The Role of Physical Therapy for Individuals with Autism Spectrum Disorders (ASDs)

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Overview
- Introduce ASD and prevalence
- Summarize recent research on ASD pertinent to PT practice
- Utilize the ICF Model as a framework for motor symptoms associated with ASD
- Explore the role of PT in promoting physical activity for individuals with ASD
- Engage in conversation about personal experiences evaluating and treating individuals with ASD

Autism 101 (Rapin & Tuchman, 2008)
- Collection of symptoms
  - Lack of social reciprocity
  - Delayed language & imaginative play
  - Restricted and repetitive behaviors
- Autism Spectrum Disorders
  - Autism
  - Asperger’s Syndrome
  - Pervasive Developmental Disorder, not otherwise specified (PDD-NOS)
By the numbers (CDC, 2007)
- North Carolina: 6.5 per 1,000 children
  - 1 out of 152 children
  - 1990: 1 out of 2500 children
- Males > Females
- 80% had documented developmental concerns before 2 years of age
  - Language
  - Social concerns
  - Imaginative play

Why is it increasing? (Daniels, 2006)
- Changes in diagnostic criteria and labels
- Increasing availability of diagnostic tools
- Improved case identification
- True changes in prevalence
  - Environmental and genetic factors
- NOT due to vaccines (Institute of Medicine, 2004)

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Motor Symptoms (Ming, Brimacombé, Wagner, 2007)
- Chart review of 154 children with ASD
  - 2-6 year old: 83
  - 7-18 year old: 71
  - 4.9:1 male to female ratio
- Autism (74), PDD-NOS (70), Asperger’s (10)
<table>
<thead>
<tr>
<th>Motor Deficit</th>
<th>Children with ASD (n=154)</th>
<th>2-6 years (n= 83)</th>
<th>7-18 years (n= 71)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotonia</td>
<td>51%</td>
<td>63%</td>
<td>38%</td>
</tr>
<tr>
<td>Apraxia</td>
<td>34%</td>
<td>41%</td>
<td>27%</td>
</tr>
<tr>
<td>Toe-walking</td>
<td>19%</td>
<td>25%</td>
<td>13%</td>
</tr>
<tr>
<td>Reduced ankle mobility</td>
<td>2%</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Gross motor delay*</td>
<td>9%</td>
<td>12%</td>
<td>6%</td>
</tr>
</tbody>
</table>

* Denver Developmental Screen

Recent Research Findings

- Toddlers with ASD had delays in gross motor, fine motor, or both (Provost et al, 2007)
- School age children with ASD scored below the 15% on the MABC (Green et al, 2009).
- Gait analysis: difficulty walking along a straight line, variable stride length and duration, reduced ‘smoothness’ (Rinehart et al, 2006)

‘Movement Disorder’ Perspective (Rinehart, 2008)

- Motor symptoms are prominent…but poorly understood
- Potential to improve understanding of the neurological underpinnings of ASD
- Inter-disciplinary approach to include gross motor assessment

Research Instruments From Our Toolbox

- Peabody Developmental Motor Scale-2 (Provost et al, 2007)
- Bruininks-Oseretsky Test of Motor Proficiency-2 (Deitz et al, 2007)
- Movement Assessment Battery for Children (MABC) (Green et al, 2009)
- Vineland Adaptive Behavior Scale (Sutera et al, 2007)
- Short Sensory Profile (Rogers, Hepburn, Wehner, 2003)
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Body Structure/Function

- Hypotonia
- Increased Joint Mobility
- Apraxia
- Impaired postural control and stability
- Deficits in motor control
- Sensory integration impairments

The International Classification of Function, Disability and Health (ICF) Model (Jette, 2006)

Body Structure and Function
- Hypotonia
- Increased Joint Mobility
- Apraxia
- Impaired postural control and stability
- Deficits in motor control
- Sensory integration impairments
Activity

- Clumsy gait
  - Rinehart (2006)
- Poor imitation
  - Williams, Whiten, Singh (2004)
- Challenged by dual task activities
  - Green et al (2009)
- Challenged by activities that require coordination

Participation

- Developmental Delay (Provost et al 2007)
- Decreased participation in free-play and organized physical activities (Cairney et al., 2005)
- Preference for sedentary activities (Provost et al 2007)
- Decreased participation in activities of self-care (Sutera et al, 2007)
**Personal** (Rapin & Tuchman, 2008)
- Cognition
- Verbal and Nonverbal Skills
- Attention
- Mood/affect
- Motivating factors
- Memory
- Sensory symptoms

**Personal: Sensory** (Rapin & Tuchman, 2008)
- Variable responsiveness
  - Decreased
  - Increased
- Somatosensory
  - Insensitivity to pain/craving deep pressure
  - Intolerance for textures, touch
- Vision
  - Unaware of obstacles and gaze aversion
  - Enhanced perception of details

**Personal: Sensory (cont.)** (Rapin & Tuchman, 2008)
- Auditory
  - Failure to respond
  - Intolerance to loudness and certain frequencies
- Vestibular function
  - Tolerance for upside-down posture, spinning
  - Motion sickness
- Taste/olfaction
  - Smell or lick objects
  - Extreme selectivity of acceptable foods

**Short Sensory Profile** (McIntosh, Miller, Shyu, 1999)
- Parent Report Measure
- Tactile Sensitivity
- Taste/Smell Sensitivity
- Movement Sensitivity
- Underresponsive/Seeks Sensation
- Auditory Filtering
- Low Energy/Weak
- Visual/Auditory Sensitivity
**Personal**
- Cognition
- Verbal and Nonverbal Skills
- Attention
- Mood/affect
- Motivating factors
- Memory
- Sensory symptoms

**Environment**
- Routine
- Predictable
- Familiar
- Closed/Open

**Autism Spectrum Disorder**

- **BODY STRUCTURE AND FUNCTION**
  - Hypotonia
  - Increased Joint Mobility
  - Apraxia
  - Impaired postural control and stability
  - Deficits in motor control
  - Sensory integration impairments

- **ACTIVITY**
  - Clumsy gait
  - Poor imitation
  - Dual task/coordination skills

- **PARTICIPATION**
  - Developmental Delay
  - Decreased participation in free-play and organized physical activities
  - Preference for sedentary activities
  - Decreased participation in activities of self-care

- **CONTEXTUAL FACTORS**
  - **PERSONAL**
    - Cognition
    - Verbal and Nonverbal Skills
    - Attention
    - Mood/affect
    - Motivating factors
    - Memory
    - Sensory symptoms
  - **ENVIRONMENTAL**
    - Routine
    - Predictable
    - Familiar
    - Closed

- **Sensory Integration impairments**
  - Hypotonia
  - Increased Joint Mobility
  - Apraxia
  - Impaired postural control and stability
  - Deficits in motor control
  - Sensory integration impairments
ICF Wrap-up

- Framework for evaluating a child
- Identify what can be modified/what cannot be modified
- Identify skills that are present
- Determine appropriate assessment tool
- Introduce and integrate these skills in functional environments using motor learning principles

Motor Learning (Valvano, 2004)

- Develop activity-related goals and objectives
- Plan activity-focused intervention
- Set up the environment
- Identify what is motivating as a reward
  - Practical for multiple environments
  - Phase out reward
- Repetition
- Vary the environment and task

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The Spectrum of BMI

- Low BMI
  - Low appetite
  - Narrow range of preferred foods
  - Slower digestion
  - Delayed physical growth

A more prevalent pattern...

<table>
<thead>
<tr>
<th>Age (author)</th>
<th>At risk for overweight</th>
<th>Overweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-5 years (Xiong et al, 2009)</td>
<td>31.8%</td>
<td>17%</td>
</tr>
<tr>
<td>6-11 years (Xiong et al, 2009)</td>
<td>37.9%</td>
<td>21.8%</td>
</tr>
<tr>
<td>2-5 years (Curtin et al, 2005)</td>
<td>23.8%</td>
<td>14.2%</td>
</tr>
<tr>
<td>6-11 years (Curtin et al, 2005)</td>
<td>37.8%</td>
<td>18.8%</td>
</tr>
</tbody>
</table>

Why the risk for high BMI is greater for ASD (Pan & Frey, 2006)
- Preference toward sedentary activity
- Fewer opportunities for structured physical activities
- Over-nutrition
- Stimulant medication-related weight gain
- Depression

Compared to peers, children with ASD...
- Are less active (Pan & Frey, 2006)
- Are more likely to be overweight (Curtin, 2005)
- Do not exercise regularly (Easterseals, 2006)
  - Only 20% of parents report their child with ASD exercises regularly

Benefits of Exercise
- Improved fitness and self-esteem (Parfitt, 2009)
- Decreased anxiety (Parfitt, 2009)
- Better sleep and digestion (Slattery, 2004; Lee & Lin, 2007)
- Increased opportunity for peer interaction
- Maintenance of a healthy weight (Pitetti, 2007)
- ASD - Potential link with a decrease in self-stimulating behaviors (Kern, 1984; Rosenthal-Malek, 1997)
  - Important link between behavior
Beyond Treatment…

- Add a physical activity goal
- Encourage incorporation of physical activity into the child/family routine
- Identify barriers to participation (personal and environmental)
- Identify successful techniques for promoting participation and training

Suggested Activities

- Walking
- Trampoline
- Martial Arts
- Bicycle/Tricycle Riding
- Swimming
- Ball Play
- Community Playground

Pamphlet Link

- Let’s Get Moving: Encouraging physical activities for your child with an Autism Spectrum Disorder
- [www.cdl.unc.edu](http://www.cdl.unc.edu)
- Click on “Professionals,” then “Resources”

A child walks into a clinic…

- Environment
- Routine
- Physical Activity
Many thanks to:

- UNC Department of Physical Therapy
- Leadership Education in Neurodevelopmental Disabilities (LEND) Program at the UNC Center for Development and Learning and Carolina Institute for Developmental Disabilities
- Angela Rosenberg, PT, DrPH
- Dawn Phillips, PT, MS
- Katie Ollendick, PT

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Turn to your neighbor...

- What has been a strategy that you have used with an individual with ASD that has been beneficial?

- What are practical and feasible ways that you could structure the environment before a treatment session with an individual with ASD?

- Do you know of any community resources for physical activity for individuals with ASD?

- How do you justify services to third party payers for a child with ASD?
Questions?

Motor Impairment


Motor Impairment (cont.)


ICF Model


References

Introduction and Overview


Daniels JL. Autism and Environment. Environmental Health Perspectives. 2006; 114(7): A 396.


Physical Activity


Motor Learning