"Sensory processing and Autism Spectrum Disorder"

Dr. Sapna Chakraborty (Missouri State University)

Learning Objectives

- Discuss various sensory processing issues commonly seen in individuals with Autism and other genetic and neurological conditions.
- Assessing, identifying, and treating the sensory processing issues.
- Interventions to cope, adapt, and learn skills to self-regulate the sensory issues affecting individuals functioning and participation in daily living roles and activities.

Occupational Therapy

HELP CHILDREN DEVELOP SKILLS NEEDED FOR THE JOB OF LIVING

This includes
- Playing
- Learning
- Getting along with others
- Taking care of own body
Specialty Practice Area:

Low Vision  Neonatal Care  Lymphedema  Mental Health

Autism Spectrum Disorder

- Assessing and identifying
- Treating
- Coping and adapting
- Sensory integration and neuro functional cognitive approach.
What is Autism?

- Very complex, often baffling developmental disability
- Leo Kanner in 1943 as early infantile autism
- "locked within themselves."
- Unusual attachment to objects, resistance to change in routine, and sensory sensitivities.

Diagnostic Criteria (DSM-5)

A. Persistent deficits in social communication and social interaction
B. Restricted, repetitive patterns of behavior, interests, or activities
C. Symptoms must be present in the early developmental period
D. Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.
E. These disturbances are not better explained by intellectual disability (intellectual developmental disorder) or global developmental delay.

[http://www.cdc.gov/ncbddd/autism/hcp-dsm.html]

Identified Prevalence of Autism Spectrum Disorder

<table>
<thead>
<tr>
<th>Surveillance Year</th>
<th>SMR Year</th>
<th>National of ASRM</th>
<th>Prevalence per 1,000 (Adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1999</td>
<td>426</td>
<td>1 in 530</td>
</tr>
<tr>
<td>2001</td>
<td>1999</td>
<td>427</td>
<td>1 in 530</td>
</tr>
<tr>
<td>2002</td>
<td>1999</td>
<td>427</td>
<td>1 in 530</td>
</tr>
<tr>
<td>2003</td>
<td>1999</td>
<td>427</td>
<td>1 in 530</td>
</tr>
<tr>
<td>2004</td>
<td>1999</td>
<td>427</td>
<td>1 in 530</td>
</tr>
<tr>
<td>2005</td>
<td>1999</td>
<td>427</td>
<td>1 in 530</td>
</tr>
<tr>
<td>2006</td>
<td>1999</td>
<td>427</td>
<td>1 in 530</td>
</tr>
<tr>
<td>2007</td>
<td>1999</td>
<td>427</td>
<td>1 in 530</td>
</tr>
</tbody>
</table>

[http://www.cdc.gov/ncbddd/autism/data.html]

National Health Statistics 2014: 1 in 45
Causes of Autism

- The simple answer is we don’t know.
- Linked to genetic disorders such as Fragile X, Tuberosclerosis, and Angelman’s Syndrome.
- Best scientific evidence: cumulative effect of multiple genetic components or undetermined environmental exposures.
- Vaccination debate (Study by Andrew Wakefield, British gastroenterologist has been retracted)
  - http://www.ted.com/talks/wendy_chung_autism_what_we_know_and_what_we_don’t_know_yet

Screening and Diagnosis

A. Developmental Screening
B. Comprehensive Diagnostic Evaluation

- Ages and Stages Questionnaires (ASQ)
- Communication and Symbolic Behavior Scales (CSBS)
- Parents’ Evaluation of Developmental Status (PEDS)
- Modified Checklist for Autism in Toddlers (MCHAT)
- Screening Tool for Autism in Toddlers and Young Children (TOD)
Diagnostic Tools

- Autism Diagnosis Interview – Revised (ADI-R) [7]
  Children and adults with mental ages about 18 months and above.
- Autism Diagnostic Observation Schedule – Generic (ADOS-G) [8]
  The observational schedule consists of four 30-minute modules, each designed to be administered to different individuals according to their level of expressive language.
- Childhood Autism Rating Scale (CARS) [9]
  Child over 2 years of age.
  Ages 3 through 22

Challenges That May Accompany ASD

- Sensory Processing
  - Organization and Attention
  - Cognitive Impairment
  - Motor Challenges
  - Emotional Issues, including Anxiety and Stress
  - Seizure Disorder
  - Allergies, Gastrointestinal Disorders (Dr. Alessio Fasano), and Pain
  - Genetic Disorders

“Children may forget what you say, but they’ll never forget how you make them feel.”

Author Unknown
What senses are affected by sensory processing disorders?

- Visual
- Auditory
- Olfactory
- Gustatory
- Touch

Children were able to receive input from stimulation.

Children were not processing effectively.

This lack of processing resulted in poor adaptive responses.

What do we call it when the brain learns to ignore the sensory information coming from a particular stimulus?

- Good Modulation
- Poor Modulation
Sensory Processing Issues

Where does it all start anyway?

CNS

- Children or adults with Autism
- Children or adults with Cognitive issues
- Children or adults with ADD/learning disabilities
- Children with Attachment issues
- Children/Adults with mental health disorders

Anatomy of the Brain

- Which part controls the executive function, reasoning, judgment, voluntary movement?
- Where is the visual cortex located?
- Which part controls intellectual and emotional functions?
Prenatal Development of Sensory System

- Tactile: Noticed as early as 7 wks. Primitive tactile reflexes elicited at 26 wks.
- Vestibular: Day 44, functional by 21 wks.
- Gustatory: Mouth with tongue bud at 4 wks., week 35 differentiates between water and glucose; newborn at day 2-3 can differentiate sweet, sour, bitter, breast milk or formula.

- Olfactory: Nasal structures start at week 5 and in place by week 8. Recognition of mother through smell.
- Visual: Start day 22 but continues till 36 wks and is maturing till 3-4 months post natal.

MRI studies by Schultz and his colleagues at Yale showed the brain regions involved are:

1. Fusiform face area (stores social knowledge, it lights up when a person processes faces)
2. Amygdala (emotional center of the brain)

In 1999, Baron-Cohen and his colleagues found that:

1. Superior temporal sulcus (STS) the front part of the brain light up when another person (or animal) looks at you.
2. Connections from the STS to the amygdala are activated when a person tries to understand what’s going on in the mind of another.

In autistic people, this pathway may be missing or incomplete.

**Amygdala**
The emotional centre of the brain
Signs of Fight, Fright, Flight

- Racing heart
- Hyper-vigilance
- Anger
- Body Tension
- Fear
- Embarrassment
- Confusion

- Threatening posture
- Verbal threats
- Different voice pitch
- Back away
- Lute louder voice
- Marked mood change

Levels of Arousal

- Low Engine
- High Engine
- Alert and Focused

The Senses

- Auditory (hearing)
- Vestibular (gravity and movement)
- Proprioceptive (sense of position)
- Tactile (touch)
- Visual (sight)

**INTEGRATION OF THEIR INPUTS**

- Body perception
- Sensory integration

**End Products**

- Language
- Speech
- Social interaction
- Activity level
- Attention span
- Emotional stability

From Sensory Integration and the Child, by Ayres, 1979
Sensory processing issues

- Sensory hyposensitivity/low registration - unaware of dirty hands, twisted clothes, withdrawn, does not perceive facial expression
- Sensory seeking - pushes others, fidgety, restless, excessively touch other people
- Sensory hypersensitivity - easily annoyed with clothing, food, sound
- Sensory avoiding - sensory defensiveness
- Sensory discrimination - body awareness, tactile identification, speed control

Decreased Sensory Processing

- Decreased touch processing - touching people and objects to the point of irritating others
- Oversensitive alert level - easily distracted by noises or objects within the environment
- RAS filter issues - decreased proprioceptive positioning - difficulty self calming
- Difficulty establishing and maintaining attention

Decreased Auditory and Visual processing - difficulty with listening skills with visual organization and processing

Decreased Movement Processing - craves movement input

Sensory Integration

- Dr. A. Jean Ayres, OTR, performed the first studies of sensory integration in the 1950's and 1960's.
- Children with learning and behavior problems
- Clumsy, poor motor planning, likes and dislikes with sensory stimulation
Sensory Integration

- Abnormal motor responses can be altered by giving person specific sensory input so that the CNS can learn to provide proper control
- Collaborative effort between the client, therapists, and caregivers
- Will require you to take advanced training and have a close working relationship with the OTR

[YouTube link](https://www.youtube.com/watch?v=D1G5ssZlVUw)

---

**VESTIBULAR SYSTEM**
- Provides information through the inner ear about gravity and input about vision and space, which is then monitored in the cerebellum of the brain
- Important in keeping us "grounded"
- The balance center

**Under-active vestibular system**
- Seek out movement
- Difficulty sitting still
- Doesn’t get dizzy easy
- Seems clumsy

**Over-active vestibular system**
- Child dislikes coordinates activities such as swinging or spinning
- Child is cautious
- Child has fear of height and/or is fearful of climbing up or going down stairs

**Vestibular Activities**
- Movement exercises
- Unilateral exercises (lying on stomach, kneeling)
- Sensory and other playground activities
- Swinging on a trampoline

---

**PROPRIOCEPTIVE SYSTEM**
- Provides information through receptors in our muscles, tendons, and joints about where our body parts are and what they are doing
- Important for body awareness

**Ways to provide proprioceptive input**
- Push/pull activities
- Heavy work
- Weighted items
- Deep pressure input

**Proprioceptive System Problems**
- Child has to pay attention to things they should look at dramatically and may be less available to attend to classroom activities
- Uses too much or too little pressure and/or force

**Activities that Provide Proprioceptive Input**
- Walking with weights, Eisenhower, pushing, dragging
- Carrying heavy objects
- Manipulate objects - right hand, hang on
- Manipulate objects - left hand, hang on
- Weighted items, weighted vest, top pillow, body pillow
- Deep pressure input: wall massage, firm pressure to shoulders/neck, rug, and
**Symptoms of Decreased Visual Processing**

- Avoidance of visual activities.
- Difficulty “keeping the eyes on the ball” during sports.
- Skipping letters or words while reading.
- Self-stimulation type activities.
- Writing in a curved fashion.
- Not “seeing items” when asked to pick up a room.

**Visual Strategies**

- Use colored overlays.
- Remove extra visual information.
- Use natural lighting instead of fluorescent lights.
- Use cardboard or other types of blockades to decrease visual information.
Visual Strategies (Continued)

- Sit on the side of the room that allows for use of the strongest eye.
- Try not to use laminated materials on the walls or use non-glare materials.
- For the visually distracted, do not sit next to open doors or windows.
- Use bright colors, especially to bullet information.

Symptoms of Auditory Processing Disorders

- Covering ears.
- Withdrawal from noisy situations.
- Tantrums or other type of explosive behaviors.
- Singing or talking to avoid other sounds.
- Avoidance behaviors.
- Speech and language delays.

Auditory Strategies

- Use headphones, ear plugs, back drops to decrease background noise
- Auditory FM systems.
- Strategic seating preferences.
- Chewing.
- Allow music to decrease background noise.
- Interactive Metronome
- Integrating Listening System
Oral Sensory Strategies

- Sensory based activities
- Behavioral Techniques

Which two new sensory systems you learnt about today?

- Vtbralesui (Unscramble)
- Porncpierptnio (Unscramble)

If your system is overstimulated, p__________ will help calm and organize
If your system is under stimulated, p__________ will help alert and organize

“The Sensory input that the brain deposits (creating maps of the body, etc.) are the foundations for forming the background for learning and understanding.”

Winnie Dunn, OTR/L
Intervention For Autism

- Early Identification
- Individualized supports (Medical, behavior, educational, social, communication, and respite)
- Environmental Arrangements and Visual Supports: Training and Education of Autistic and Related Communication Handicapped Children (TEACCH)
- Communication Assist: Picture Exchange Communication System (PECS)
- Social Stories
- Applied Behavioral Analysis (ABA) and Discrete Trial Training (DTT)
- Sensomotor Methods
- Functional Intervention

Comparisons

COMPARING AUTISM TO "NORMAL" IS LIKE COMPARING TRAINS TO CARS

- One man with autism compared himself to a locomotive traveling down a railroad track.
- Trains may function differently than cars, but if you let them stay on their tracks, they will eventually get to their destination.
- If you force a train off its tracks, it will probably make big ruts in your road.
- Research shows that individuals with autism have different patterns of development and follow their own paths to learn life skills.

Famous People linked with ASD

- Albert Einstein (Scientist)
- Sir Isaac Newton (mathematician)
- Wolfgang Mozart (composer/ musician)
- Charles Darwin (naturalist/scientist)
- Michelangelo (painter/sculptor/architect/poet)
- Ludwig van Beethoven (composer/musician)
- Lewis Carroll (author)
- Thomas Jefferson (U.S. President)
- Vernon Smith (2002 Nobel Prize Winner for economics)
References


8. http://www.ted.com/talks/wendy_chung_autism_what_we_know_and_what_we_don_t_know_yet


17. www.oneworld.net/ penguin/energy/energy.html

18. www.computerprivacy.org/ who/