The Aetiology and Societal Costs of Childhood Behavioural Disorders
“SOMEONE’S TAKEN ITS APPENDIX OUT.”
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Neuropsychiatry

- Psychiatric disorders = disturbances of brain function
- The relationship between the brain and the mind is bidirectional
  - The brain affects the mind
  - However, the mind also affects the brain
- Effective behavioural therapy alters CNS metabolism

ADHD

• Highly comorbid with behavioural disorders
• 50% of children with ODD/CD have ADHD and vice versa\(^1\)
• ADHD and ODD/CD share substantial genetic influences\(^2\)


An aetiological framework

• Behavioural issues start at 18 months with:
  1. Restlessness
  2. Negativism
  3. Irritability

• Neurobiological factors are that which alters brain structure and metabolism → mostly genetic

• Neurobiological factors are responsible for initiating behavioural disorders at this age, but also have a role in maintaining them later in life
An aetiological framework

• From 3 years of age:
  • Symptoms of ODD/CD
  • Negative parenting behaviours

• Negative parenting:
  • Getting frustrated at your child
  • Unreasonably harsh criticism
  • Evoked responses to the child’s behaviours
  • From the parent’s personality traits.
An aetiological framework

- By preschool:
  - Negative interactions
  - Negative cognitions
  - Poor emotional regulation
- These synergize with neurobiological factors to sustain behavioural disorders
An aetiological framework

- Increasing age $\rightarrow$ large role of environments
- More caregivers = more inconsistency = more misbehaviour
Individual Characteristics
Behavioural and Molecular Genetics

- Psychiatric disorders are caused by susceptibility genes\(^1\)
- Antisocial behaviours are 82\(^2\)% genetic at 5yo and 41\(^3\)% later in life
- A child’s environment can protect against or encourage antisocial behaviours

Behavioural and Molecular Genetics

- Behavioural issues + (ADHD\(^1\) or callous-unemotional traits\(^2\)) \(\rightarrow\) greater genetic component

- Genetic predisposition in a child \(\rightarrow\) biological parents more likely to have behavioural issues too

- Parents with behavioural issues \(\rightarrow\) negative parenting

Genes influencing environment

• Children with a genetic predisposition to behavioural issues get spanked more but not abused.

• Child abuse is only linked to behavioural issues in the parents.¹

• Suboptimal parenting doesn’t cause ODD/CD, but it can reinforce it by responding innappropriately

Temperament

• Temperament = enduring behavioural traits

• Lack of control → antisocial behaviour:
  • Emotional lability
  • Restlessness
  • Short attention span
  • And negativism¹

Temperament

- The Australian Temperament Project by Sanson, Smart, Prior & Oberklaid in 1993 → irritable infants become hyperactive and aggressive children.¹

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
</tr>
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<tbody>
<tr>
<td>Add stimulus</td>
<td>Remove stimulus</td>
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</table>

<table>
<thead>
<tr>
<th>Reinforcement</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase/maintain behavior</td>
<td>Decrease behavior</td>
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</table>
Practices of NGOs

• South Coast NGO
  • Helped parents of children with behavioural issues
  • Never used punishment
  • Have we evolved beyond punishment?
  • Is this evidence based?
  • Why do we still get speeding tickets?
Please go to live.voxvote.com and enter PIN: 53963
2. Is there still a role for Operant Conditioning in modern parenting?

- Yes: 83.3% (42 users voted)
- No: 16.7%
3. If a Child A hits Child B, and their teacher tells Child A that hitting other children is inappropriate, is this a punishment?

- Yes: 15.9%
- No: 84.1%

44 users voted
4. If a child behaves inappropriately and their mother chooses to ignore this behaviour, is this a punishment?

- Yes: 16.3%
- No: 83.7%
2012 meta-analysis of 41 studies¹:

- Praise alone is not effective
- Praise + reprimands + nonverbal responses = compliance

<table>
<thead>
<tr>
<th>Positive</th>
<th>Reinforcement</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(add stimulus)</td>
<td>Add pleasant stimulus to Increase / maintain behavior</td>
<td>Add aversive stimulus to Decrease behavior</td>
</tr>
<tr>
<td>Negative</td>
<td>Remove aversive stimulus to Increase / maintain behavior</td>
<td>Remove pleasant stimulus to Decrease behavior</td>
</tr>
</tbody>
</table>
An aversive stimulus is an unpleasant event that is intended to decrease the probability of a behavior when it is presented as a consequence (i.e., punishment). However, an aversive stimulus may also increase the probability of a behavior when it is removed as a consequence, and in this way it will function as negative reinforcement.
Back to the NGO…

• If no punishment then what is the response to antisocial behaviours? → ignore them → neutral response

• But, is ignoring your child a neutral response?

• Does a 6-year old boy not find being ignored by his mom an unpleasant event?
Punishment Sensitivity

- Children learn to refrain from inappropriate behaviour if they are sensitive to punishment cues.¹

Punishment Sensitivity

• Amygdala → undesirable behaviour = punishment

• Children with CD have less amygdala gray matter and the matter that is present responds poorly to fear (on fMRI)


Punishment Sensitivity

• Children with ODD/CD have reduced:
  • SNS response\textsuperscript{1}
  • Cortisol levels\textsuperscript{2}
• This blunted stress response may be caused by chronic negative experiences.\textsuperscript{3}

Reward Sensitivity

• Rewarded behaviours are more likely to be repeated

• However, children with a low sensitivity to reward do not respond to normal rewards

• Behavioural symptoms may be a child seeking a reward that is stimulating enough for them

Reward Sensitivity

• Dopamine is important in reward processing.¹

• An impaired dopaminergic functioning reduces a child’s reward sensitivity.

• Studies show that children with ODD/CD have reduced dopaminergic functioning¹

Reward Sensitivity

• Studies on the orbitofrontal cortex, caudate nucleus and heart rate all indicate that reduced reward sensitivity plays a role in ODD/CD

• Psychostimulants help children with ODD/CD become more motivated to comply with instructions¹

Reward and Punishment Sensitivity

- Children with behavioural issues are less responsive to both reward and punishment
- Mild rewards and punishments don’t work
- Excessive punishment doesn’t work either
- This creates a narrower therapeutic range for effective parenting strategies and must be supplemented by consistency
Cognitive Control

• Cognitive control is the paralimbic system \(^1\) affecting problem solving and inhibiting inappropriate responses \(^2\)

• ODD/CD = structural deficit of paralimbic system \(\rightarrow\) impaired cognitive control \(\rightarrow\) poor response to reward. \(^3\)

Cognitive control

• ODD/CD children need tangible rewards to affect behavioural change, due in part to impaired cognitive control.¹

• Sensitive parenting can compensate for poor cognitive control.²


Cognitive control

• Poor response inhibition:
  • reactive (defensive) aggression\(^1\)
  • response perseveration\(^2\)
  • Small immediate reward + delayed large punishment = too tempting to turn down

Cognitive control

- Poor response inhibition $\rightarrow$ disadvantageous decision making, also seen in:
  - PSA
  - Gambling
  - Psychopathy
  - Violent offenders\(^1\)

Gender, Abuse and Hormones

• Statistically, men are more physically abusive than women.

• Women are more emotionally abusive than men.¹

• Physical and emotional abuse contribute equally to behavioural and affective disorders in children.²

• After puberty ODD/CD = more testosterone³


Neurological Impairment

- Dysmorphia = neural maldevelopment = risk factors for behavioural problems\(^1\)
- ODD/CD = more likely to have ID (or maybe just learning difficulties from comorbid ADHD?)\(^2\)
- Impaired language = risk factor for ODD/CD\(^3\)

Flaws in Social Information Processing

• ODD/CD/ADHD = acting before interpreting their environment
• Over perceive aggression in others while minimising their own
• External locus of control
• Poor empathy skills

Flaws in Social Information Processing

• Value revenge and dominance\(^1\)
• Fewer possible solutions\(^2\)
• Solutions more physical/aggressive\(^3\)

Flaws in Social Information Processing

• Think aggressive responses are morally good, and acceptable.¹
• More confident aggression will achieve their goals.²

The Role of Affect

- Angry affect $\rightarrow$ emotional dysregulation $\rightarrow$ aggression$^{1,2}$
- Emotional regulation training $\rightarrow$ reduced aggression.$^{3}$

Environmental Characteristics
Environmental Characteristics

• Environment can protect against behavioural disorders
• Can also initiate and maintain behavioural disorders through:
  • Family factors
  • Parenting practices
  • Community and school factors
  • Media factors
Environment affecting biology

• Maternal exposure to alcohol/methadone/cocaine/malnutrition → behavioural issues.\(^1\)

• Maternal smoking → ? behavioural issues\(^2\)

• Low MAO expression ≠ misbehaviours, but….

• Low MAO + harsh punishment = misbehaviours

Environment affecting biology

- Testosterone ≠ aggression, but…
- Testosterone + abuse/low SES = aggression¹
- Abuse → fear + hypervigilance → perceived hostility → aggression²
- Supervision → inhibition of hostility. ²

Environment affecting biology

• Foetal hypoxia → aggression\(^1\), but not as much as
• Maternal hostility/rejection/inconsistency → aggression\(^2\)


Family Factors

• 20% of children with behavioural issues in poverty¹

• Yet poverty ≠ behavioural issues

• Poverty = parents separated¹/depressed/arguing/hostile² → behavioural issues


Family Factors

• Native American casino proved $$$ → better parenting → clear and consistent consequences → better behaviour

Family Factors

• Parental crime/PSA/depression $\rightarrow$ child behavioural issues.\(^1\)

• <10% of families are responsible for >50% of crime.\(^2\)

• Parents model +/- reward antisocial behaviour.

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Family Factors

- Spillover hypothesis: parental hostility to each other spills over into parenting behaviours.¹

Harsh Parenting

• Harsh punishment = externalizing behaviours (aggression, lying and stealing)

• Harsh punishment → over perception of hostility → maintenance of behavioural issues


Parental Warmth

- Low parental warmth $\rightarrow$ harsh parenting $\rightarrow$ oppositional behaviours$^1$ $\rightarrow$ more harsh parenting$^2$

- High parental warmth =
  - Less antisocial behaviour/narcissism/PSA
  - More acceptance of the child by their peer group$^3$


Monitoring and Supervision

- Monitoring = knowing where your children are and who they’re with → less PSA\(^1\)
- Supervision = directly controlling your children
- More rules + more punishment – supervision = children getting into fights\(^2\)
- Zero punishment isn’t good, but more punishment isn’t necessarily the answer

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Discipline

• Good discipline \(\rightarrow\) good behaviour and good behaviour \(\rightarrow\) good discipline\(^1\)

Peer Factors

- Friends are protective against poor parenting

Peer Factors

• Misbehaving teens are continually rejected from prosocial peer groups due to aggressive/noxious behaviour directed towards these prosocial peers

• Peer rejection → forming antisocial cliques → antisocial behaviours maintained due to modelling and reinforcement from peers in these antisocial cliques
Citations for the previous slide…


Peer Factors

Antisocial behaviours → Peer rejection

• 1st grade antisocial behaviours → Peer rejection in the 2nd grade → -ve peer interactions → inhibited prosocial growth → more antisocial behaviour in the 3rd grade

Peer Factors

• Boys ostracize aggressive boys more than girls ostracize aggressive girls\(^1\)

• Ostracized boys are more delinquent than ostracized girls\(^2\)


Peer Factors

- Depression $\rightarrow$ perceived peer rejection $\rightarrow$ antisocial behaviours$^1$
- Denial of peer rejection is protective$^2$

Peer Factors

• The exception: aggression ≠ peer rejection if child:
  • Has good sense of humour
  • Leadership qualities
  • Is popular\textsuperscript{1,2}


Community Factors

- Deprived neighbourhoods = high unemployment, dense public housing, social isolation, crime, violence, poor social cohesion and insufficient community resources

- Dense neighbourhoods → academic problems, aggression, delinquency\(^1\) and publicly visible violence.

- Publicly visible violence = modelling → proactive aggression

- Proactive aggression → adult delinquency and PSA\(^2\)

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School Factors

• Classroom modelling can be good or bad
• A class with prosocial students will protect against behavioural disorders
• A class where deviant behaviours are tolerated will encourage antisocial behaviours

Media Factor

• Violent television and video games → aggression¹

Child care

• Early day-care does not have any affect on a child’s psychological development¹

Societal Costs
2001 UK Study\textsuperscript{1}

- Looked at the cost of \textit{extra} public services used by people from age 10 to 28 years old in those with and without conduct disorder:
  - foster and residential care in childhood
  - special educational provision
  - state benefits received in adulthood
  - breakdown of relationship (domestic violence and divorce)
  - health
  - crime (prosecution and imprisonment)

2001 UK Study

- No conduct disorder = extra £7423 in 1998 currency ($20,404 AUD today)
- Conduct disorder = extra £70 019/$192,460 AUD
- Also much more likely to require psychiatric services
## Prevalence of behavioural and attention disorder in Juvenile Justice Centres

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Males (n=180) %</th>
<th>Females (n=11) %</th>
<th>Aboriginal (n=100) %</th>
<th>Non-Aboriginal (n=92) %</th>
<th>Total (N=192) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention deficit hyperactivity disorder</td>
<td>20.6</td>
<td>27.3</td>
<td>21.0</td>
<td>20.7</td>
<td>20.8</td>
</tr>
<tr>
<td>Attention deficit hyperactivity disorder NOS</td>
<td>1.7</td>
<td>0.0</td>
<td>3.0</td>
<td>0.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Oppositional defiant disorder</td>
<td>2.8</td>
<td>0.0</td>
<td>4.0</td>
<td>2.2</td>
<td>3.1</td>
</tr>
<tr>
<td>Conduct disorder</td>
<td>46.7</td>
<td>27.3</td>
<td>46.0</td>
<td>44.6</td>
<td>45.3</td>
</tr>
<tr>
<td>Disruptive disorder NOS</td>
<td>5.6</td>
<td>45.5</td>
<td>9.0</td>
<td>6.5</td>
<td>7.8</td>
</tr>
<tr>
<td>Any attention/behavioural disorder</td>
<td>58.3</td>
<td>72.7</td>
<td>60.0</td>
<td>58.7</td>
<td>59.4</td>
</tr>
</tbody>
</table>
Cost to detain a juvenile

- The average annual cost per juvenile detainee is $468,389.¹
- This is 5.1 times the cost for adult detainees.¹

¹ Justice 2018 FINANCIAL AUDIT NEW SOUTH WALES AUDITOR-GENERAL’S REPORT
Other costs of ODD/CD

- Costs to others:
  - Emotional distress to family, parents needing to disrupt their work
  - Peers → bullying, impairing classroom learning
  - Health resources → CAMHS

Table 5.7: Average cost per bed day by phase of care type – Admitted setting

<table>
<thead>
<tr>
<th>Study site characteristic</th>
<th>Acute Bed-days</th>
<th>Average cost</th>
<th>Functional Gain Bed-days</th>
<th>Average cost</th>
<th>Intensive Extended Bed-days</th>
<th>Average cost</th>
<th>Consolidating Gain Bed-days</th>
<th>Average cost</th>
<th>Initial Assessment Bed-days</th>
<th>Average cost</th>
<th>All Phases Bed-days</th>
<th>Average cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>52,572</td>
<td>$1,158</td>
<td>19,501</td>
<td>$1,132</td>
<td>22,685</td>
<td>$906</td>
<td>7,108</td>
<td>$1,292</td>
<td>101</td>
<td>$1,453</td>
<td>101,967</td>
<td>$1,085</td>
</tr>
<tr>
<td>Qld</td>
<td>18,305</td>
<td>$2,567</td>
<td>12,622</td>
<td>$1,469</td>
<td>6,087</td>
<td>$1,458</td>
<td>5,378</td>
<td>$1,246</td>
<td>802</td>
<td>$4,915</td>
<td>43,194</td>
<td>$1,969</td>
</tr>
<tr>
<td>WA</td>
<td>21,199</td>
<td>$1,529</td>
<td>2,450</td>
<td>$1,471</td>
<td>3,087</td>
<td>$1,540</td>
<td>2,542</td>
<td>$1,292</td>
<td>395</td>
<td>$1,773</td>
<td>29,920</td>
<td>$1,514</td>
</tr>
<tr>
<td>SA</td>
<td>10,251</td>
<td>$1,232</td>
<td>920</td>
<td>$1,245</td>
<td>302</td>
<td>$1,101</td>
<td>190</td>
<td>$976</td>
<td>60</td>
<td>$860</td>
<td>11,724</td>
<td>$1,224</td>
</tr>
<tr>
<td>All public</td>
<td>102,327</td>
<td>$1,495</td>
<td>35,493</td>
<td>$1,278</td>
<td>32,161</td>
<td>$1,073</td>
<td>15,218</td>
<td>$1,122</td>
<td>1,368</td>
<td>$1,551</td>
<td>186,805</td>
<td>$1,367</td>
</tr>
<tr>
<td>Private</td>
<td>30,768</td>
<td>$490</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30,768</td>
<td>$490</td>
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<tr>
<td>All Admitted</td>
<td>133,095</td>
<td>$1,626</td>
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<td>$1,073</td>
<td>15,218</td>
<td>$1,122</td>
<td>1,368</td>
<td>$1,551</td>
<td>217,573</td>
<td>$1,243</td>
</tr>
</tbody>
</table>

Source: HealthConsult MHCS ‘Costed Activity’ data set 2015. Note that the total number of phases in this analysis is different to Chapter 4, as phases that had costs at the episode level but not at phase level were included, and phases that costs at phase level but not episode level were excluded in the Chapter 4 analysis, but, for this analysis study sites must have reported a cost at the phase level. Also note that the overall cost per bed-day is different to that presented in Table 5.3, as that analysis was of the distribution of cost/bed-day, whereas this analysis calculates costs on the basis of total cost/total bed-days (i.e. overall average versus average of the averages).
Future costs

- ODD $\rightarrow$ CD $\rightarrow$ ASPD\(^1\)
- Imprisonment = 11.7x more likely to have ASPD
- Prison population = 35% ASPD\(^2\)

Costs of ASPD and other behavioural disorders

- NSW Police budget increased 15% last year to $3.9 billion\(^1, 2\)
- Adult inmates in NSW is at a record high of 14,000\(^3\)
- Prisons are overcrowded with almost half a billion spent last year on new beds\(^3\)

2. NSW Police Force 2017-18 Annual Report
3. Justice 2018 FINANCIAL AUDIT NEW SOUTH WALES AUDITOR-GENERAL’S REPORT