A NEUROSCIENCE APPROACH TO ADHD/ODD BEHAVIORS

Amen, D. (2011)
Healthy Brains at Rest

Top View

Front View

Amen, D. (2011)
ADD/ADHD Classic Symptoms

• Persistent short attention span
• Distractibility
• Disorganization
• Procrastination
• Poor judgments
• Impulse control
• 60% of people that have ADD will have co-occurring learning disabilities.
Type 1 Classic ADD

• **Symptoms**: Primary ADD symptoms plus hyperactivity, restlessness, and impulsivity.

• **Brain Scan**: decreased activity in the basal ganglia and prefrontal cortex during a concentration task

Type 1 Classic ADD

• Prefrontal Cortex is responsible for executive functions, mediating conflicting thoughts, making choices between right and wrong, forethought, and governing social control such as suppressing emotional or sexual urges.

• Associated with qualities of sentience, human general intelligence, and personality.
Type 1 Classic ADD

- **Basal Ganglia** is responsible for feelings of euphoria, and is the reward center, is greatly affected by drugs. Drugs such as cocaine and nicotine boost the dopamine receptors in this area of the brain, increasing the payoff of exposure to those substances, thus increasing chances for addictions.
Type 1 Classic ADD

- **Brain Scan:** decreased activity in the basal ganglia and prefrontal cortex during a rest and a concentration task.

Type 1 Classic ADD

Therapeutic Interventions:

**Medications**: stimulant medications (such as Adderall, Concerta, Ritalin, or Dexedrine)

**Cognitive Behavioral Therapy** – social skills, collaborative problem solving skills.

**Dialectical Behavior Therapy** – Mindfulness, skill training, relaxation techniques.

**Multi-Systemic Therapy (MST)**

Type 1  Classic ADD  
Therapeutic Interventions - Adderall 

ADD Before Treatment 

ADD After Treatment 

Type 2: Inattentive ADD

• Primary ADD symptoms plus:
  – Decreased motivation
  – Low energy
  – Chronic Boredom
  – Unable to concentrate,
  – Internally preoccupied.
  – Diagnosed later in life, more common in girls.

These are the quiet kids and adults, often labeled indolent or unmotivated combined with simple cognitive functioning.

Type 2: Inattentive ADD

- **Brain Scan**: Decreased activity in the basal ganglia and dorsal lateral prefrontal cortex during a concentration task
- The Basal Ganglia is responsible for motor control, learning and tasks requiring the allocation of attention and the processing of stimuli such as music and language.

Type 2: Inattentive ADD

Therapeutic Interventions:

• Medical interventions - Psychostimulants in the methylphenidate group.

• Cognitive Behavioral Therapy – social skills, collaborative problem solving skills, task oriented skills.

• Dialectical Behavior Therapy – Mindfulness, skill training, relaxation techniques.

• Multi-Systemic Therapy (MST)

Type 3: Overfocused ADD

• **Symptoms:** include cognitive inflexibility, poor adaptability, overfocused, focuses on negative thoughts or behaviors, worrying, argumentative and oppositional, and adjustment to change is difficult.

• Often includes hyperactivity, impulsivity, and inattention.
Type 3: Overfocused ADD

- **Brain Scan**: Increased activity in the anterior Cingulate Gyrus and decreased Prefrontal Cortex activity.

- **Cingulate Gyrus** is the part of the brain associated with shifting attention. Responsible for emotional sensations such as fear, anxiety or pleasure and the associated physical responses to those emotions.

Type 3: Overfocused ADD

Characteristics:

• Instead of learning from an embarrassing, frustrating or hurtful life experiences, they are likely to dwell on the negative feelings.

• A person will tend to say “no” without listening to the question.

• Cognitive issues such as obsessive compulsive disorder, eating disorders and addictions are linked to this neurological component.

• These children are often found in families with addiction or obsessive compulsive issues.
Type 3: Overfocused ADD

Therapeutic Interventions:

• **Medical Intervention** - Antidepressants like Effexor, or a combination of an SSRI and a stimulant. Medications that enhance both serotonin and dopamine availability in the brain.

• **Cognitive Behavioral Therapy** – social skills, collaborative problem solving skills, task oriented skills.

• **Dialectical Behavior Therapy** – Mindfulness, skill training, relaxation techniques.

• **Neurofeedback Therapy**

• **Multi-Systemic Therapy (MST)**
Type 4: Temporal Lobe ADD

- **Symptoms:** Type 1 symptoms plus inattention and/or hyperactivity-impulsivity and mood instability, aggression, mild paranoia, anxiety with little provocation, atypical headaches or abdominal pain, visual or auditory illusions, and learning problems especially reading and auditory processing.

Amen, D. (2011)
Type 4: Temporal Lobe ADD

- Temporal lobe activity enhances mood stability, while increased or decreased activity in this part of the brain leads to fluctuating, inconsistent or unpredictable moods and behaviors.
Type 4: Temporal Lobe ADD

- **Brain Scan**: Decreased or increased activity in the temporal lobes with decreased prefrontal cortex activity.
- Aggression tends to be more common with left temporal lobe abnormalities.

Type 4: Temporal Lobe ADD

Therapeutic Interventions:

• **Medical Intervention** - Antidepressants like Effexor, or a combination of an SSRI and a stimulant. Medications that enhance both serotonin and dopamine availability in the brain.

• **Cognitive Behavioral Therapy** – social skills, collaborative problem solving skills, task oriented skills.

• **Dialectical Behavior Therapy** – Mindfulness, skill training, relaxation techniques.

• **Neurofeedback Therapy**

• **Multi-Systemic Therapy (MST)**
Type 5: Limbic ADD

Symptoms:

• Inattention and/or hyperactivity-impulsivity and negativity, depression, sleep problems, low energy, low self-esteem, social isolation, decreased motivation and irritability.

• The focus is on the emotions, motivation, circadian rhythms, and some decision making systems.

Type 5: Limbic ADD

- **Brain Scan**: increased central limbic system activity and decreased prefrontal cortex activity

Bottom view increased limbic activity

Bottom view increased limbic, basal ganglia and cingulate activity

Type 5: Limbic ADD

- The limbic lobe is made up of a number of systems that support memory, learning, emotion and perception.
- The cortex also helps join the limbic system and emotion.
- In the limbic system is where dopamine modulates habit formation by enhancing the neural correlation between pleasure and a given behavior.
Type 5: Limbic ADD

Therapeutic Interventions:

• **Medical Intervention** - responds best to stimulating antidepressants such as buprion or imipramine, or venlafaxine if obsessive symptoms are present.

• **Cognitive Behavioral Therapy** – social skills, collaborative problem solving skills, task oriented skills.

• **Dialectical Behavior Therapy** – Mindfulness, skill training, relaxation techniques.

• **Neurofeedback Therapy**

• **Multi-Systemic Therapy (MST)**
Type 6: The Ring of Fire ADD

- Type 1 ADD, plus having extreme moodiness, oppositional behavior, racing thoughts, excessive talking, easily triggered anger outbursts, and hypersensitivity to lights and sounds.

- This is the part of the brain which is responsible for higher thought and functioning and the continuous firing is what creates the problems.
Type 6: The Ring of Fire ADD

Top view at rest
Top view active

increased activity in the cingulate, lateral parietal, frontal and temporal lobes

Type 6: The Ring of Fire ADD

Symptoms:

• Tend to be severe oppositional behavior (ODD), distractibility, irritability and temper problems and mood swings. *

*Possibly the beginning to an early bipolar pattern.

Type 6: The Ring of Fire ADD

Therapeutic Interventions:

• **Medical Intervention** - responds best to anticonvulsant medications, like Depakote or Neurontin, or antipsychotic medications such as Risperdal or Zyprexa. Psychostimulants are not effective.

• **Multi-Systemic Therapy (MST)** – Most effective

• **Cognitive Behavioral Therapy** – social skills, collaborative problem solving skills, task oriented skills.

• **Dialectical Behavior Therapy** – Mindfulness, skill training, relaxation techniques.

• **Neurofeedback Therapy**

Cont.
The ADHD/ODD Child

Top View
Normal Brain

Top View
ADHD/ODD Brain

The ADHD/ODD Child

Therapeutic interventions:

• Complete Medical assessment from a Pediatrician. Meds for the ADHD.

• A Neurological and/or Psychological assessment for learning disabilities.

• Multi-Systemic Therapy - This therapy goes into the home, school, families, friends and into the community daily and weekly as needed to work with the parent-child interactive to intervene in controlling negative behaviors between the child and parent.
The ADHD/ODD Child

MST therapeutic interventions for the child:

• Cognitive behavioral therapy – To replace negative, disruptive behaviors with positive, constructive behaviors.

• Social skills training to help a child get along better with peers, parents, and other authority figures.

• Have the youth engage in several activities, sports, gymnastics, music, the activities the child enjoys, then encourage the parent be committed to supporting them.
The ADHD/ODD Child
MST interventions for the parent: To Do’s

• No isolation time-outs. This teaches them nothing.
• Avoid power struggles. Parents should selectively pick their battles.
• Remain calm and unemotional in the face of disruptive or oppositional behavior. ODD behavior feeds on negative emotions.
• Recognizing and emphasizing consistently your praise for all positive behaviors that show self-control as much as possible.
• Always reward and work with positive consequences – If you take something away make a plan to earn it back.
The ADHD/ODD Child
MST interventions for the parent: To Do’s

• Maintain consistent reinforcement of rules and behavior to provide the child with structure.
• Maintain consistent routines with regular meals and family activities.
• Giving your child a chore without demands, to instill a sense of accomplishment and responsibility.
• Work with your spouse or partner to ensure cohesive parenting strategies.
• Always give your child unconditional love and acceptance no matter what the circumstances.
What parents need to remember with ADHD/ODD children

- Kids do well if they can
- It's a lack in skills that creates the negative behaviors
- Think what you are asking them to do.
- Set your child up for success - kids want to do well.
- Do not assume kids know what is expected of them

The ADHD/ODD Child
Collaborative Problem Solving intervention

CPS Model (Most effective)

• **Step 1 - Empathy** - gather information about the child and the problem.

• Ask what's going on? Tell me why are you angry? This problem really bothers you, why? Tell me more about the that sad face...

Greene, R.W. (2010a)
Step 2 - Define the problem - Understand how the child is feeling about the problem.

• This is where the adult shares their concern about the same unsolved problem. Sharing with the youth how the unsolved problem may affect others.

Greene, R.W. (2010a)
The ADHD/ODD Child
Collaborative Problem Solving intervention

Step 3 - Invitation step. - brainstorm with the child how to get the problem solved. Make it a win-win situation. The important part is building the relationship, and not so much the end task.

• This gives the child reasonable life choices and offers them a sense of control and choice of consequences.

Greene, R.W. (2010a)
The ADHD/ODD Child
Strategies for avoiding conflict

• Authoritarian parenting will not work with ODD children.
• If routine is changed, prepare the child for change, preteach.
• Remember, these kids do not handle surprises well, so take time to preteach so they know what to expect.
• Watch non verbal cues. If signs of frustration begin, stop, distract or change the situation.
Additional Brain scans for other common behavioral symptoms
Scalloping (toxicity), low overall activity, especially in the prefrontal and temporal lobes

Excessive activity in the anterior cingulate gyrus. Gets stuck on bad thoughts

Substance Abuse Brain scans

Substance Abuse

Toxic Work Exposure

Alcohol Abuse

Long Term Alcohol Abuse

Daily Drinking

Effects of Smoking Marijuana

18 y/o – 3 year history of 4 x week use underside surface view decreased pfc and temporal lobe activity

Substances that damage the patterns in your brain
Effects of Smoking Marijuana

Healthy Brain

Bottom View

18 year old
3 years 4 x week use

Decreased prefrontal Cortex
and temporal lobe activity
Effects of Smoking Marijuana

Healthy Brain

16 year old
2 year history of daily abuse

Bottom View
Effects of Smoking Marijuana

Healthy Brain

28 year old
10 years of weekend use

Bottom View
Effects of Smoking Marijuana

On THC

Off THC

Bottom View
Effects of Smoking Marijuana

Effects of Smoking Marijuana

Our studies have shown that frequent marijuana use in adolescence is linked to poorer memory and attention, abnormal brain activation, and poorer integrity of white matter in the brain, even after 28 days of abstinence. (Susan Tapert, MD)
Over 70,000,000 Served

Researchers found that 42% of people surveyed in the U.S. had tried marijuana at least once

- Marijuana is the most widely used illicit drug in America today, and this has been the case for some years. *Nearly 70 million Americans have used marijuana in their lifetime.* By 12th grade, 52% of youth have tried marijuana. Marijuana is a potent, intoxicating drug with long-term, cumulative effects. Unlike alcohol or most other substances of abuse, it remains in the body for as long as forty days. Heavy users can test positive for the drug even after weeks of abstinence.

http://www.americanathleticinstitute.org/highschool/marijuana.html
Premenstrual Cycle of a 12 year old girl with violent mood swings, aggressive behavior, prolonged tantrums, depression and oppositional behavior.

Pathological Gambling

2 yrs. Failed Marriage Therapy - Male

Healthy

Failed Marital Therapy: Toxic

References


Patterns of PMS Symptoms

Commonly associated symptoms of Deep Limbic Activity and an underactive Prefrontal cortex:

Over Active Left Side
- Anger
- Irritability
- Expressed negative emotion
- Outwardly directed anger and irritability

Over Active Right Side
- Sadness
- Emotional withdrawal
- Anxiety
- Repressed negative emotion
- Right-sided overactivity is more an internal problem.

Patterns of PMS Symptoms

Commonly associated symptoms of Deep Limbic Activity with co-occurring increased cingulate gyrus:

- Repetitive negative thoughts
- Negative verbalizations
- Increased sadness
- Worrying
- Cognitive inflexibility – unable to shift attention easily

Case Study 1 - PMS Symptoms

- A 25-year-old female who has been diagnosed with severe PMS and ADD. Seven to ten days before the onset of her menstrual cycle she experiences moodiness, irritability, hypersensitivity to others, anxiety and increased alcohol consumption. These symptoms decrease significantly several days after the onset of her menstrual period.

Case Study 1 - PMS Symptoms

Worst Time Just Before Period

Decrease in prefrontal and temporal lobe activity

Bottom looking up view

Top down view

Case Study 1 - PMS Symptoms cont.

Worst Time Just Before Period
Increased cingulate activity - Hyperactivity

Case Study 1 - PMS Symptoms

Best time - 1 week after Period

Overall improvement

Bottom looking up view

Top down view

Case Study 1 - PMS Symptoms
Best time - 1 week after Period
Cingulate Gyrus activity is calm – no hyperactivity

Case Study 1 - PMS Symptoms

Cingulate Gyrus activity

Worst time

Best time