Physical Therapy and Sensory-Motor Integration

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Overview

• Perkins School for the Blind
• Sensory processing
• Sensory processing disorder
• Sensory regulation and motor learning
• Physical Therapy: Sensory-motor strategies and interventions
“The Perkins mission is to provide education and services that build productive, meaningful lives for children and adults around the world who are blind, deafblind or visually impaired, including those with additional disabilities.”

“All we see is possibility”

www.Perkins.org
Perkins School Programming

• Perkins School (Day and Residential)
  – Early Learning Center (ELC) [ages 3-6]
  – Lower School [ages 6-15]
  – Secondary [ages 15-22]
  – Deafblind [ages 3-22]
  – Outreach, Early Intervention, Itinerate

• Perkins International
• Perkins Solutions
• Perkins eLearning
• Perkins Library
Perkins School Services

- Classroom Teacher
- Teacher of the Visually Impaired (TVI)
- Physical Education Teacher
- Physical Therapy
- Occupational Therapy
- Speech Therapy
- Orientation & Mobility (O&M)
- Music Therapy
- Art
- Social Work
- Psychology
- Nursing
- Residential Staff
Common Diagnoses at Perkins

- **Visual Impairments**
  - Cataracts
  - Cortical Visual Impairment (CVI)
  - Glaucoma
  - Low Vision
  - Optic Nerve Hypoplasia
  - Retinopathy of Prematurity
  - Septo-Optic Dysplasia

- **Medical Diagnoses**
  - Cerebral Palsy
  - CHARGE Syndrome
  - Developmental Delays
  - Downs Syndrome
  - Hydrocephalus
  - PDD-NOS, Autism
  - Prematurity
  - Seizure Disorder
  - Traumatic Brain Injury (TBI)
  - Other (Genetic, Acquired)

- **SENSORY PROCESSING DISORDER**
How Do We Process Sensory Information?

• Take an object nearby you
• Describe the object in your head
• What senses did you use to describe it?
  – Sight, Touch, Taste, Smell, Hearing
  – Proprioceptive, Vestibular
• All your senses are important in your ability to learn about and interact with your environment
Self Regulation & Routines

- What are your daily routines?
- Why do you need these routines?
- How would you feel if your routine was changed?
- We ALL have our own sensory diets
  - Sensory input can be alerting or calming
  - Daily activities provide us with input to keep us regulated to be able to become alert, relax, and focus on daily tasks
Samples of Engines in High
Samples of Engines in Low
This chart shows typical patterns of change in arousal in response to environmental events.

Key:

Child who experiences overload, or sensory shutdown.

Child with a non-defensive system.

Sensory defensive child.

Child who is under responsive or has sensory registration problems.

Figure 1-6. From Sensory Defensiveness in Children Ages 2-12: An Intervention Guide for Parents and Other Caretakers, © 1991, Wilbarger and Wilbarger. Reprinted with permission of Avanti Education Programs.
Visual Processing Game

The next slide will have directions for you to follow

Pay Attention!
Sensory Processing

• The way the nervous system receives messages from the senses and turns them into appropriate motor and behavioral responses.

(http://www.spdfoundation.net)

• Self-Regulating strategies/patterns used to process sensory information:
  – Sensory seeking
  – Sensory avoiding
  – Sensory sensitive
  – Low registration

Sensory Processing Disorder ( SPD)

- A condition that exists when sensory signals don't get organized into appropriate responses. (http://www.spdfoundation.net)
  - Nervous system is unable to take in relevant information from the environment and process it correctly

- A person with SPD finds it difficult to process and act upon information received through the senses

- Signs of SPD
  - Easily distracted, clumsy, slow to perform tasks (gross/fine motor), difficulty with transitions, trouble attending tasks, behavioral problems, anxiety, depression, difficulty at school

http://www.spdfoundation.net
• **Hypersensitivity**
  - Caused by over-reaction of normal protective senses, resulting in social and emotional problems, including hyper-vigilance, anxiety, and aggression (Wilbarger, 1995).
  - Vestibular, Tactile, Proprioceptive, Auditory
  - May present as:
    - Dislike of being touched
    - Feeling discomfort or pain from clothing rubbing against skin
    - Dislike for foods with mixed textures
    - Discomfort when one looks directly into the eyes of another person
    - Exaggerated startle reflex
    - Dislike of complex visual stimuli, such as fast-moving objects or colors

• **Hyposensitivity**
  - Characterized by an unusually high tolerance for environmental stimuli
  - Vestibular, Tactile, Proprioceptive, Auditory
  - May present as:
    - Restless
    - Seek sensory stimulation


Parent Concerns & Reports

• Self-regulation
  – Self-control, temper, shutting down, impulsive, handle pressure, handle self, control behavior, regulate, cope-coping, meltdowns, frustration, “out of control,” calming self

• Social Participation
  – Peer interactions and relationships, friendships, socialization in group settings, play with others, make friends

• Skill Development
  – Fine motor, gross motor, handwriting, gripping pencil, throwing-catching ball, riding bike, playing on playground

• Confidence
  – Self-esteem, confidence, feels good about self, self-worth, comfortable with self, self-liking

## Sensory Strategies

### Table 5. Alerting and calming activities

<table>
<thead>
<tr>
<th>Sense</th>
<th>Alerting activity</th>
<th>Calming activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch</td>
<td>Rubbing, patting, the cold e.g. clapping hands</td>
<td>Hugging, holding, stroking, e.g. self-massaging</td>
</tr>
<tr>
<td>Vestibular</td>
<td>Rotation, rapid forward movement, e.g. running</td>
<td>Slow, rhythmic movement, e.g. sitting in a rocking chair</td>
</tr>
<tr>
<td>Proprioceptive</td>
<td>Light pressure, e.g. brushing the skin with a feather</td>
<td>Moderate pressure, e.g. being wrapped up in a blanket</td>
</tr>
<tr>
<td>Visual</td>
<td>Bright colours, bright light, e.g. flashing images</td>
<td>Pastel colours, low-intensity settings, e.g. candlelight</td>
</tr>
<tr>
<td>Hearing</td>
<td>Irregular, loud and contrasting sounds, e.g. banging on a piano</td>
<td>Melodious, rhythmic, slow music, e.g. strumming a harp, listening to classical music</td>
</tr>
<tr>
<td>Smell</td>
<td>Pungent smells, e.g. vinegar</td>
<td>Sweet, faint smells, e.g. vanilla</td>
</tr>
<tr>
<td>Taste</td>
<td>Strong flavors, crunchy food, e.g. hot peppers, pretzels</td>
<td>Smooth texture, warm, e.g. hot chocolate</td>
</tr>
</tbody>
</table>

Sensory Diets

- Occupational Therapy
- Provide consistent sensory input
- Regulate state of arousal
  - Implemented as needed or scheduled throughout the day, as part of a predictable, structured, and individualized program
Examples of Sensory Diets

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
</table>
| 8:30-9:30  | Arrive at School
Swing             |
| 9:35-10:05 | Snack
Bounce on peanut ball          |
| 10:10-10:40| Art
Lotion (warm up hands)         |
| 10:45-11:15| Computer
Trampoline - 1 song            |
| 11:20-11:50| Classroom table activity Squeezes|
| 11:55-12:25| Gym
Compression vest               |
| LUNCH      |                                   |
| 1:20-1:50  | Cooking
Quiet music                  |
| 1:55-2:25  | Cooking
Weighted vest                 |
| 2:30-3:00  | News from home & school          |

Peanut Ball
Rocking Chair
Lotion/Massage
Fidget toys

- For kids who need input less frequently, or less predictably, so that a rigid schedule wouldn’t work as well
- They may be able to make a choice between two, or request a strategy independently
- Ideally, strategies are used before student is disregulated...but they are often brought in to help a student who is already deregulated

Sensory strategies created by Greta Mangini, Occupational Therapist at Perkins School for the Blind
Motor Development and the Sensory System

One helps the other!

- Physical Therapy for children focuses on activities including:
  - Reaching
  - Rolling
  - Sitting
  - Crawling
  - Transitional movements
  - Standing
  - Walking

- These activities promote:
  - Spatial perception
  - Body awareness
  - Mobility for play
  - Social interaction
  - Exploration of environment

- Experiences provide sensory feedback of proper movement patterns

Sensory System and Motor Learning

• Processing sensory information accurately is necessary for the body to formulate and execute an appropriate motor response.

• Child needs to be at an optimal level of arousal to learn new tasks and commit to motor memory.
Sensory Processing Disorder and Physical Therapy

- Consult with Occupational Therapy
- “Children with SPD exhibit sensory impairments, social issues, and slower development of mobility skills” when compared with their peers
- Incorporate activities that address the child’s sensory needs while addressing physical impairments and functional limitations
  - Muscle imbalances (weakness and/or tightness)
  - Postural control
  - Balance
  - Endurance
  - Motor planning

Sensory-Motor Integration

- Combining sensory and gross motor activities
- Teaches students to use their senses to help perform gross motor tasks
- Focuses on sensory processing
- Allows them to be active in their sensory learning
- Feedforward and Feedback
Sensory-Motor Activities

Yoga (proprioceptive, vestibular, kinesthetic awareness, stretching, strengthening, breathing…)

Group games (auditory processing, following directions, peer interaction)

Obstacle courses (balance, motor planning, changing body positions, transitions)

Sensory equipment (swings, bouncers, spinners, weighted objects)
### Managing Sensory Sensitivities

#### Table 4. Activities to manage sensory hypersensitivity and hyposensitivity

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1 Trampoline</td>
<td>Stimulate vestibular sensitivity</td>
</tr>
<tr>
<td>B2 Therapy ball</td>
<td>Stimulate propioceptive sense and relaxation</td>
</tr>
<tr>
<td>B3 Sand bath</td>
<td>Calm down or organise tactile sensitivity</td>
</tr>
<tr>
<td>B4 Visual stimulation through lights</td>
<td>Increase attention span and sitting tolerance</td>
</tr>
<tr>
<td>B5 Ball pool</td>
<td>Organise tactile sensitivity</td>
</tr>
<tr>
<td>B6 Balancing board</td>
<td>Stimulate vestibular sensitivity and motor coordination</td>
</tr>
<tr>
<td>B7 Ladder</td>
<td>Stimulate vestibular sensitivity</td>
</tr>
<tr>
<td>B8 Vibrator</td>
<td>Stimulate proprioceptive sense</td>
</tr>
<tr>
<td>B9 Tunnel</td>
<td>Stimulate proprioceptive sense</td>
</tr>
<tr>
<td>B10 Swing</td>
<td>Stimulate vestibular and proprioceptive sense</td>
</tr>
</tbody>
</table>

Differential Diagnosis

• “Multiple sensory motor variables contribute to the initiation and execution of movement.”

• Possible variables:
  – Sensory motor
  – Mechanical
  – Cognitive
  – Task requirements
Visual Impairments and Motor Development

Visual Impairment puts you at risk for:

- Limited Motor Experiences
- Decreased sensory exploration
- Physical/Motor Impairments
Visual Impairment and Motor Development

- **Limited Motor Experiences**
  - Decreased Activity Levels
  - (Sedentary Lifestyle, Obesity)
  - Impaired Motor Planning
  - Delayed Motor Development

- **Decreased Sensory Experiences**
  - Poor Self-Regulation of Nervous System
    - Hyper-Sensitivity
    - Hypo-Sensitivity
    - Sensory Seeking
    - Sensory Avoiding

- **Physical/Motor Impairments**
  - Muscle Imbalances
  - Bony Changes
  - Changes in Posture
  - Changes in Gait
Quick Recap

- Motor and sensory experiences work hand in hand to enhance child development

- We ALL use sensory strategies throughout our day to help regulate us
  - Alerting or Calming
  - Keeps us focused and attentive to work

- Kids job is to play!
  - It’s how they learn and develop skills in all areas of development
  - Use sensory activities to address impairments (strength, balance, flexibility, motor planning, etc) while receiving sensory input that is regulating to the child

- Consulting with occupational therapy is key to determine a child’s sensory needs

- Impaired sensory processing complicates learning (cognitive and motor) and must be addressed for acquisition of new skills
Thank You!!