Recent advances in understanding ADHD and conduct disorder: an update
Outline of presentation

1. ADHD and conduct disorder: definition
2. ADHD and conduct disorder: key biological and psychosocial risk factors
3. New insights
4. Future directions
"Hello, Emily. This is Gladys Murphy up the street. Fine, thanks . . . Say, could you go to your window and describe what's in my front yard?"
1. ADHD: definition

Diagnostic nosology-some comments:

DSM-IV definition of a mental disorder-
A mental disorder is conceptualized as

a clinically significant

*behavioural pattern* that occurs
in an individual

and

is associated with *impairment* in
one or more areas of functioning

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1. ADHD: definition

Diagnostic nosology-some comments

in children and adolescents-

impairment is developmentally inappropriate, judged relative to children of the same age, gender and IQ in social, academic, occupational or other important areas of functioning

multi-informant reports required

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1. ADHD: definition

Attention Deficit Hyperactivity Disorder (ADHD)
DSM-IV CRITERIA

- six or more symptoms, at least six months duration, maladaptive/inconsistent with developmental level
- inattention dimension and/or
  hyperactivity-impulsivity dimension
- evident in at least two settings
- onset before seven years of age
- impairment in social, academic, occupational functioning
- symptoms not due to a PDD, Psychotic, Mood, or Anxiety Disorder

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1. **ADHD: definition**

**TYPES of ADHD**

- combined type
- predominantly inattentive type
- predominantly hyperactive-impulsive type
1. ADHD: definition

Key comorbid conditions:

-tic disorders
-oppositional defiant disorder/conduct disorder
-anxiety and/or depressive disorders
-language learning disorders (spelling/reading/arithmetic/writing)
speech and language disorders (articulation/grammar)
developmental coordination disorder
1. ADHD: definition

Common possible developmental pathways: all associated with educational, social, occupational under-achievement, alcohol/substance abuse/dependence disorders, altered adult personality

<table>
<thead>
<tr>
<th>Childhood</th>
<th>Adolescence</th>
<th>Adulthood</th>
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</thead>
<tbody>
<tr>
<td>ADHD-CT</td>
<td>ADHD-IA</td>
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<td>ADHD-CT</td>
<td>Depressive d</td>
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<tr>
<td>ADHD-CT</td>
<td>Conduct d</td>
<td>ASPD</td>
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2. ADHD: Key biological risk factors

- Biological risk factors
- Psychosocial risk factors

Healthy | ADHD | ADHD

\[ d = 1.0 \]
\[ d = 0.5 \]
1. **Conduct disorder: definition**

The Spectrum of Antisocial Behaviour  
(Steiner, 1999)

- antisocial behaviour  
- criminality and delinquency  
- antisocial behaviour and psychopathology  
- persistent conduct problems  
- conduct disorder  

- psychopathy
1. **Conduct disorder: definition**

**Oppositional defiant disorder (ODD)**

- a recurrent pattern of negativistic, defiant, and hostile behaviour
- onset usually before 7 years of age
- usually first emerges in the home setting
- always a precursor for Conduct disorder (approximately 3% of children with ODD develop CD)
- prevalence (2%-16%) have been reported (Loeber et al. 2000)

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1. Conduct disorder: definition

Conduct disorder (CD)

-repetitive and persistent pattern of behaviour in which the basic rights of others and/or major age-appropriate norms or rules are violated, evidenced by three or more of the following criteria within the previous 12 months, with at least one criterion present in the past 6 months:
-Serious violations of social rules/norms
Theft
Destruction of property
Aggression/Cruelty towards people and/or animals

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1. Conduct disorder: key comorbid conditions

COMORBIDITY of ODD/CD

- alcohol/substance abuse/dependence disorders
- ADHD, combined type,
- language learning difficulties/disorders
- anxiety disorders
- depressive disorders
- speech/language disorders
- developmental coordination disorder
- autistic spectrum disorders
- bipolar disorder

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2. Conduct disorder: Key biological risk factors

Healthy  Conduct d  Conduct d

d = 1.0

Psychosocial risk factors  Biological risk factors

d = 0.5
"All right, Billy, you just go right ahead! ... I've warned you enough times about playing under the anvil tree!"
2. ADHD: Key biological risk factors

**Behavioural Genetics:** heritability estimates 65%-90%

**Molecular Genetics:** dopamine and noradrenaline functional genes

**Neuroimaging:** frontal-striatal-temporal-parietal neural networks

**Cognitive neuroscience:** working memory, attention, memory tasks, response inhibition tasks
**Total cerebral growth curves**

Controls > ADHD

\[ p < .003 \]

**Castellanos et al., JAMA 2002**
2. ADHD: Key biological risk factors

Summary

- biological factors important
- small effect: candidate genes
- medium effect: candidate genes - CogNS measures; brain structural/functional changes
- large effect: CogNS constructs

- developmental stage-independent deficits
- compensatory changes post-puberty

- medication changes non-specific currently

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2. **Conduct disorder: Key biological risk factors**

- lower verbal/performance IQ;
- hypo-arousal; hyper-arousal;
- irritability;
- executive function deficits-
  especially response inhibition and working memory
- comorbid alcohol/substance abuse/dependence disorders
- **NB:** within-individual factors have to be considered in the interpersonal context (for example, ‘chaotic’ family factors)

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2. ADHD and conduct disorder: Key psychosocial risk factors

- Parental psychopathology; parental relationship dysfunction
  family unit dysfunction

- Absent resilience factors and present risk factors important?

- Specific factors not yet identified
## 3. New insights

<table>
<thead>
<tr>
<th></th>
<th>1 ADHD only</th>
<th>2 ADHD + ODD</th>
<th>3 ADHD + CD</th>
<th>4 Control</th>
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<tbody>
<tr>
<td>N</td>
<td>17/6</td>
<td>19/3</td>
<td>16/4</td>
<td>18/7</td>
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<tr>
<td>Age</td>
<td>8.23 (1.94)</td>
<td>9.02 (2.11)</td>
<td>8.24 (1.64)</td>
<td>8.81 (1.48)</td>
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<tr>
<td>CGIp</td>
<td>19.08 (5.96)</td>
<td>22.95 (5.77)</td>
<td>23.40 (4.40)</td>
<td>4.22 (4.08)</td>
<td>1,2,3&gt;4*</td>
</tr>
<tr>
<td>CGIt</td>
<td>18.92 (9.42)</td>
<td>16.82 (6.60)</td>
<td>19.20 (5.39)</td>
<td>1.71 (1.74)</td>
<td>1,2,3&gt;4*</td>
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<tr>
<td>Parentext</td>
<td>62.75 (10.15)</td>
<td>73.77 (8.50)</td>
<td>75.53 (6.53)</td>
<td>52.09 (2.99)</td>
<td>4&lt;1&lt;2,3*</td>
</tr>
<tr>
<td>Teacherext</td>
<td>66.58 (12.76)</td>
<td>62.64 (10.95)</td>
<td>70.60 (7.92)</td>
<td>51.00 (2.10)</td>
<td>1,2,3&gt;4*</td>
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<tr>
<td>Full Scale IQ</td>
<td>98.67 (12.64)</td>
<td>98.91 (15.04)</td>
<td>97.80 (10.96)</td>
<td>99.27 (9.88)</td>
<td>ns</td>
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</table>
3. New insights

<table>
<thead>
<tr>
<th></th>
<th>ADHD only Mean (SD) N = 23</th>
<th>ADHD + ODD Mean (SD) N = 22</th>
<th>ADHD + CD Mean (SD) N = 20</th>
<th>Control Mean (SD) N=25</th>
<th>Group Comparison</th>
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<tbody>
<tr>
<td>Spatial Span</td>
<td>4.08 (1.67)</td>
<td>4.09 (1.37)</td>
<td>3.46 (1.06)</td>
<td>5.06 (1.09)</td>
<td>F=8.10** 4&gt;1,2,3</td>
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<tr>
<td>SWM Total BSE</td>
<td>57.50 (17.89)</td>
<td>50.27 (16.83)</td>
<td>56.06 (17.46)</td>
<td>42.48 (19.85)</td>
<td>F=5.90* 1,2,3&gt;4</td>
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<tr>
<td>DMTS (% correct)</td>
<td></td>
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<tr>
<td>Simultaneous</td>
<td>75.83 (31.17)</td>
<td>82.27 (18.23)</td>
<td>81.33 (15.05)</td>
<td>93.65 (8.86)</td>
<td>F=6.91** 4&gt;1</td>
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<tr>
<td>Total across delay trials</td>
<td>49.72 (19.41)</td>
<td>54.09 (17.84)</td>
<td>52.44 (20.21)</td>
<td>68.59 (15.33)</td>
<td>F=9.75** 4&gt;1,2,3</td>
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<td>Total responses</td>
<td>56.25 (19.84)</td>
<td>61.13 (16.39)</td>
<td>58.00 (18.27)</td>
<td>73.89 (15.43)</td>
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3. New insights

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<tr>
<td>Parent/BSE</td>
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<td>.45 .06</td>
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<td>CGI/BSE</td>
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<td>.12 .51##</td>
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3. New insights

![Bar chart showing mean correct scores for different COMT genotypes: VAL/VAL, VAL/MET, and MET/MET. The chart illustrates higher scores for VAL/MET and MET/MET compared to VAL/VAL.]
4. Future Directions

- Subtypes of ADHD and ODD/CD – behave similarly or not
- Developmental trajectory from pre- to post-puberty
- Gene x environment interaction / correlation
- Primary versus secondary phenomena
- Early recognition, more targeted intervention, more synergistic psychosocial treatments facilitated by medication
I worry about the decreased polarization of our society.
“Our psychopharmacologist is a genius.”
"Well, well, King ... looks like the new neighbors have brought a friend for you, too."