Developmental Dyspraxia: 
Sensory Considerations for 
Motor Skill Development

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The speakers declare no conflicts of interest.

Acknowledgments

Current Funding
• SC CTSI KL2 Award (NIH/NICHD/NCATS Grant #KL2TR000131)
• SC CTSI Pilot Award (NIH/NICHD/NCATS Grant #KUL8TR000130)

Recent Past Funding
• T32 Award (NIH/NICHD/NCATS Grant #T32 HD86457-01A1)

Mentors
• Terence D. Sanger, MD, PhD
• Elizabeth Sowell, PhD
• Florence Clark, PhD, OTR/L
• Stewart Mostofsky, MD
• The children and the families under our care.
Objectives

- Discuss current research findings describing developmental dyspraxia in the pediatric special needs population.
- Utilizing a conceptual framework, explain the relationship between pediatric motor disorders, sensory integration, and developmental dyspraxia in infants and children.
- Identify the impact of developmental dyspraxia on the acquisition of complex motor skills and subsequent levels of participation in life roles.
- Demonstrate an understanding of considerations relating to plans of care and intervention strategies capable of addressing sensory-based impairments impacting the development of praxis in infants and children.

APTA Vision Statement

Transforming society by optimizing movement to improve the human experience.

Principles to Achieve the Vision

Movement is key to optimal living and quality of life for all people that extends beyond health to every person's ability to participate in and contribute to society.
Guiding Principles: Identity

• The physical therapist will be responsible for evaluating and managing an individual’s movement system across the lifespan.....

• The movement system is the core of physical therapist practice, education, and research......

Movement = Action and Perception

Movement is Embodied (DST)

• Includes the sensory information that occurs before, during, after the movement as well as the perception of the mover about what is happening

• Perceptual information is a requisite for guiding reach, mobility and balance control
  ◦ Balance control provides the basis for intentional movement of the head, trunk and limbs

Movement encompasses a motor and a sensory event.
Pediatric Motor Disorders  
- Developmental conditions that impact the child's ability to produce controlled, coordinated motor movements  
- Significantly impact the child's development across multiple domains  
- Disrupt the child's daily routines and limit active participation in childhood occupations

Taxonomy of Pediatric Motor Disorders

References

Developmental Dyspraxia  
- The failure to have acquired the ability to perform age appropriate complex motor actions  
- Estimated prevalence in 2% of the population, with 70% of those male
Developmental Dyspraxia

- We theorize that the development of praxis naturally occurs as the typically developing child interacts with the environment.

- Successful environmental interactions correlate with changes in brain structure and function, thereby providing the basis for the development of increasingly more complex skills.

- One theory about the difficulties seen in developmental dyspraxia relate to differences in sensorimotor integration.
Sensorimotor Integration

Sensorimotor integration refers to the child’s ability to successfully transform sensory information into a motor response.

Overarching Research Question

Is there a link between disordered processing of sensory information in the brain and developmental dyspraxia? And if so, what areas of the brain might be involved?

Testing of This Hypothesis

• Phase 1: Development of a behavioral paradigm to explore the contribution of sensory input to motor performance.

• Phase 2: Ongoing research study using advanced multimodal imaging techniques to explore the various regions associated with praxis.
Research Question #1
Related to Behavioral Paradigm
• What are the underlying sensorimotor problems in children who are suspected of having developmental dyspraxia

Research Question #2
Related to Behavioral Paradigm
• Do dyspraxic children with ASD and DCD have differing patterns of sensorimotor problems?

Research Question #3
Related to Behavioral Paradigm
• Does the Test of Hand Gestures (TOHG) provide us with insight about these differences?
Identification of Populations

Current research identifying the presence of sensory integration challenges within pediatric populations demonstrating developmental dyspraxia

Participation

- Broadly defined as involvement in life situations and includes physical, social, and self-engagement in activities.

Participation Implications

The objectives of rehabilitation services are

- for children to participate in an ongoing way in their community
- to have a sense of belonging and contribution at each stage of their on-going development.
Participation as an Outcome

- Participation is considered to be a key outcome of rehabilitation programs and services directed at assisting children and families to adapt to the challenges they face (King 2002).
- Parents, youth and professionals consider enhanced participation in activities as one of the more important outcomes of intervention (Palisano et al.).

Benefits of Participation

- Meaningful and intrinsically motivated leisure activities:
  - foster mental and physical health benefits
  - provide opportunities for social relationships
  - may improve quality of life.

- Participation in family life and community activities enables children to:
  - become self-determined
  - learn skills
  - form friendships
  - express creativity
  - determine meaning and purpose in life.

Specht

Dijkers
Benefits of Participation

• For children with disabilities, participation in activities is the context in which they learn skills, do tasks, develop friends and find satisfaction.

Law

Health Promotion

Participation is essential to sustain health promotion action.

Rowland et al 2015

Dimensions of Participation

• Physical Engagement
  ◦ child's involvement in the activity

• Social Engagement
  ◦ child's interpersonal interactions that occur during the activity

• Self-Engagement
  ◦ child's enjoyment in the moment and self-understanding

Palisano et al 2012
Participation: Physical
What do we know?

- Children with dyspraxia
  - ASD
  - DCD

Participation: Social
What do we know?

- Children with dyspraxia
  - ASD
  - DCD

Participation: Self
What do we know?

- Children with dyspraxia
  - ASD
  - DCD
Considerations: Plan of Care

- Considerations for plans of care designed to address developmental dyspraxia

Considerations: Strategies

- Considerations for sensory-based intervention strategies designed to address developmental dyspraxia

Lifespan

"The need is critical for youth with disabilities to participate in health promotion and fitness programs to develop active, healthy lifestyles into adulthood."
References


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