Behavior management and psychopharmacology in children with autism spectrum disorders

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Disclosures

• Dr. Coplan is author of Making Sense of Autistic Spectrum Disorders: Create the brightest future for your child with the best treatment options (Bantam-Dell, 2010), and receives royalties on its sale

• This presentation will include a discussion of off-label drug use

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Outline

- Definitions
- Behavioral Interventions
- Neuropsychological Deficits
- Pharmacologic Interventions
- Summary

Maladaptive Behavior

- Externalizing
- Internalizing

Disruptive ("Externalizing") Behavior

- Tantrums
- Property Destruction
- Aggression towards others
- Self-injurious behavior (SIB)
Social Functions of Externalizing Behavior

- Attention
- Access to a preferred object
- Escape from a task

“Internalizing” Behavior

- Anxiety
- Depression
- Obsessiveness / Rigidity
- Perfectionism

The ABC’s of Behavior Analysis

- What is the Antecedent?
- What is the Behavior?
- What is the Consequence?
Antecedents

Internal Stimuli
- Hunger
- Thirst
- Pain
- Etc.

External Stimuli
- Physical
- Social
- Etc.

Behavior

Consequence

Antecedents

Internal (Biological)
- Hunger, Thirst, Pain, etc.
- Neuropsychological abnormalities
- Developmental

External (Social)
- Imposition of a task
- Change in routine
- Denial of access to object or activity
- Other....
Antecedents - Developmental

- What is the child’s developmental level?
- Is the behavior normal for the child’s developmental level?
  - Tantrums / Noncompliance
  - “Impulsivity” / “Inattention”

Antecedents - Developmental

- What is the child’s ability to communicate?
  - Does “disruptive” behavior serve a communicative function?

Consequences 1: Reinforcers

- Reinforcers (↑ likelihood of recurrence)
  - Positive (add something)
    - Attention
    - Access
  - Negative (remove something)
    - Escape

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Food Selectivity
Positive and Negative Reinforcement of unwanted behavior

- Parent removes non-preferred food (negative reinforcement)
- Parent provides child with his/her preferred food (positive reinforcement)
- Alternatives
  - First ... Then
  - Put refusal on extinction
  - The kitchen is closed between meals
  - Desensitization (non-preferred food is on table, on plate, touch, lick, mouth, eat)

Consequences 2: Aversives

- Aversives lead to a decrease in the likelihood of recurrence of the antecedent behavior
- Logical Consequences
  - If child refuses to use toilet, child must carry backpack with spare clothes, when family is in public
- Over-correction
  - Must wash out soiled diaper
  - If the child spills milk on purpose: child must mop the entire kitchen floor

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**Internal Stimuli**
- Hunger
- Thirst
- Pain
- Etc.

**External Stimuli**
- Physical
- Social
- Etc.

**Behavior**

**Consequence**

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**Disruptive Behavior:**
**Function & Best Response**

- **Attention**
  - 1-2-3 ➔ “Time Out”

- **Access**
  - *Never* grant access to desired object in response to disruptive behavior

- **Escape**
  - *Never* permit the child to terminate a task with disruptive behavior. Walk child through task first, then ➔ Time Out.

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**Delayed Gratification:**
**Token Economy**

- Concretely specified behaviors
- Earn and Lose Points (Tokens)
- Points ➔ Access to specified reward
  - Reward determined by child’s interests
    - Preferred toys, Computer time, etc.
  - NO access to reward at other times
  - “Extra” treats not as effective
- Works with children who understand rule-based play (CandyLand, Uno, etc.)
But.....

Children with ASD have atypical responses to external stimuli

- What good is Time Out if the child has no eye contact?

Children with ASD have a range of abnormal, autonomous, internal stimuli

- Obsessive behavior not the same as "ordinary" task refusal
Neuropsychological Abnormalities in Children with ASD

Core Deficits
- Cognitive Rigidity
- Abnormal regulation of attention
- Abnormal regulation of arousal
- Abnormal regulation of sleep
- Abnormal sensory processing

Abnormal regulation of arousal

Abnormal regulation of sleep

Abnormal Sensory Processing

Cognitive Rigidity

Abnormal regulation of attention
Neuropsychological Deficits in Persons with ASD

- Abnormal regulation of arousal
- Abnormal regulation of attention
- Abnormal regulation of sleep
- Abnormal Sensory Processing
- Cognitive Rigidity

- Agitation
- Aggression
- SIB
Behavior Management & Psychopharmacology in children with ASD

Cognitive Rigidity

- Inability to shift mental sets
  - Rule-bound
  - Perfectionism
  - Obsessions
  - Compulsions
- (Anxiety)
- (Depression)

Cognitive Rigidity

- Insistently repetitious behavior
- Problems with changes in routine, transitions, unmet expectations (events; work product)
- (Anxiety)
- (Depression)

Abnormal regulation of arousal
Abnormal sensory processing
Agitation
Abnormal regulation of attention
Abnormal regulation of sleep
Abnormal routines
Stereotypies
Aggressive
Violent
RIGIDITY

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Cognitive Rigidity

- **Interventions**
  - Visual Schedules
    - What am I supposed to be doing **now?**
    - What am I supposed to do **next?**
    - “Oops” cards
  - Relaxation Techniques
    - Fidget toys, Deep Breathing, Isometrics
    - “Break” cards
  - SSRIs
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My Calming Sequence
Sometimes my morning can be too busy. I walk with my hands up and take a deep breath. I put my hand in my hair and rub my head. This can help me to stop crying.

1
2
3
4
5

The Incredible 5-Point Scale
Solving students with autism spectrum disorders by understanding their emotional responses and controlling their emotional responses

Cognitive Rigidity

• Insistently repetitious behavior
• Problems with changes in routine, transitions, unmet expectations
• Perfectionism
• (Anxiety)
• (Depression)
Anxiety

RD. 7 y.o. F, nl IQ, PDD-NOS & Anxiety. Father: GAD

**A.W.: 9 year old boy with PDD-NOS and normal IQ (MRN 11-07710**

“**The house is on fire and we are running for our life.”**

**Joseph F: 15 y.o. boy Asperger Syndrome & chronic anxiety (MRN 05-036)**
Depression

www.drcoplan.com KO; 10 yr old female, PDD-NOS, normal IQ

Selective Serotonin Reuptake Inhibitors (SSRIs) in ASDs

- Primary targets
  - Cognitive Rigidity
  - Anxiety
  - Obsessive / Perfectionistic behavior
  - Depression
- Stereotypes: Probably not

- “Downstream” benefit:
  - Disruptive Behavior
  - Quality of Life
Serotonin (5 HT)

Nestler, Molecular Neuropharmacology, Fig 9.3

Serotonin-promoting (serotonergic) drugs

SSRIs block re-uptake (SERT)

Serotonin (5-HT)

Release

Emotional regulation & numerous other actions

+ Mirtazapine: Release of Serotonin via inhibition of alpha-2 receptors

+ Buspirone: 5-HT1A agonist

Selective Serotonin Reuptake Inhibitors block the re-uptake of Serotonin

Serotonin (5 HT) Pathways

Stahl, Essential Psychopharmacology, fig 5.52-3

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Pharmacotherapy for anxiety disorders in children and adolescents

- Studies reviewed: 22 RCTs/2,519 participants
  - Short-term (average 11 wks)
  - Mean age 12 yrs
  - Drugs studied (versus placebo)
    - SSRIs: 15 (fluoxetine 6, fluvoxamine 2, paroxetine 3, sertraline 4)
    - SNRIs: 5 (clomipramine 3), venlafaxine 2)
    - Benzodiazepines: 2 (alprazolam 1, clonazepam 1)
    - Tricyclic antidepressants: 1 (desipramine)

- Meta-analysis
  - Response rate: Medication 59%; Placebo 31%
  - 7.3% of subjects treated with SSRIs withdrew bec/o side effects
  - "The overwhelming majority of evidence of efficacy was for the SSRIs, with the most evidence in paediatric OCD"
Abnormal regulation of arousal

Abnormal regulation of sleep

Routines

Cognitive Rigidity

Regulation of Attention

Attend to stimulus #1

Let go & Shift

Attend to stimulus #2

Agitation

Aggression

SIB

Abnormal Sensory Processing
Abnormal Regulation of Attention - 1

- **Perseveration**
  - Inability to “Let go and shift”
  - Gets “stuck”
  - “Overattention Deficit Disorder”
- Compounds the effects of cognitive rigidity
Abnormal Regulation of Attention (Perseveration)

• Interventions
  – Verbal preparation for transitions
  – Visual Schedules
  – SSRIs (OCD: Proven; ASD: likely)
Abnormal Regulation of Attention - 2

- Inattention
  - Inability to focus
  - Impulsive
  - Distractible
Inattention

- **Interventions**
  - Limited stimuli
  - Short work periods
  - Medication
    - Stimulants (may cause anxiety / rigidity / agitation)
    - alpha-2 agonists

Noradrenergic pathways
(Norepinephrine)

Locus Ceruleus ("blue spot"): Principal noradrenergic source in brain.

Nestler, *Molecular Neuropharmacology*, Fig 8.5

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Insufficient activation of frontal cortex ➔ Inattention

Stahl, *Essential Psychopharmacology*, Fig 12.1
Hyperactivity

Stimulants in children with ADHD → “Paradoxical” calming


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Stimulants

(Dopaminergic; Noradrenergic; Sympathomimetic)

Stimulants (Dopaminergic; Noradrenergic; Sympathomimetic)

Atomoxetine

Stimulants, Norepinephrine Reuptake Inhibitors (NRI's)

<table>
<thead>
<tr>
<th>Generic Name(s)</th>
<th>Brand Name(s)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphetamine</td>
<td></td>
<td>FDA Schedule II</td>
</tr>
<tr>
<td>Dextroamphetamine</td>
<td></td>
<td>FDA Schedule II</td>
</tr>
<tr>
<td>Dextroamphetamine + amphetamine</td>
<td>Adderall</td>
<td>FDA Schedule II</td>
</tr>
<tr>
<td>Methylphenidate</td>
<td>Concerta, Ritalin, Metadate</td>
<td>FDA Schedule II</td>
</tr>
<tr>
<td>Dexamethasphenidate</td>
<td>Focalin</td>
<td>FDA Schedule II</td>
</tr>
<tr>
<td>Atomoxetine, Attentin</td>
<td>Strattera</td>
<td>Norepinephrine reuptake inhibitor (NRI), not FDA Schedule II</td>
</tr>
</tbody>
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**Alpha-2 Agonists**

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<th>Generic Name</th>
<th>Brand Name(s)</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>Clonidine</td>
<td>Catapres</td>
<td>More sedating than guanfacine</td>
</tr>
<tr>
<td>Guanfacine</td>
<td>Tenex, Intuniv</td>
<td></td>
</tr>
</tbody>
</table>

- Frontal cortex / Locus Ceruleus: post-synaptic alpha-2 receptors
- Sympathetic outflow (autonomic nervous system): Pre-synaptic autoreceptors

**Clinical Pearl**

- **Beware of anxiety or perseveration masquerading as inattention**
  - Perseveration on inner stimuli: “Inattentive”
  - Perfectionism: “Problems w. task completion”
  - Anxiety: “Rushes through work”
Abnormal regulation of arousal

Abnormal regulation of attention

- Perseveration
- Inattention

Abnormal regulation of sleep

- Hypo-arousal
- Hyper-arousal

Routines

- Stereotypies
- Agitation
- Aggression
- SIB
- Impulsivity
- Hyperactivity

Cognitive Rigidity

Abnormal Sensory Processing

Regulation of Arousal

Hypoarousal → Calm & Relaxed → Fight or Flight Response → Combative

“Red Alert”

- Adrenaline
- Heart Rate
- Resp. Rate

“He is so hard to calm down when he gets upset….His emotional thermostat doesn't work”

Parent of an 8 year old with ASD and a low arousal threshold
Abnormal regulation of arousal

- Perseveration
- Inattention

Abnormal regulation of attention

- (Hypo-arousal)
- (Hyper-arousal)

Routines

- Stereotypies
- Agitation
- Aggression
- SIB
- Impulsivity

Hyperactivity

• Atypical neuroleptics
• α2 agonists
• GABA-ergic drugs

Cognitive Rigidity

Abnormal regulation of sleep

Abnormal Sensory Processing

Dopamine

Substantia Nigra ("black stuff"), Ventral tegmentum, arcuate nucleus

Nestler, Molecular Neuropharmacology, Fig 8.6

Atypical Neuroleptics

(Dopamine Blockers)

Side effects
- Sedation
- Insulin resistance / diabetes
- Movement disorders

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### Atypical Neuroleptics

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
<th>Comment</th>
</tr>
</thead>
</table>
| Aripiprazole | Abilify    | • Relatively less risk of weight gain  
|              |            | • FDA approved for Rx of ASD          |
| Clozapine    | Clozaril   | • Bone marrow suppression            |
| Olanzapine   | Zyprexa    | • Greater risk of weight gain        |
| Quetiapine   | Seroquel   | • Greater sedation                   |
| Risperidone  | Risperdal  | • Greater risk of weight gain        
|              |            | • FDA approved for Rx of ASD          |
| Ziprazidone  | Geodon     | Relatively less risk of weight gain  |

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### Regulation of Sleep - 1

- **Melatonin**
  - Brain hormone
  - \(\downarrow\) Metabolic rate (Heart, Temp)
  - "You're sleepy now"

- **Suppressed by light**
  - 24 hr cycle
  - Seasonal cycle

### Regulation of Sleep - 2

- **Abnormal melatonin cycling**
  - Primary disorders of sleep
  - Blindness
  - ASD

- **Symptoms**
  - Delayed onset of sleep
  - Shortened duration / frequent wakening

### Regulation of Sleep - 3

- **Shared genetic control**
  - Regulation of sleep
  - Regulation of arousal

- **Family history of sleep disorder**
Abnormal regulation of arousal

Abnormal regulation of attention

Cognitive Rigidity

Abnormal Sensory Processing

Abnormal regulation of sleep

Abnormal regulation of arousal

Atypical neuroleptics

$\alpha_2$ agonists

Melatonin

Stimulants

$\alpha_2$ agonists

Rigid + Perseverative

Agitation + Aggression

Impulsivity + Hyperactivity

Disordered Sleep

Hypo-arousal

Hyper-arousal

Routines

Stereotypies

Impulsivity + Disruptive

Agitation + Disruptive

Impulsivity + Agitated

Impulsivity + Agitated /
Disrituctive
Abnormal regulation of arousal

Abnormal regulation of attention
- (Perseveration)
- (Inattention)

Cognitive Rigidity

Abnormal regulation of sleep

Abnormal Sensory Processing

Sensory Threshold
- (Hypo-arousal)
- (Hyper-arousal)

Routines

Stereotypies

Sensory-Seeking

Agitation

Aggression

SIB

Sensory Overload

Impulsivity

Impulsive

Disordered Sleep

The whole is greater than the sum of its parts

Max Wertheimer
Abnormal regulation of arousal

- Perseveration
- Inattention

Cognitive Rigidity

Abnormal regulation of sleep

- Hypo-arousal
- Hyper-arousal

Sensory Processing

- Sensory Threshold
- Sensory Processing dysfunction

Abnormal regulation of attention

- Impulsivity
- Hyperactivity

Routines

- Stereotypies
- Sensory-Seeking

Agitation

- SIB

Impulsivity + Agitated / Disruptive

Rigid + Perseverative

Abnormal Sensory Threshold

Disordered Sleep

- Abnormal regulation of sleep

Impulsivity + Agitated / Disruptive

Stimulants

- Atypical neuroleptics
- \(\alpha\)-2 agonists
- SSRIs

Melatonin

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Summary

- Why this child?
  - What is this child's developmental level?
    - Is this stage-appropriate behavior?
  - Does the behavior serve a social function?
    - Escape, access, attention
  - Is the classroom placement appropriate?
    - Language level?
  - Does this behavior occur in other settings?
    - Family factors?
      - Parents consistent at home?
      - Parental psychopathology? (Anxiety, Depression, Alcohol)

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Summary

- Why this child?
  - Neuropsychological factors?
    - Cognitive Rigidity
    - Dysregulation of attention
    - Dysregulation of arousal
    - Sensory Seeking / Sensory Overload

- Behavioral Intervention – Usually

- Change in classroom setting – sometimes
  - Shift from rote to inferential learning (2nd - 3rd grade): challenge

- Medication: Sometimes

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An ounce of prevention…

- Identify *internalizing* behaviors *before* they lead to *externalizing* behaviors
  - Behavior Management Plan that proactively seeks to avert or dissipate anxiety

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Thank you

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