic; ADHD is always present
- Medication side effects: Bronchodilators, thyroid replacement, neuroleptics

Concurrent Diagnoses

- ODD: 50% of children with ADHD are also diagnosed with ODD
- 5-6% of children have both ADHD and LD
More common in boys
- About 40% of children with ADHD struggle with depression.



CDC.gov, 2021

Note. 2016 data 2-17 yrs of age.

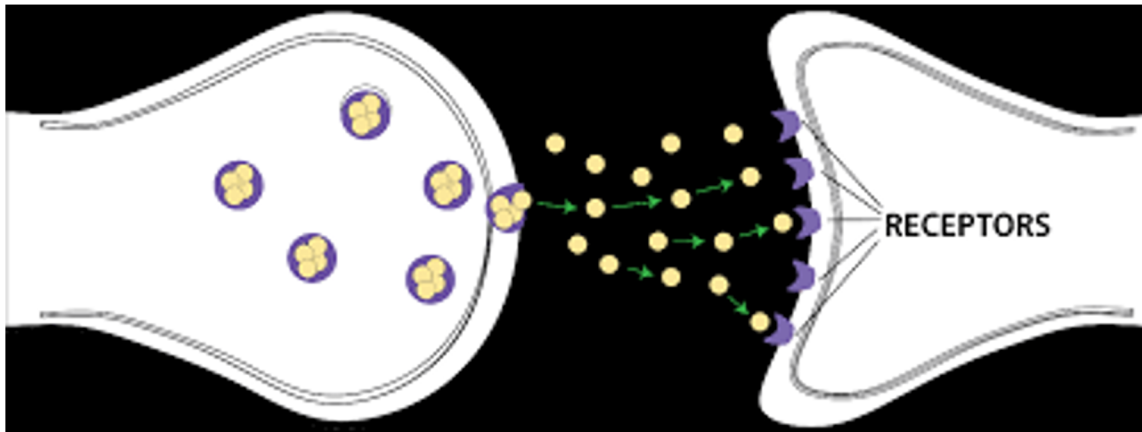
TREATMENT OPTIONS:

MEDICATION

- 55-92% of children diagnosed with ADHD improve on medications
- Appropriate evaluation and diagnosis
- Appropriate medications
 - Category
 - Dose
 - Side effects
- Most effective when combined with other strategies



HOW DO MEDICATIONS WORK?



- Dopamine travels from one neuron to the next across the synapse.
- Stimulant medications increase dopamine in the synapse (extracellular levels).
- These medications are designed to increase dopamine in the Pre-frontal Cortex (D1 and D2 receptor sites).
- Medications also can decrease norepinephrine in the Limbic system (decreases hyperactivity and aggression).

Effects and Side Effects of Medication

Effects:

- 50-60% improve in behavior,
- Improved academic skills
- Improved mood with decreased suicidal ideation, depression, and anxiety
- Improved social skills
- Improved mental health

Side Effects:

- Sleep disruption
- GI symptoms
- Decreased appetite
- Increased heart rate
- Increased blood pressure
- Altered growth
- Mood changes
- Irritability

Misuse

- Most use for academic performance enhancement, despite little evidence showing improved performance in individuals without ADHD, and may decrease performance in HS students

Categories of Medications Used to Treat Mental Health Conditions in Childhood

Attention Deficit Disorder and Hyperactivity and Impulsivity

Medications	Age Range	Dose Range	Comments
Methylphenidate (Ritalin, Concerta, Jornay)	6 years	5 to 60 mg per day	Comes in immediate release, extended release with morning and evening dosing. Effects last 4 to 16 hours.
Dexmethylphenidate (Focalin)	6 years	5 to 40 mg per day	Comes in immediate release, extended release with morning dosing. Effects last 4 to 8-12 hours.
Dexamphetamine (Adderall)	6 years	5 to 60 mg per day	Comes in immediate release, extended release with morning dosing. Effects last 4 to 8-12 hours.
Lisdexamfetamine (Vyvanse)	6 years	1- to 70 mg per day	Extended release; last 10-12 hours.
Atomoxetine (Strattera)	6 years	10 to 80 mg per day	SNRI- works similar to antidepressants- takes 2-3 weeks to know effectiveness.
Bupropion (Wellbutrin)	12 years	50 to 300 mg	Comes in sustained and extended release. Watch for seizure threshold.

Understanding Executive Functioning to Guide Behavioral Approaches

- Executive functioning skills
 - Sustained attention
 - Decreased distractibility
 - Starting and finishing tasks
 - Inhibiting actions, words, thoughts, and emotions
 - Sustained problem solving towards a goal (future directed thinking)
 - Self Awareness
 - Working memory
 - Self control
 - Self motivation



Self regulation

- Self awareness
- Inhibition
- Re-direction or attention management
- Self talk
- Non-verbal memory (i.e., visual memory)
- Problem solving
- Motivation

Note. 2016 data 2-17 yrs of age.



Behavioral Strategies

- Behavioral concerns do not stem from lack of knowledge; rather a disorder of performance.
- Behavioral plans therefore must facilitate performance rather than teach/educate knowledge.
- **Remember: Children with ADHD often know what to do, they just cannot do it.**

What to do.....

- Use tools for:
 - Organization
 - Time Management
 - Regulation of routines
- Focus on short term goals to reach long-term goals (use immediate rewards)
 - Intervene at the point of performance rather than weekly counseling sessions
 - Break up larger goals into manageable chunks
- Use external motivators longer than expected
- Watch for temporary depletions (give breaks; have a snack; move, etc.)
- Positive self talk towards self efficacy (“I can do this”)
- Exercise
- Use multiple methods of reminders (i.e., visual, auditory, etc.)

Case Study: Max: Without Medication

Demographics, background and environments:

- 1st grade, 6 yrs. old
- History - challenging kindergarten year but interventions were successful
- General education classroom, 28-30 students, one teacher and occasional paraeducators in room
- Suburb community
- Divorced family

Education planning and teaming:

Prior to intervention

- **Individual challenges** – would freeze when addressed by the teacher, transitions were very difficult, run out of the classroom and up and down the hallway, would hide behind door every time a new adult would come into the room, hard time finishing work, hard time sitting at desk for extended periods of time, would sit at desk rather than floor during circle time, was increasingly isolating himself from peers
- **Classroom challenges** - roaming the room, peers were often laughing at him as if he was the class clown, disruptive to classroom routines
- Recommendations - 1st grade teacher was recommending ADHD screening and evaluations across all team members, family, doctors, etc.
- District behavior analyst recommended behavior interventions prior to medications

After Interventions

- Parent training and education, social skills and PBS (random acts of kindness-classwide, catch him being cool, self awareness of keeping his cool, feelings sandwich, Zones of Regulation, the Good Behavior Game, feelings thermometer, exercise breaks, and lots of positive behavior support)
- **Individual successes** – improved self awareness, stayed in class/no elopement, sustained attention to task, improved functional communication, went from being student of concern to star student
- **Classroom community** – the whole school wrapped around this student and teaming continued across grades, continued developing peer relationships and friendships, improved classroom community, improved relationships in building, parent education was a success – interventions at home as well created consistency across environments

Alternative Treatments

- Diet
 - Essential Fatty Acids: 1200 mg of Omega 3 per day
- Biofeedback
- Computerized training
- Yoga
- “Green therapy”
- Exercise

Risk With No Treatment



UNTREATED:

- Increased juvenile crime rates
- Increased academic failure
- Increased teen pregnancy rates
- Increased substance abuse and addiction

CDC.gov, 2021

TREATED:

- No difference between treated ADHD and general population
- No indication that treatment increases substance use or addiction

Note. 2016 data 2-17 yrs of age.



HOW TO APPROACH RELUCTANT PARENTS?

ASSESS WHERE THE FAMILY IS:

- Understanding of ADHD
- Where they received information thus far
- Ability to understand medical information
- Values and beliefs regarding medical model of treatment
- Use face-to-face education rather than relying on reading material/Internet searches alone
- Avoid rushing; give time
- Start with behavioral approaches
- Use a collaborative approach with school, behavioral health, pediatrician, specialist, parents, and child.
- Set goals “with” the family rather than “at” the family

Case Study: Quentin, 7-year-old Male

- Referred for evaluation of ADHD by his teacher due to increasing academic difficulties, poor writing skills, and increased social difficulties at school.
- Mother stated he was easily distractible, very active, and struggled following directions at home. She noted that he did better after being active.
- Following a thorough evaluation, he was diagnosed with ADHD- combined. When medication was suggested, his mother declined stating she would rather treat his ADHD through “natural” and behavioral options. Through collaboration, Quintin was started on a 504 Plan at school with accommodations (quiet space, frequent breaks, frequent tokens to reach goals, shortened assignments, and guaranteed recess. He could also use fidgets).
- He was also given Omega 3 1200 mg per day. Parent counseling was provided, as well as individual behavioral counseling.
- After 9 months, his symptoms improved slightly. Continued conversation and education was provided to parents in addition to a referral to a support group for parents. His parents requested to reevaluate the medication option and noted they had read more and spoke with other parents and were now feeling more comfortable starting medication.
- Today Quintin is 14 years old and has been taking Methylphenidate ER (Concerta) for the past 6 years. He is currently titrated to 27 mg per day. He is earning A’s and B’s in high school and is active on the basketball team. He continues to be an active part of his treatment team.





- Respect for autonomy
- Appropriate information
- Beneficence
- Non-maleficence:
First do no harm
- Justice

ETHICAL DILEMMAS



DISPELLING MYTHS

- ADHD is not a real medical condition
- Individuals with ADHD just need to try harder; they do not need medication
- Those with ADHD have lower IQ's than those without ADHD
- Kids with ADHD will "grow out of it"
- ADHD is caused by "bad parenting"
- Ritalin kills
- Children taking stimulant medications to treat ADHD are more likely to use addictive substances than children not treated for ADHD

Summary

ADHD is a medical condition with target symptoms identified by the DSM 5.

Medications are effective in treating ADHD.

Classifications of medications include stimulant and non-stimulant medications. Stimulant medications are the most effective.

The most effective behavioral strategies used to treat ADHD are focused on enhancing executive functioning skills.

Parents need face-to-face information, collaborative goal setting, time, support, and opportunity to explore options.

Ethical dilemmas include access to care, regulating scheduled medications, and appropriate diagnosis and monitoring.

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- *Manya C. Ralkowski, EdS, BCBA, LBA*

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