Obsessive Compulsive Disorder

Biological Risk Factors

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Outline of presentation

• OCD – definition
• Neuropsychological risk factors
• Neuroimaging: risk factors
• Neurochemistry: risk factors
• Genetic risk factors
• Neuropharmacology: risk factors
• Summary, conclusions and future directions
Obsessive Compulsive Disorder (OCD)

- Usually chronic psychiatric condition in children and adolescents
- **Characterised by:**
  - Recurrent, intrusive thoughts (obsessions)
  - Dysphoric, anxious unpleasant feelings
  - Repetitive, stereotyped behaviours (compulsions)
- Symptoms are diverse and clinical presentation varies between and within individuals over time
- Symptoms and impairment often hidden
Obsessions

• Defined as:
  - persistent ideas, thoughts, impulses, or images that are experienced as intrusive, inappropriate and making no sense by the sufferer
  - cause marked anxiety and/or distress
• Common obsessions:
  - repeated thoughts of contamination, pathological doubt (checking), aggressive, sexual (primarily when child is pubescent), and religious.
**Compulsions**

- **Defined as:**
  - repetitive behaviours or mental acts of which the goal is to prevent or reduce anxiety or distress

- **Common compulsions:**
  - repetitive checking, cleaning, counting, symmetry, exactness and hoarding
Prevalence

• 1% to 2.3% point prevalence in children and adolescents
• Rates appear to increase with age
• Males vs. Females
  - In childhood, OCD is more common in males than females with a ratio of approximately 3:2
  - Males: pre-pubescent age of onset, gradual onset, chronic course, and occurs in a relatively high proportion of males with comorbid phobias and/or tic disorders, also ADHD.
  - Females: acute pubertal onset, episodic course, and they also report more frequent precipitating stressful life events prior to onset.
Key comorbid conditions

- **ADHD**
  - both inattentive and combined subtypes

- **Tic disorders**
  - simple tics through to Tourette’s disorder

- **Anxiety disorders**
  - type of anxiety disorder dependent on age: separation anxiety disorder – younger while panic disorder – older sufferers; GAD common regardless
Key comorbid conditions

• **Depressive disorders**
  - type of depressive disorder dependent on age: dysthymic disorder earlier age of onset than major depressive disorder

• **Autism Spectrum disorders**
  - high functioning autism and asperger’s disorder are equally associated with OCD

• **For all these comorbidities**
  - hybrid forms of comorbidity
  - tends to be associated with worse OCD
# OCD and Development

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<tr>
<th>Childhood</th>
<th>Adolescence</th>
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<td>OCD</td>
<td>Disorganised Schizophrenia</td>
<td>Paranoid Schizophrenia</td>
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Numerous theories proposed to explain OCD in children and adolescents

Theories must account for wide range of problems – impairment in academic, behavioural, cognitive, family and social domains of functioning

Various neurobiological, genetic, environmental and psychosocial risk factors noted
Current models implicate:
- abnormalities in the prefrontal cortex – esp. the orbitofrontal cortex (OFC), anterior cingulate cortex (ACC), dorsolateral prefrontal cortex (DLPFC), and the basal ganglia region, particularly head of the caudate nucleus, linked to the thalamus

Biological risk factors may play a predominant role in the onset of OCD
Neuropsychology

- Theoretical models implicate:
  - OFC; DLPFC
  - ACC
  - basal ganglia
- These brain regions subserve executive function (EF) deficits in children and adolescents with OCD
Executive Function – Definition

• Executive functions – are a set of cognitive processes that enable performance to be maximised in situations where a number of cognitive processes are required.

• These cognitive processes include
  - the enhancement of information ‘online’
  - the organisation of attentional resources
  - the inhibition of inappropriate responses
  - the monitoring of behaviour with respect to affective and/or motivational state
Executive Function deficits

- The key EF deficits identified in children and adolescents with OCD have been on:
  - attentional set shifting tasks
  - visuospatial working memory tasks
Attentional set shifting refers to the cognitive processes that enable a shift from one response to another or the ability to flexibly switch attention to a more appropriate response. A number of attentional set shifting tasks are available.
Attentional Set Shifting

- Measuring attentional set shifting -
- CANTAB task – Intra-Extra Dimensional Set Shift
- Visual discrimination and attentional set formation
- Maintenance, shifting and flexibility of attention
- This test is primarily sensitive to changes in the fronto-striatal regions of the brain
This test has eighteen outcome measures, assessing errors, and numbers of trials and stages completed.
OCD and Attentional Set Shifting

- Research mostly based on adult studies
- Literature has produced inconsistent findings with relation to the association
- The subtle deficits that are identified implicate mild abnormalities in the lateral prefrontal and orbitofrontal cortical regions in children and adolescents with OCD
OCD and Attentional Set Shifting

Attentional set shifting: OCD vs Healthy Controls

Kolta and Vance (2009)
Visuo-spatial Working Memory

- Visuo-spatial working memory involves the holding of visuo-spatial information in mind and its organisation.
- It particularly enables the individual to manage moving between low stimulus environments when cues are known to high stimulus environments with many novel cues.
Visuo-spatial Working Memory

• **Two main components**
  - the ‘capacitance’ component that reflects the amount of information that can be held in mind (measured by span)
  - the ‘executive’ component that involves the manipulation, organisation and prioritisation of information (measured by strategy)
  - the ‘capacitance’ component is underpinned by inferior parietal lobe through to ventrolateral prefrontal cortex (VLPFC) neural networks
  - the ‘executive’ component is underpinned by the DLPFC and its neural connections
• Measuring visuo-spatial working memory –
• CANTAB tasks – Spatial Span (SS) & Spatial Working Memory (SWM)
• SS contributes to SWM capacity, and is a visuospatial analogue of the verbal Digit Span test
• SWM tests one’s ability to encode and maintain spatial information and then to manipulate remembered items in working memory. It is a self-ordered task, which also assesses heuristic strategy.
• These tests are a sensitive measure of ‘executive’ dysfunction mediated by frontal-striatal-parietal neural networks
Measuring Spatial Span (SS)

This test has six outcome measures, covering *span* length (the longest sequence successfully recalled), errors, number of attempts and latency.
The twenty-four outcome measures for SWM include between search errors (revisiting boxes that have already been found to contain a token and emptied), a measure of strategy, and latency measures.
Visuospatial Working Memory

- Visuospatial Working Memory (between search errors)
- Spatial span
- Strategy

Diagram shows the relationship between spatial span, strategy, and visuospatial working memory.
• **OCD and Spatial Span** – no reported studies have explored SS abilities in children and adolescents with OCD.

• Adult studies have found SS deficits indicating a reduction in their ability to hold information in their spatial memory

• **OCD and Spatial Working Memory** – few studies have explored the relationship between working memory and OCD in children and adolescents

• Findings have been inconsistent
OCD and Visuo-spatial Working Memory

Kolta and Vance (2009)