

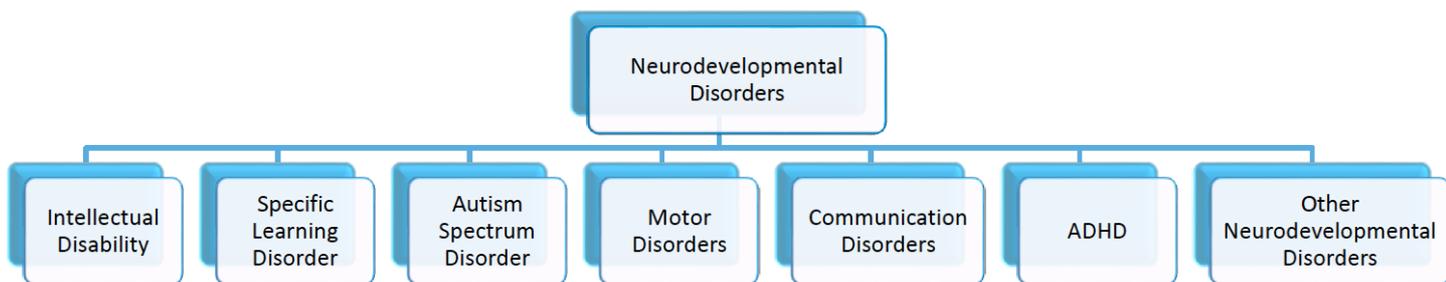
Week 2: Disorders of Childhood

What are neurodevelopmental disorders?

- A group of conditions with onset in the developmental period
- Disorders of the brain
- The disorders manifest early in development, often before the child enters school
- They are characterised by developmental deficits that produce impairments of:
 - Personal
 - Social: develop and maintain relationships
 - Academic: school
 - Occupational functioning
- The range of developmental deficits varies from very specific limitations of learning or control of executive functions to global impairments of social skills or intelligence

DSM 5 Classification:

- Neurodevelopmental disorders frequently co-occur



- For some disorders, the clinical presentation includes symptoms of excess as well as deficits and delays in achieving expected milestones

Diagnosis of Neurodevelopmental disorders:

- The same or similar symptoms can present across different disorders
- Eg down syndrome, ASD and Intell disability often experience elevated attention difficulties, yet the pathways to these behaviours are different
- This can present diagnostic dilemmas
- Prior to making a diagnosis, clinicians must also consider what is typical for a particular age
- Developmental psychopathology: focuses on disorders of childhood within the context of life span development to identify behaviours appropriate at one stage and not the other
- Rely on symptoms and behavioural ratings
- Need to assess behaviour in relation to peers of their age

Childhood disorders prevalence divided into two broad domains:

1. Externalising disorders: outward directed behaviours, eg aggressiveness, overactivity: includes ADHD, conduct disorder and ODD

2. Internalizing disorders: inward focused experiences such as depression, social withdrawal, anxiety: includes anxiety and mood disorders

ADHD:

- Common behavioural disorder
- Starts during childhood and continue into adulthood
- Have trouble making friends
- Have 3 main symptoms:
 1. **Inattention:** ability to remain focused on task, attend to information, pay attention
 2. **Hyperactivity:** ability to modulate motor activities, conversation
 3. **Impulsivity:** ability to regulate behaviour in appropriate ways and settings. Eg not blurting out responses to questions

DSM 5 criteria:

- Need 6 or more symptoms of either inattention or hyperactivity/impulsivity. Eg 6 symptoms in inattention is okay but more likely to have difficulties in both aspects
- Need to be frequent, pervasive, persistent and significant impact on child's life
- Symptoms should be present for at least **6 months**
- Several of the symptoms should be present **before the age of 12**
- Some impairment from the symptoms in **2 or more settings**
- Clear evidence of clinically significant impairment in how the child functions in social, or school situations (distinct from typical development)
- Rule out symptoms that occur due to another disorder eg intellectual disorder
- The age of onset was changed from 7 to under age 12
- Adults only need to show symptoms in 5 domains rather than the 6 required for children
- 3 specifiers are included to indicate which symptoms predominate:
 1. Inattentive
 2. Hyperactive-Impulsive
 3. Combined (most common)
- A co morbid diagnosis with ASD is now allowed
- These changes may result in more children and adults receiving a diagnosis of ADHD
- Half of children with ADHD are diagnosed by age 6. However children with severe ADHD tend to be diagnosed earlier

	Inattention	Hyperactivity/Impulsivity
1	Not giving close attention to details, or make seemingly careless mistakes	Fidgeting with their hands or feet, or squirming in their seat
2	Having difficulty sustaining attention in tasks or play activities	Leaving their seat in the classroom
3	Not seeming to listen when spoken to directly	Running about or climbing excessively in inappropriate situations
4	Not following through on instructions and not finishing school work, chores or other duties	Having difficulty playing or taking part in leisure activities quietly
5	Having difficulty organising tasks and activities	Being 'on the go' or act as if 'driven by a motor'
6	Avoiding or disliking tasks that need continuing mental effort	Talking too much
7	Losing things needed for tasks or activities	Answering before questions have been completed
8	Being easily distracted	Having difficulty waiting in turn
9	Being forgetful in daily activities	Interrupting or intruding on others

ADHD and conduct disorder:

- Frequently co occur
- ADHD more associated with off task behaviour in school, cognitive and achievement deficits and better long term prognosis
- Girls with both ADHD and conduct disorder exhibit more antisocial behaviour and risky sexual behaviour than girls with only ADHD

Prevalence of ADHD

How many children have ADHD?

- Prevalence of around 7% in an Australian sample- Based on DSM-IV criteria
- The CDC reports that in 2011-2012, 11% of all 4-17 year old's in the US had been diagnosed with ADHD. A reported 42% increase from 2002-04 to 2011-12.
- However rates vary, with some reporting prevalence rates of just over 3%
- A recent meta-analysis did not find evidence for an increase in the number of children who met criteria for ADHD over time
- Variability across studies due to:
 - Diagnostic criteria, source of info
 - Different funding models/ education
 - Location

Sex differences:

- Girls with combined ADHD more likely to have comorbid diagnosis of CD or ODD than girls without ADHD
- ADHD girls viewed more negatively
- ADHD girls more anxious and depressed
- ADHD girls exhibited neuropsych deficits in executive functioning
- By adolescence ADHD girls were more likely to have symptoms of an eating disorder and SUD

Adult and ADHD:

- More likely to have lower SES and change jobs more frequently

Development of ADHD:

- Difficult to diagnose in children under 4 (4 year old developmentally appropriate behaviour is variable)
- ADHD is 3 times more common in boys: girls more inattentive and internalizing behaviours, boys more hyperactive and disruptive behaviours
- Difficulties become evident in school years when demands of school exceed capacity
- 65-80% of children with ADHD still meet criteria when adolescents
- ADHD in adulthood:
 - Severity of symptoms may reduce
 - Reduction in overt hyperactive symptoms
 - Difficulties with restlessness, inattention, poor planning and impulsivity may persist
 - 15% continue to meet DSM criteria and 60% continue to exhibit some symptoms
 - As they get older, they manage symptoms better

Impact of ADHD:

- Attention is a fundamentally building block for cognitive development, behavioural regulation and academic success
- Impacts education, employment, criminal activities, relationships, social inclusion and four times more likely for mortality

Comorbidity:

- Also diagnosed with learning difficulties, mood disorders (bipolar), anxiety disorders and substance use disorders

Causes of ADHD:

- We don't know the exact cause of ADHD but researchers suspect genetic, neurobiological and environmental factors
- Genetic factors:
 - Heritability estimates of 70-80% from adoption and twin studies
 - Adopted child has increased chance of ADHD (environ)
 - Twin studies: twin developing ADHD is much higher (genes significant role)
 - Candidate genes associated with neurotransmitter **dopamine**:
 - DRD4, DRD5 (dopamine receptor)
 - DAT 1 (dopamine transporter)
 - SNAP 25 (promotes plasticity)
 - Low levels of dopamine = increased ADHD symptoms
- However a single gene is unlikely to account for ADHD
- Gene x environment interaction most likely

Causes of ADHD- Neurobiological factors

- Brain structure, function and connectivity has been shown to differ in children with vs without ADHD
- Lower grey matter density
- Smaller dopaminergic areas of the brain, such as caudate nucleus, GP and frontal lobes
- Less activation in frontal areas of the brain: relates to executive functioning: not be impulsive, plan, organise, WM, attention
- White matter abnormalities
- Reduced brain volume
- Delayed cortical maturation in children/adolescents)
- Differences in amygdala and hippocampus
- Trying to do tasks but have background noise going on

Perinatal and Prenatal functions:

- Low birth weight
- But can be mitigated by greater maternal warmth

Environmental toxins:

- Early theories in 1970s involved role of environ toxins
- Feingold proposed additives and artificial colours in food upset CNS of hyper children, so he prescribed no fat diet but not supported by research
- Lead
- Nicotine: Thapar concluded ADHD symptoms were greater related to genetic maternal smoking as opposed to non genetic mothers smoking

Family factors in ADHD:

- Parents give more commands have negative reactions to ADHD children = children are less compliant and more negative
- Many parents have ADHD themselves

Causes of ADHD:

Environmental factors:

Table 2. Environmental risks that have been most commonly been studied in relation to attention deficit hyperactivity disorder

Pre- and perinatal factors	Environmental toxins	Dietary factors	Psychosocial adversity
Maternal smoking, alcohol and substance misuse <i>Risk but not proven causal risk factor</i>	Organophosphate pesticides <i>Risk but not proven causal risk factor</i>	Nutritional deficiencies eg zinc, magnesium, polyunsaturated fatty acids <i>Correlate not yet proven risk factor</i>	Family adversity & low income <i>Correlate not yet proven risk factor</i>
Maternal stress <i>Risk but not proven causal risk factor</i>	Polychlorinated biphenyls <i>Risk but not proven causal risk factor</i>	Nutritional surpluses eg sugar, artificial food colourings <i>Correlate not yet proven risk factor</i>	Conflict/parent-child hostility <i>Correlate not yet proven risk factor</i>
Low birth weight and prematurity <i>Risk but not proven causal risk factor</i>	Lead <i>Risk but not proven causal risk factor</i>	Low/high IgG foods <i>Correlate not yet proven risk factor</i>	Severe early deprivation <i>Risk, likely causal risk factor</i>

Treatment for ADHD:

- ADHD is typically treated with medication and with behavioural therapies based on operant conditioning.

Stimulant Medications

- In 2011-2012, 7 in 10 children (69%) with a current diagnosis of ADHD were taking medication for ADHD. This equates to 3.5 million children in the US according to the CDC.
- FDA approved drugs include: Adderall, Concerta and Strattera
- Stimulant medication according to AU RACGP guidelines (MAD)
 - **Methylphenidate/Ritalin- most common**
 - Dexamphetamine sulphate (DEX)
 - Atomoxetine (ATX)
- Medication reduces disruptive behaviour and impulsivity and improve ability to focus attention by interacting with dopamine system in brain
- Double-blind, placebo controlled studies show short term improvements in
 - Concentration
 - Goal directed activity
 - Classroom behaviour
 - Social interactions
 - Reduced aggressiveness and impulsivity
- Side effects: loss of appetite, weight loss, stomach pain and sleep problems
- Not many studies show long term impact on medication

MTA study: