IMPACT OF PRENATAL SUBSTANCE EXPOSURE ON CHILDREN AND ADOLESCENTS

Erin Telford, Psy.D.
Clinical Psychologist
Children's Research Triangle

Agenda

1. Impact of prenatal substance exposure on developing child
2. Impact of environmental substance exposure on developing child
3. Intervention approach and strategy
4. Case discussion

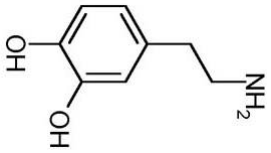
Impact of Substances on Cognitive Development

- Methamphetamine
  - Long-term outcomes still unknown
  - Some research indicates deficits with visual recognition, place navigation, and verbal memory
  - Early research suggests some deficits with overall cognitive abilities and academic deficits

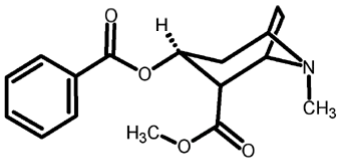
How Methamphetamine Works

- Methamphetamine works two ways:
  1. Increased release of dopamine
  2. Decreased reuptake of dopamine
- Results in the longer effects of the drug

Methamphetamine Versus Cocaine



Dopamine



Cocaine

Cocaine ($C_{17}H_{21}NO_4$)
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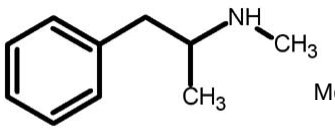

Methamphetamine

Methamphetamine ($C_{10}H_{15}N$)
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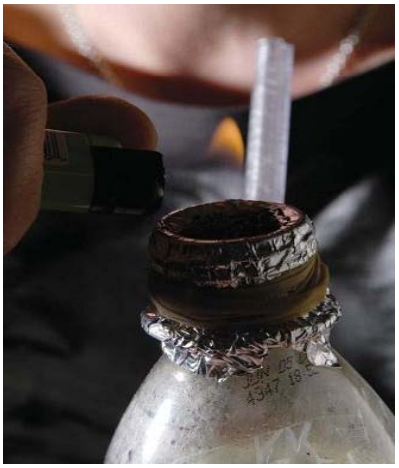
Impact of Substances on Cognitive Development (cont.)



- Cocaine
  - Over the years, studies have shown differing results
  - Generally, minimal to no difference in cognitive abilities
  - Expressive language deficits, but no notable deficits in receptive language skills
  - Dysregulation in infancy/early childhood with increased rates of ADHD

Complicated Issues

- Medical complications associated with stimulant use
  - Preterm labor
  - Intrauterine growth retardation
  - Placental abruption
  - Prematurity
  - Low birth weight
  - Maternal hypertension
  - Hypoxia
  - Intracranial hemorrhages/strokes
- With many substances (particularly methamphetamine), polysubstance use common
- Can make differentiating the effects of specific drugs difficult

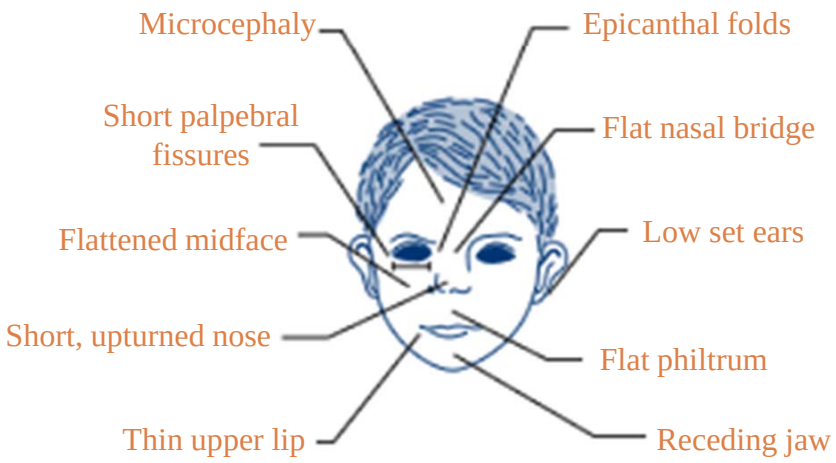
Fetal Alcohol Spectrum Disorder

- Continuum disorder
  - Fetal Alcohol Syndrome (FAS)
  - Alcohol Related Neurodevelopmental Disorder (ARND)
- Having FAS does not mean more serious problems with mood, behavior, or cognitive/executive functioning

Fetal Alcohol Syndrome

- Growth delays either at birth or after
- CNS Dysfunction
  - Microcephaly (small head size)
  - Mental retardation
  - Structural changes to the brain
  - Deficits in 3 areas as determined by neuropsychological testing
- Characteristic facial dysmorphology

FAS Facial Features

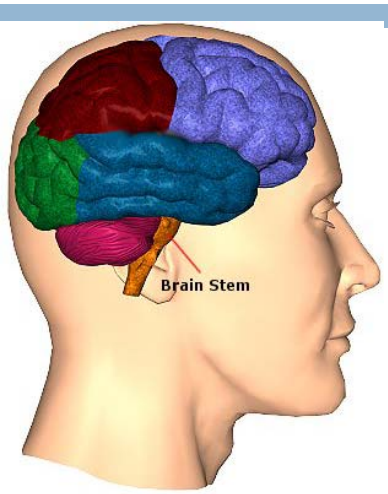


Alcohol Related Neurodevelopmental Disorder

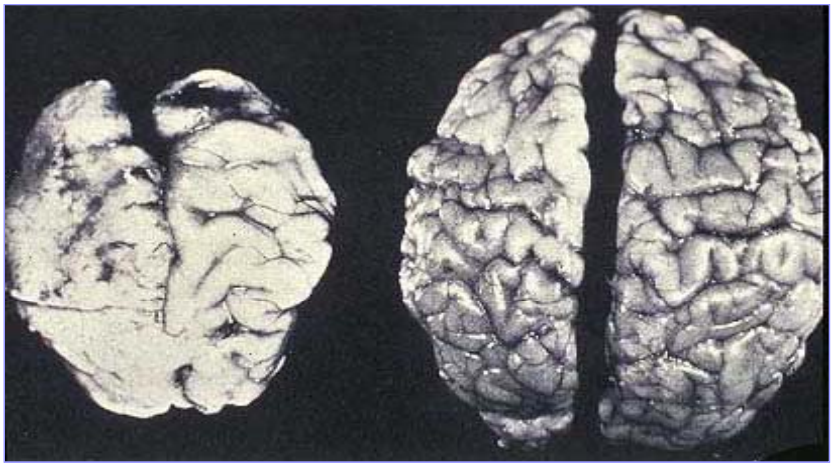
- Documented history of prenatal alcohol exposure
  - Parental acknowledgement of alcohol use
  - Kinship reports
  - DCFS records
  - Court/police records
  - Birth records
- Central Nervous System Impairments

Effects of Prenatal Alcohol Exposure on the Brain

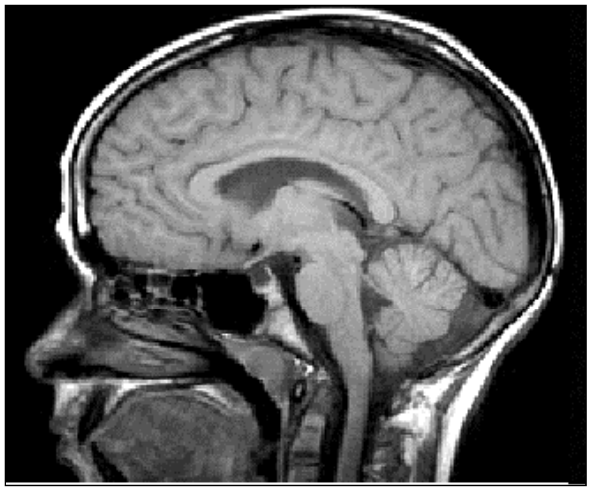
- Alcohol is a midline teratogen
- Brain areas affected:
  - Frontal lobes
  - Limbic system
  - Basal ganglia
- Size of brain is affected
- Damage to the corpus callosum



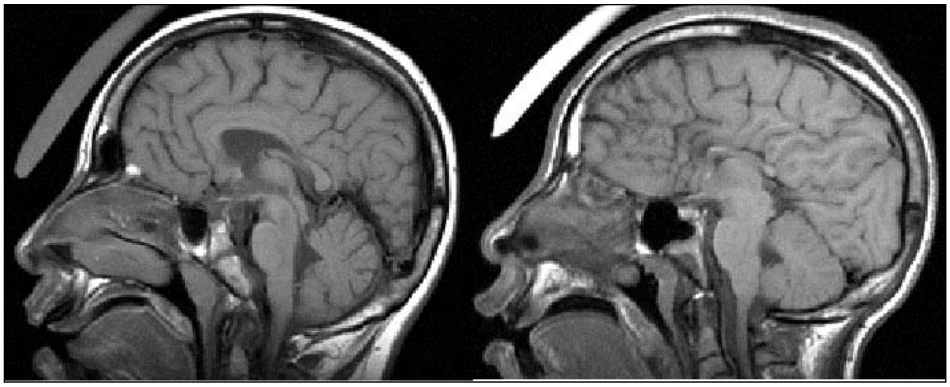
Brain Changes with Prenatal Alcohol Exposure



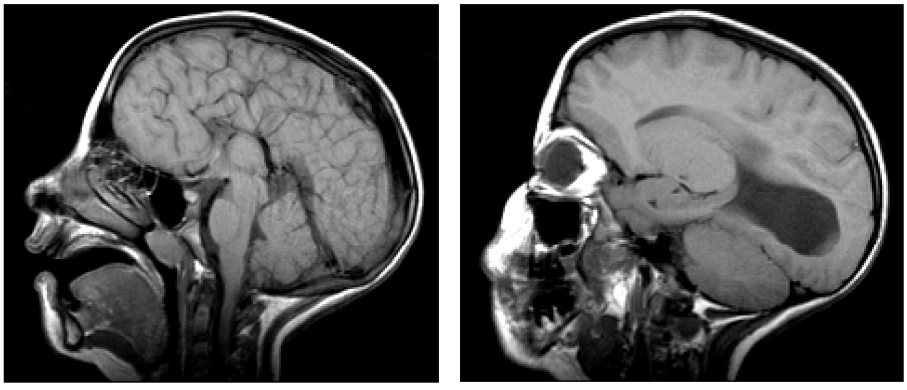
Brain Changes with Prenatal Alcohol Exposure (cont.)



Brain Changes with Prenatal Alcohol Exposure (cont.)



Brain Changes with Prenatal Alcohol Exposure (cont.)



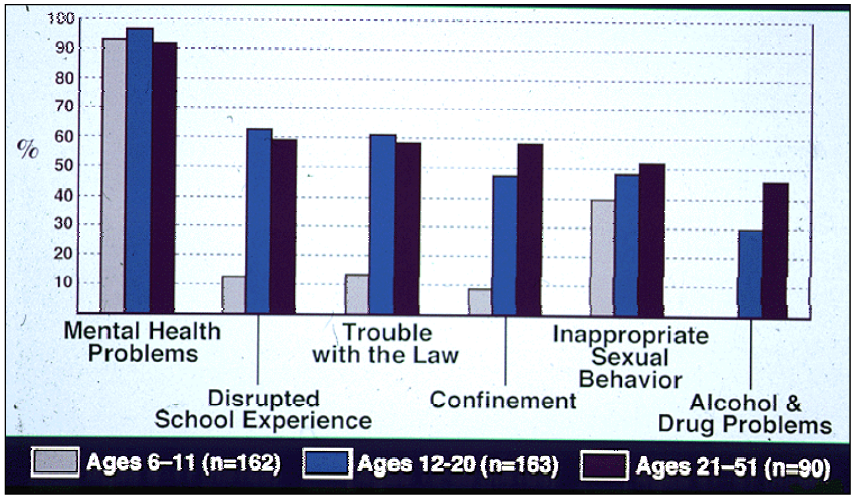
Alcohol Dose

- 1 drink / week
  - Hyperactive and aggressive behaviors
- Moderate to heavy use
  - Delinquent behavior and overall problem behavior
- Any alcohol use in pregnancy
  - 3.2 x risk for delinquent behavior

Risk Factors

- Dose of alcohol
- Pattern of exposure (binge vs chronic use)
- Timing of exposure
- Genetic variations
- Maternal characteristics
- Interaction with nutritional variables
- Synergistic reactions with other drugs

Secondary Disabilities



Protective Factors

- Being raised in a stable, nurturing home
- No sexual or physical abuse
- Diagnosis before the age of 6
- Receiving early intervention services.
- Diagnosis of FAS vs. ARND

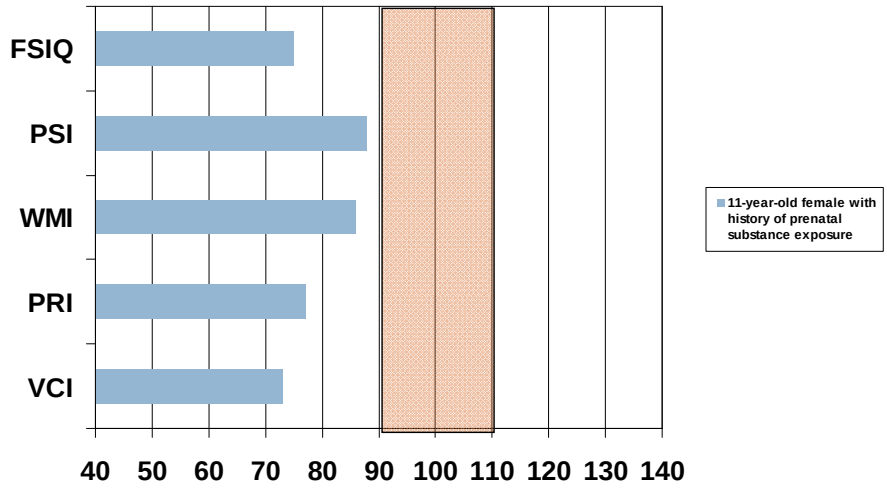
Case History

- 11-year-old African-American female
- Referral due to behavior problems and academic concerns
- Positive toxicology at birth for cocaine and opiates
- Maternal history of prenatal alcohol use
- Biological home for first 6 years
- History of severe neglect and possible abuse
- Over 6 placements once in protective custody
- Placement disruptions due to behavior
- School suspensions for fighting
- Poor grades

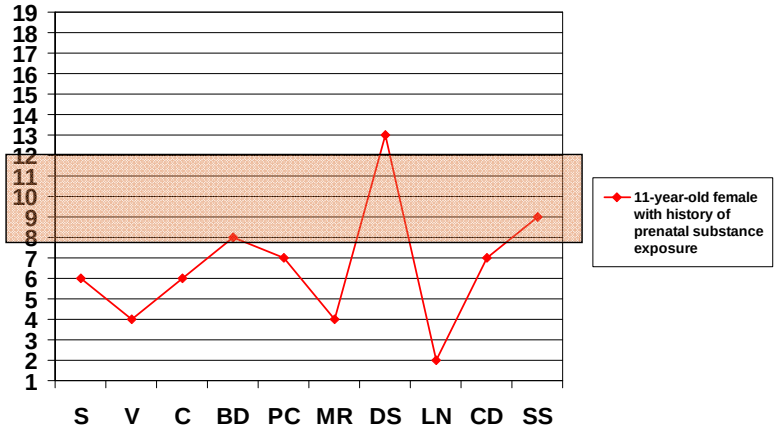
Cognitive Deficits

- Prenatal substance exposure's effects on the developing brain ultimately affect cognitive abilities
- Deficits may include:
  - Global deficits (developmental delays, mental retardation)
  - Borderline cognitive abilities
  - Pockets of intellectual deficits
  - Widely varying abilities

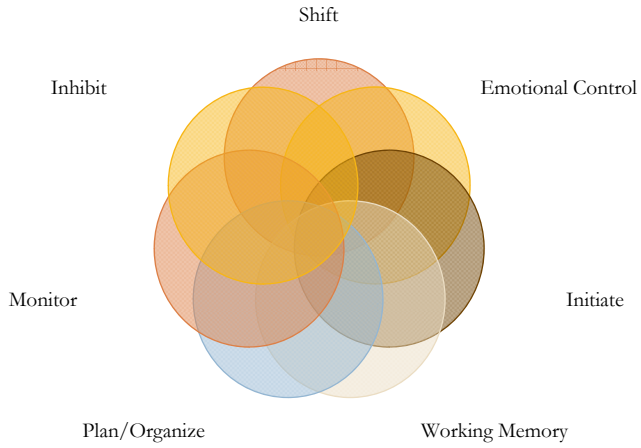
Case Example



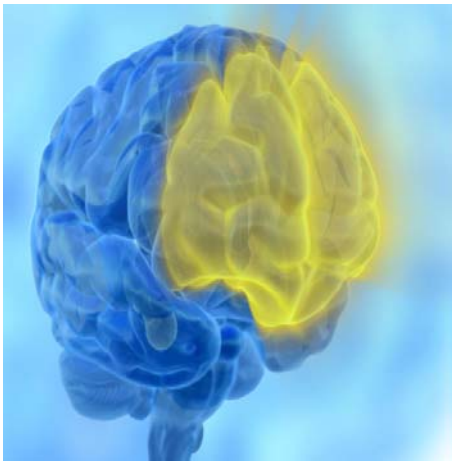
Case Example (cont.)



Executive Functioning



Executive Dysfunction



- Damage to the frontal lobes and the prefrontal cortex
- Impacts all areas of functioning
- Behavioral symptoms may resemble ADHD

Case Example

- Presented with deficits in her ability to:
  - Inhibit behavior
  - Shift between different tasks
  - Maintain emotional control
  - Monitor behavior

Academic Deficits

- Some children qualify as learning disabled, but many "fall between the cracks"
  - Mathematics deficits
  - Reading comprehension difficulties
  - Difficulties with written expression
  - Speech and language delays
  - Fine motor delays
  - Emotional and behavioral disturbances

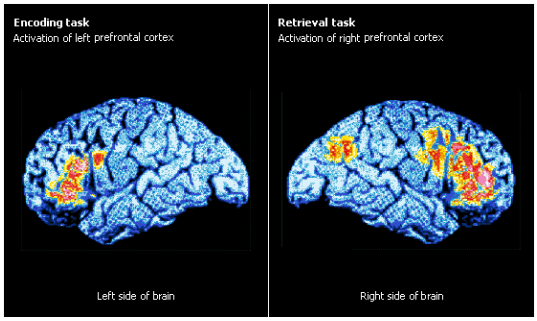
Case Example

- Typical performance in:
  - Word reading
  - Word decoding
  - Spelling
  - Listening comprehension
- Deficits in:
  - Reading comprehension
  - Numerical operations
  - Mathematical reasoning
  - Written expression
  - Oral expression

Memory Deficits

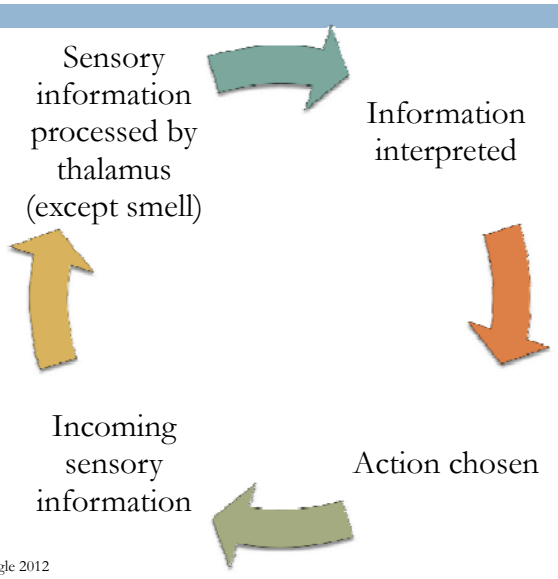
- "She seems to remember things one day, but not the next…"
- Wide range of memory deficits:
  - Visual memory
  - Verbal memory
  - Attention/concentration
  - Information processing deficits

Memory and the Brain

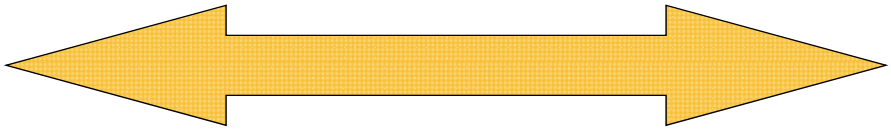


- Encoding and retrieval deficits result in inconsistent memory
- Combination of deficits in prefrontal cortex and limbic system

Sensory Integration and Dysfunction



Sensory Dysfunction



Hypersensitivity **Hyposensitivity**

- Lower threshold
- Easily overwhelmed by incoming sensory information
- Need less of a given stimuli

- Higher threshold
- Need high levels of stimulation to even register the stimuli

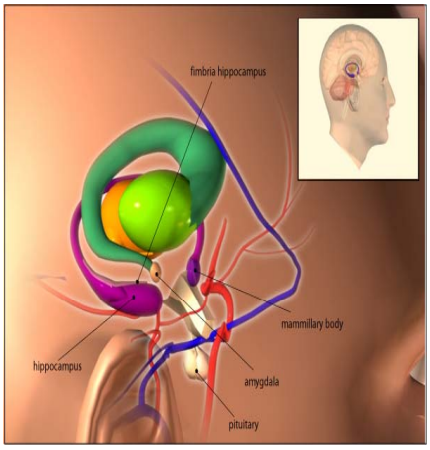
Impact of Sensory Dysfunction

- May be a source of agitation and discomfort
- May lead to distractibility
- May lead to irritability/behavioral outbursts
- May interfere with overall functioning
- Can mimic other disorders (e.g., ADHD)

Case Example

- Taste and smell sensitivity
- Sensation seeking behaviors
- Auditory filtering problems

Emotional Difficulties



- Limbic system damage predisposes children to emotional dysregulation
- Common complaints include:
  - Emotional lability
  - Anxiety
  - Depression
  - Impulsivity

Emotional and Behavioral Problems

- Depression
- Anxiety
- ADHD
- Conduct disorders
- Attachment deficits
- Mood swings
- Tantrums

Social Deficits

- Typically desire friendships
- Emotional dysregulation contributes to social difficulties
- Inability to anticipate consequences leads to interaction problems
- Often respond to peers in an impulsive manner

Case Example

- Significant emotional, behavioral, and social difficulties
  - Fighting
  - Depression
  - Rule-breaking behavior
- Difficulties complicated by trauma history and multiple placements

Environmental Exposure

- Children living in environment with substance users face a variety of challenges
- The degree and impact of environmental exposure can vary depending on the drug
- Some parents are able to remain functional, whereas others are significantly impaired
- Home life is often lacking and can fail to meet the child's basic needs

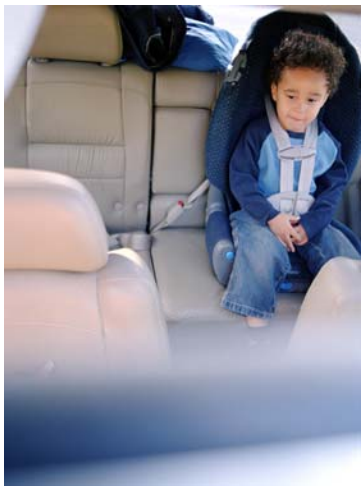
Environmental Exposure (cont.)

- Unlike many other drugs, meth exposure continues after birth
- Meth contaminates surfaces that a child has access to
- Many children test positive for amphetamines upon removal from the home
- Even if the environment is "cleaned" chemicals can remain on surfaces

Trauma

- Substance abuse can significantly impact an adult's ability to parent
- Depending on substance used and effect, can result in careless behavior, irritability, violence, paranoia, and psychiatric symptoms
- Parents ultimately respond to their children from this state

Trauma (cont.)



- Neglect
  - Parents often unable to care for child's basic needs
  - Focus can be on obtaining drug rather than child
  - Older children become caretakers
  - Children left to fend for themselves

Trauma (cont.)

- Physical Abuse
  - Parent's anger may be triggered by small incidents
  - Even "normal" things can result in extreme reaction
  - Places children and significant risk

Trauma (cont.)

- Sexual Abuse
  - Parents often allow adults into home unsupervised while using
  - Expose child to sex, pornography, and other inappropriate sexual situations
  - Direct sexual abuse of child

Trauma (cont.)

- Exposure to violence
  - Substance users can lead dangerous lifestyles that place children at risk
  - May be exposed to domestic violence between parents/adults
  - Violence in the community
  - Violence over drugs

Attachment

- What is attachment?
  - Relationship that develops between child and caregiver during early years of life
  - Biologically based
  - Affective and state regulation

Attachment (cont.)

- Attachment is communicated in many ways
  - Attuned, responsive caretaking
  - Facial expressions
  - Posture
  - Voice tone
  - Physiological changes
  - Rate of movement
- Changes as child develops

Attachment (cont.)

- Secure Attachment
  - Caregiver generally available
  - Caregiver usually responsive
  - Caregiver sensitive to child's signals
  - NOT perfect parenting
- Insecure Attachment
  - Caregiver inconsistent in their response or availability
  - Not attuned to child's cues
  - Unreliable in their response to child

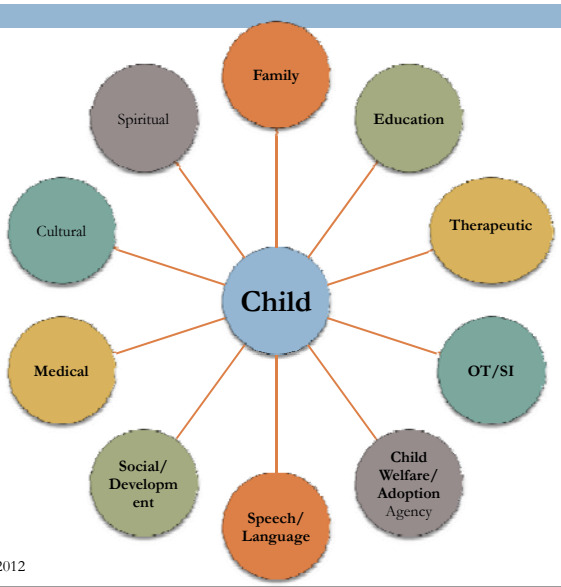
Attachment (cont.)

- Risks to secure attachment
  - Disrupted attachments (i.e. multiple placements)
  - Developmental delays
  - Death of caregiver
  - Sensory processing issues
  - Caregiver illness
  - Caregiver depression
  - Premature infant
  - Abuse/neglect/trauma
  - Drug/alcohol exposure
  - Child's illness

Importance of Integrative Treatment Approach

- Multiple levels of treatment across different systems is critical
- Regular communication and collaboration between treatment providers
- Team approach is necessary

Managing Multiple Systems



Treatment Values

- Promotes positive relationships
- Emphasis not merely symptom remediation
- Child is an active participant in treatment planning
- Incorporate cultural, racial and economic factors

Components of Treatment

- Educational interventions
- Intensive case management
  - Advocacy
  - Linkage
  - Referral
- Psychotherapeutic interventions
  - Individual
  - Family
  - Group

Intervention Strategies: External Brain

- Change the environment, NOT the child
- Consistency across contexts
- Plan, structure, organize, and predict
- Respect the child and his/her abilities
- Help develop self-regulation
- Distinguish between willful behavior and neurological deficits
- Multi-sensory learning

Intervention Strategies: Prevention

- Identify triggers and causes of over-stimulation
- Look for cues that the child is feeling overwhelmed
- Model calm, organized behavior
- Use intervention only when the child is calm and in control
- Defer discussions of misbehavior until the child is calm

Intervention Strategies: Physical Environment

- Plain walls
- Avoid mobiles/hanging items
- Soft lighting
- Cover part of windows
- Limit open spaces
- Label areas with pictures and words
- Keep work areas clean – only have out materials being used
- Use preferential seating for classroom

Intervention Strategies: Communication

- Avoid timed activities
- Closely monitor independent work
- Avoid "why" questions
- Use "how," "who," "what," and "where" questions
- Give 1 instruction at a time

Intervention Strategies: Transitions

- Allow child to feel a sense of completion before transitioning to next task
- Adapt work to minimize frustration and anxiety
- Provide warning and preparation for transition times
- Assist student to devise organizational strategies for transition
- Rely on routines and rituals for memory consolidation, calming
- Create a picture of time

Intervention Strategies: Attention

- Ensure child is listening prior to direction
- Use multi-sensory teaching
- Break instructions into small segments
- Do not assume prior knowledge!
- Have child repeat instructions in his/her own words
- Discuss what to listen for/look for
- Encourage child to pay attention to details
- Ask questions that cue memory
- Picture cues/schedules
- Audio tape important information

Intervention Strategies: Self-Regulation

- Gradual shift from external to internal regulation
- Must teach self-regulation
- Allow opportunities for sensory input:
  - Fidget toys, water bottles, gum, Thera-Bands ®, chew toys, straws, silly putty
- Alert Program ©
- Provide frequent breaks with motor movement
- Provide a quiet, safe place for times of dysregulation
  - Bean bags, soft lighting, soft pillows, music

Intervention Strategies: Social Skills

- Teach relationship skills
- Pair child with a positive peer role model
- Convene small "lunch bunch" with school counselor to teach social skills

Intervention Strategies: Discipline

- Be firm, not punitive
- Consistently adhere to rules
- Wait until child is calm and de-escalated before intervening
- Avoid debates, just state the rule
- Positive/negative reinforcement works for some children but not all
- Use "cool down" space, not "time out"
- Learn what the child values
- Avoid punitive consequences such as isolation
- Provide frequent praise for positive behavior, delivered immediately after it occurs
- Catch the child being "good"
- Recognize something good at the end of everyday
- "All of our brains work differently"
- Make "choice cards" for positive rewards

Prenatal Substance Exposure and Medication Management

- Children and adolescents with a history of prenatal substance exposure often show symptoms consistent with ADHD
  - Inattentiveness
  - Distractibility
  - Impulsivity
  - Hyperactivity

Medication Management in the Prenatally Exposed Child

- Choice of medication
- Side effects
- Monitoring and follow-up

Intervention Summary

- Develop a "system of care" treatment model:
  - Needs can be met within the home, school, and community
  - Interagency collaboration
  - Child-centered focus
  - Family based strategies
  - Strength based
  - Culturally competent

Looking to the Future

- No amount of alcohol or drugs is safe during pregnancy
- For women already using substances, recommendation is to stop as soon as possible
- Provide substance abuse treatment for families impacted by substances
- Children prenatally and environmentally exposed should be closely monitored
  - Cognitive
  - Academic
  - Social
  - Behavioral
- Early intervention and treatment is key

Children's Research Triangle