DIVERSITY IN ADHD

Recent Findings in Neurobiology, Clinical Manifestations and Diagnosis

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ATTENTION DEFICIT / HYPERACTIVITY DISORDER

A brain disorder marked by an ongoing pattern of inattention and/or hyperactivity-impulsivity that is inconsistent with a child’s level of development.

- are more severe
- occur more often
- interfere with or reduce the quality of how they functions socially, at school, or in a job
Evolution of nomenclature used to describe ADHD

- **“Fidgety Phil” Germany** (1848)
- **Brain-Injured Child Syndrome** (1800s)
- Volitional Inhibition (George Still, 1902)
- Possible Manifestation of Von Economo’s Encephalitis in Children (1918)
- Minimal Brain Dysfunction (1930)
- Hyperkinetic Reaction (DSM-II, 1968)
- Renamed ADD/ADHD (1970s)
- ADHD (DSM-III-R, 1980)
- Attention-Deficit/Hyperactivity Disorder (DSM-IV, 1994)
- Attention-Deficit/Hyperactivity Disorder (DSM-5, 2013)
Prevalence of ADHD in children and adolescents by geographical location (n=102 studies)

Worldwide estimates = 5 – 7%

Philippine Estimates of AD/HD Prevalence

Prevalence: 3 - 5%

Population: 103.3 M

AD/HD: 3-5.1 M
Prevalence rates of ADHD Diagnosis among children and adolescents aged 4 to 17 years

M:F (4:1)

55% increase in diagnosis among girls from 2003 to 2011

50% increase among younger children

52% increase among adolescents

Maternal and Child Health Bureau and the National Center for Health Statistics of the U.S. Centers for Disease Control and Prevention in a National Children's Survey from 2003-2011
Average age of diagnosis = 6.2 yrs old

- "Mild" ADHD diagnosed at 7 years,
- "Moderate" ADHD diagnosed at 6.1 years
- "Severe" ADHD diagnosed at 4.4 years.

✓ The more severe the symptoms, the younger they are identified and the earlier intervention can be started


ETIOLOGY
EPIGENETIC BASIS OF ADHD
EPIGENETIC BASIS OF ADHD
Overstimulation hypothesis:

Overstimulating the brain in the first years of life will condition it to expect high levels of input leading to shorter attention spans later.

"I’m bored!"

"aren’t you always?!"
Attentional and Self-regulatory Problems from early screen exposure:

- 10% increase for every hour of television viewing per day in children < 3 yrs old
- Further increase with fast-paced videos
- 110% increase if violent games

Children who can’t pay **ATTENTION** can’t **LEARN**!

“High speed media content can contribute to **ATTENTION DEFICIT**, as well as decreased concentration and memory, due to the brain pruning neuronal tracks to the frontal cortex.”

Neurobiology OF ADHD

How Neurotransmission Works
https://www.youtube.com/watch?v=p5zFgT4aofA
NEUROBIOLOGY OF ADHD

- Frontal Lobe
- Amygdala
- Hippocampus
- Basal ganglia (putamen, nucleus accumbens)
- Cerebellum
NEUROBIOLOGY OF ADHD

Basal ganglia (putamen, nucleus accumbens)

Frontal Lobe

“HOW”

NEUROBIOLOGY OF ADHD

NEUROBIOLOGY OF ADHD

NEUROBIOLOGY OF ADHD

Brain Imaging Studies comparing maturation of Frontal Lobes of Individuals with and without ADHD

*Lighter colored areas indicate peak cortical maturation
NEUROBIOLOGY OF ADHD
MRI Differences between ADHD and Control brains

> Frontal Lobe size reduction
> Temporal lobe size reduction
> Decreased activity in both
MRI Studies show less blood flow in regions of the brain while working on a task in individuals with ADHD vs. Non-ADHD.
DIAGNOSIS and CLASSIFICATION
CORE SYMPTOMS OF AD/HD:

(EXECUTIVE FUNCTIONS)

1. Inattentiveness

(SELF-REGULATION)

2. Hyperactivity
3. Impulsivity

Emotional Dysregulation
AD/HD Mimickers

✓ Sudden change in the child’s life (ex: death of a parent, divorce, parent’s job loss)
✓ Undetected seizures
✓ Intermittent hearing problems (ex: middle ear infection)
✓ Underachievement caused by Learning Disability
✓ Anxiety or depression
✓ Other medical disorders that affect brain functioning
Diagnosis and Assessment

DSM – 5
(American Psychiatric Association)
ICD-10
(World Health Organization)

Rating scales:
- ADHD-RS
- Vanderbilt
- SNAP-IV
- Conners
- SKAMP
- ACE
Diagnosis and Assessment

Comprehensive Assessment tools
(ex: Intelligence/Mental Development tests, Educational Achievement tests)

Neuroimaging Studies (ex: MRI, PET Scans)

Electrometric Tests (ex: EEG)
Diagnostic and Statistical Manual of Mental Disorders

- Published by the American Psychiatric Association
- Provides standard diagnostic criteria
- First edition (DSM-1) published in 1952
ADHD: Changes in the DSM-5

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<th>CHANGES IN THE DSM-5</th>
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<td><strong>Examples added</strong> especially for adult presentation</td>
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<tr>
<td><strong>Age of onset:</strong> Before 12 years old (7 years old in DSM-IV)</td>
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<td><strong>Subtypes replaced with presentation specifiers:</strong></td>
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<tr>
<td>▪ Combined presentation</td>
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<tr>
<td>▪ Predominantly inattentive presentation</td>
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<tr>
<td>▪ Predominantly hyperactive/impulsive presentation</td>
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<td><strong>Comorbidity with ASD</strong> is allowed</td>
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<td><strong>Symptom threshold:</strong> 5 for ≥ 17 years, 6 for younger persons</td>
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<td><strong>Several symptoms</strong> (not impairment) present in more than one setting</td>
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\(^a\)The caveat *not due to oppositional behavior or failure to understand instructions* has been removed from the DSM-5.
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<tr>
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<th>Revisions to DSM Hyperactivity/Impulsivity Symptoms of ADHD</th>
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<td>DSM-5 revisions are in red.</td>
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<tr>
<td>1.</td>
<td>Often fidgets with or taps hands or feet or squirms in seat.</td>
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<td>2.</td>
<td>Often leaves seat in situations when remaining seated is expected (eg, leaves his or her place in the classroom, in the office or other workplace, or in other situations that require remaining in place).</td>
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<td>3.</td>
<td>Often runs about or climbs in situations where it is inappropriate. (Note: In adolescents or adults, may be limited to feeling restless.)</td>
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<td>4.</td>
<td>Often unable to play or engage in leisure activities quietly.</td>
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<td>5.</td>
<td>Is often “on the go,” acting as if “driven by a motor” (eg, is unable to be or uncomfortable being still for extended time, as in restaurants, meetings; may be experienced by others as being restless or difficult to keep up with).</td>
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<td>6.</td>
<td>Often talks excessively.</td>
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<td>7.</td>
<td>Often blurts out an answer before a question has been completed (eg, completes people’s sentences; cannot wait for turn in conversation).</td>
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<td>8.</td>
<td>Often has difficulty waiting his or her turn (eg, while waiting in line).</td>
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<td>9.</td>
<td>Often interrupts or intrudes on others (eg, butts into conversations, games, or activities; may start using other people’s things without asking or receiving permission; for adolescents and adults, may intrude into or take over what others are doing).</td>
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DSM – 5 CLASSIFICATION for a DIAGNOSIS OF AD/HD

- Before 12 years
- At least 6 months
- Present in ≥ 2 settings
- Impact on social, academic and occupational functioning
- Not better accounted for by another mental disorder
- Requires indication of severity

Prevalence of AD/HD presentations according to age range

Distribution of Children with AD/HD in association with Co-morbid conditions

- Diagnosed with only AD/HD: 33%
- Diagnosed with 1 co-morbid disorder: 18%
- Diagnosed with 2 co-morbid disorders: 33%
- Diagnosed with 3 or more co-morbid disorders: 16%

N = 5000 children
Percent of children with certain problems, by disorder group

- Below average school performance
- Held back in school
- Trouble with police or suspended or expelled from school
- Difficulty making and keeping friends

- No disorder
- ADHD alone
- ADHD and CD or ODD

AD/HD will persist in approximately 50 – 75% of children diagnosed with the condition.

Predictors of Persistence of ADHD into Adulthood

- Severity
- Need for treatment
- Co-morbid conduct disorders
- Co-morbid major depressive disorder

Kessler, RC et al. Arch Gen Psychiatry 2010; 67:1168-1178
Associated Conditions

1. Learning Disabilities (30-60%)
   a. Dyslexia
   b. Dyscalculia
   c. Dysgraphia

2. Problems in Fine Motor Coordination (Dyspraxia) (50%)

3. Externallizing behavior Problems (50-60%)
   a. Oppositional Defiant Disorder
   b. Conduct Disorder

4. Internalizing Behavior Disorder (30%)
   a. Anxiety/Mood disorder

5. Language/Communication Disorder (Dysphasia)

6. Tic Disorder

7. Nocturnal Enuresis/Encopresis
Impact of ADHD across the lifespan
Executive Functions Impaired in ADHD

**Executive Functions**
(Work together in various combinations)

- Organizing, prioritizing and activating to work
- Focusing, sustaining and shifting attention to tasks
- Regulating alertness, sustaining effort, and processing speed
- Utilizing working memory and accessing recall
- Managing frustration and modulating emotions
- Monitoring and self-regulating action

1. Activation
2. Focus
3. Effort
4. Memory
5. Emotion
6. Action

Problem Behaviors associated with ADHD compared to those without ADHD

- Repeat a grade
- < high school
- Teen pregnancy
- STD
- Substance abuse
- Accident prone
- Serious car accident
- Arrested
- Incarcerated
- Fired from job

Subjects (%)

Perceived negative impact of ADHD on everyday life of children and adolescents

Developmental Impact of ADHD

- **Behavioral Disturbance**
  - Preschool
  - School-age
  - Adolescent
  - College-age
  - Adult

- **Academic Problems**
  - Difficulty with social interaction
  - Self esteem issues

- **Behavioral Disturbance**
  - Academic Problems
  - Difficulty with social interaction
  - Self esteem issues

- **Academic Failure**
  - Self esteem issues
  - Relationship problems
  - Substance abuse
  - Injury, accidents
  - Occupational Failure

- **Difficulty with social interaction**
  - Self esteem issues

- **Legal Issues, smoking and injury**

- **Substance abuse**

- **Injury, accidents**

- **Occupational difficulties**

Harpin V. 2005. The Effect of AD/HD on the Life of an Individual, their Families and Community from Pre-school to Adult life. Arch of Dis in Childhood
Some Positive AD/HD Traits
Some Positive AD/HD Traits

- Productive
- Multi-task
- Resourceful
- Achiever
- Ambitious
- Broad minded
- Conceptualizes well
- Tenacious
- Tolerant
- Driven
- Optimistic
- Empathetic

HYPER-FOCUSED
Some Positive AD/HD Traits

Adaptive
Collaborative
Adventurous
Courageous
Confident
Eloquent speakers
Unconventional
Creative
Innovative
Imaginative
Versatile
Multi-talented

IMPULSIVE
UNINHIBITED

HYPER-FOCUSED
Some Positive AD/HD Traits

Outgoing
Witty
Funny
Exciting
Lively
Good story-teller
Attractive personality
Charismatic
Sociable
Spontaneous
Pragmatic

IMPULSIVE
UNINHIBITED
ATTENTION-SEEKING
HYPER-FOCUSED
To Conclude: