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Impact of Motor Learning: Daily Life and Play

Presented by:

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Board-Certified Clinical Specialist
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Lisa Roehl, PT, DPT, Board-Certified Clinical Specialist in Pediatric Physical Therapy

- Lisa is a physical therapist with 10 years of experience in pediatrics. She received her Doctor of Physical Therapy degree from the University of South Carolina in 2009. Lisa has worked within outpatient pediatric clinics, serving a variety of patient populations and ages. She is trained in TheraSuit® and TheraSuit Method®, with the provision of an intensive therapy model for children with neurological disorders from 2011-2013 in Columbia, SC. She specializes in the neurological population and early motor reflex integration. Lisa became a Board-Certified Specialist in Pediatric Physical Therapy in 2019. Lisa currently works in Greenville, SC at Advanced Therapy Solutions, Kids.

Mariah Woody, OTR/L

- Mariah is a graduate of the Medical University of South Carolina and grew up in Kentucky. Mariah is a former Applied Behavior Analysis therapist for children with autism, and that is how she fell in love with Occupational Therapy. Mariah is an Interactive Metronome provider, and Integrated Listening Systems provider, Kinesio Taping Practitioner®. She is trained in neuro-developmental techniques for the adult and pediatric populations, reflex integration, and also heavily trained in Cranial Sacral Therapy. She was the South Carolina Occupational Therapy Association President (2018-2020). She has passions in reflex integration, praxis, visual deficits, craniosacral therapy, and neuro-rehabilitation. She loves living in South Carolina with her husband, son, and dog.

- Presenter Disclosure: Financial: Presenters have received an honorarium for presenting this course. Non-financial: Presenters have no relevant non-financial relationships to disclose.

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Learning Outcomes

- Participants will be able to identify the theory of praxis, and its direct relation for the child with ASD.
- Participants will be able to identify at least 5 signs of motor coordination impairment within activities of daily living for the child with ASD.
- Participants will be able to identify at least 5 signs of motor coordination impairment within gross motor milestone development affected for the child with ASD.
- Participants will be able to identify at least 2 ways social skills play into the motor coordination development for the child with ASD.

Rhythmicity

- Impact on cerebellum, and how children with ASD have impaired functions of cerebellum
- Challenges with rhythmicity can bring challenges with self-organization, balance, body awareness
- Rhythmic auditory cuing could be an appropriate technique for a predictable structure to stabilize variability in movement pattern and facilitate a motor plan

Praxis

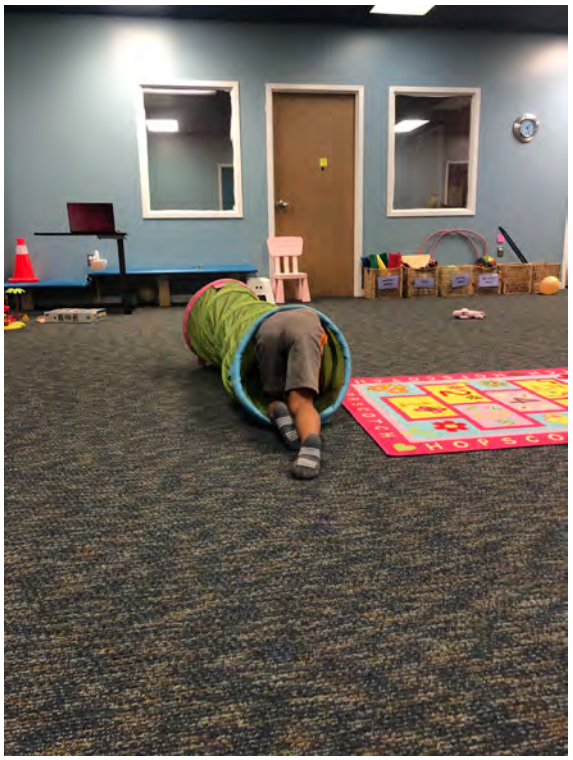
- What is it?
  - Praxis- ability to adaptively respond to environmental demands
    - Adapt to novel and challenging environmental demands in a way that is meaningful and efficient
    - Praxis is required in everything!

What does praxis require?

- Process sensory input (tactile, proprioceptive, vestibular)
- Spatial-temporal recognition
- Motor memory-- pull from previous actions
  - Some children have to re-create motor memories each time they perform a task
- Feed-forward- ability to adjust an action once it's already taking place (like kicking a moving ball)
- Feedback- what the body did, how the action was performed, what was done to the environment

What does praxis require?

- If they can do a task once, why is it so hard for them to do it again?
  - Example: what would happen if something changed in their routine or environment?



Praxis and Autism Spectrum Disorder

- Praxis ability is a strong predictor of defining social, communication and behavioral characteristics, which are primary features of the ASD diagnosis.

Praxis Subcomponents

- Ideation (idea for the action)
- Motor organization
- Execution

Praxis Subcomponent: Ideation

- Ideation (idea for the action)
  - Trouble generating ideas of motor actions
  - Requires understanding of object affordances, use of memories, organized sensory inputs, and more.

Praxis Subcomponent: Ideation

- Ideation (idea for the action)
  - Knowledge of objects
  - Knowledge of actions
  - Knowledge of appropriate action-object interactions
  - Knowledge of serial actions

Praxis Subcomponent: Motor Organization

- Motor Organization
  - Required for learning
  - Requires processing of tactile, proprioceptive, and visual-perceptual skills
    - This builds the body scheme – critical step

Praxis Subcomponent: Motor Organization

- Bilateral Integration
  - Much higher level of motor organization
  - Requires vestibular and proprioceptive inputs

Praxis Subcomponent: Motor Organization

- Projected Action Sequences
  - Also high level motor organization
  - Usually automatic
  - Utilizes feed-forward mechanisms

Praxis Subcomponent: Motor Organization

- Execution
  - Precision and refinement
  - Usually difficulties related to sensory integration, postural, and tone challenges
  - Relies on cerebellar sequencing and timing (remember rhythmicity at the beginning?)

Types of Dyspraxia: General

- Several types of dyspraxia
  - *This presentation will focus primarily on General Dyspraxia*
- 1. General dysfunction that affects all part of life
    - Most children with ASD fall in this category
      - Delayed milestones
      - Challenges with ADLs and play skills
      - Tactile/proprioceptive/vestibular sensory systems
      - Postural control

Types of Dyspraxia: Ideational

- 2. Ideational- trouble generating ideas of motor actions

Ideational

Types of Dyspraxia: Somatodyspraxia

- 3. Somatodyspraxia- motor planning deficits
  - Also trouble with tactile and proprioceptive awareness
  - Decreased body scheme and awareness
  - Also frequently seen in visual deficits

Somatodyspraxia

Types of Dyspraxia: Bilateral Integration and Sequencing

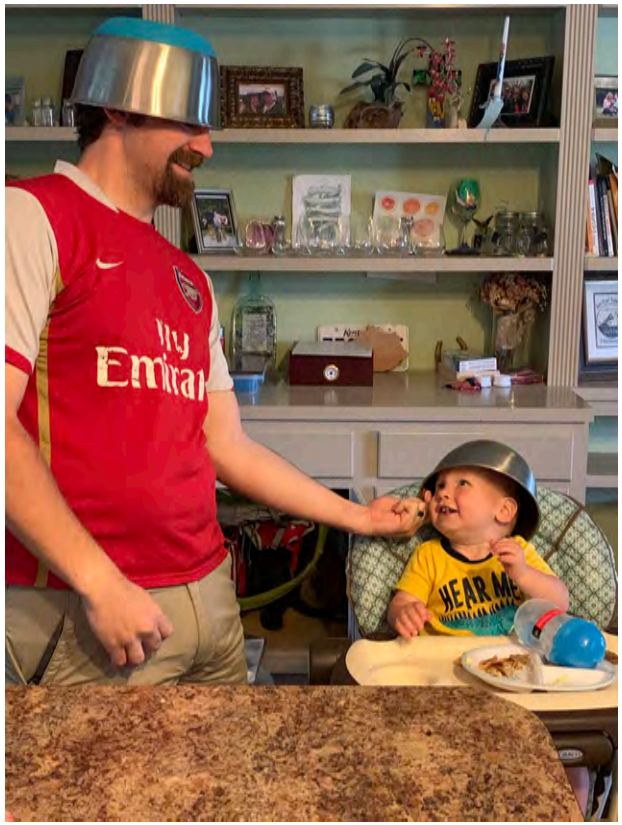
- 4. Bilateral Integration and Sequencing
  - Also difficulties with vestibular and proprioceptive inputs
  - Also found with visual deficits and postural deficits

Types of Dyspraxia: Bilateral Integration and Sequencing

Types of Dyspraxia: Bilateral Integration and Sequencing

Praxis and Imitation

- Interpersonal synchronization-social motor coordination in the form of both imitation and interpersonal synchrony is a critical prerequisite for successful social interactions
- Social movement-based contexts are valuable in promoting imitation/praxis, interpersonal synchrony, and motor performance
  - Should be included within the standard-of-care treatment for children with ASD



Praxis and Imitation

- Children with ASD face limitations in basic gross motor skills and interpersonal synchronization that restrict playful peer opportunities
  - Trouble in spatial-temporal movements
  - Trouble with rhythmicity
  - Trouble with imitation
  - Children with ASD have trouble overall with synchronization

Praxis and Imitation

- Interpersonal synchronization-
  - Allow people to adjust their behaviors to one another.
  - A very primitive mechanism
  - Cues are exchanged (behavioral, motor, emotional, etc.)
  - Involves imitation
- Toddlers prefer to play with or help adults who have mimicked their actions
- 12 month old- prefer social stimuli that moved synchronously with them (not yet developed at 9 mos.)
- It has been proposed that understanding early deficits in the ability to imitate others (issue with mirror neurons) is key to understanding autism
- Social skills- language, communication, and interaction all rely on using motor skills—so whether someone can coordinate themselves or not needs to be considered in a social way
- May share the same neural circuit for social, motor, and behavior

Praxis and Imitation

- Some preservation in "being imitated" awareness
  - Imitating the child can be effective in improving imitation and social abilities
  - More frequent scheme and toy changes when imitated with the same object
    - Over time, increase of time spent exploring objects observed
    - Increase social attention can increase performance
    - Being imitated triggers the mirror system response

Key Points in Motor Coordination in Development

- Early motor proficiency is an indicator of optimal outcomes later in childhood
- Motor delays increased with age
- When compared to the social and communication domains, research in the motor domain is relatively underrepresented in children and youth with ASD
- Even less represented is the physical activity (PA) levels in children and youth with ASD

Key Points of Sensory Regulation and ADL Motor Coordination Development

- Review of vestibular, proprioceptive, and tactile involvement
  - Body scheme
  - Body awareness
  - Learning hierarchy pyramid

Key Points of ADL Praxis/Motor Coordination Development

- 4 areas of ADL functioning
  - ADLs
  - Play
  - Behavior
  - Social Emotional

Key Points of ADL Praxis/Motor Coordination Development

- ADLs
  - Concentrating on forming letters, exerting a lot of effort in the mechanics of writing, then have very little resources left for the conceptual part of written expression
  - Meal Prep- pouring a liquid
  - Household chores- more time and energy, hard for parents to follow through as this requires a very high level of involvement from caregivers.
    - VERY cognitive skills (top down approach)

Key Points of ADL Praxis/Motor Coordination Development

- Play
  - Difficulty generalizing skills from real objects to imaginary uses
  - Less acknowledgement of affordances
  - Poorer play skills with reaching, moving, manipulating (and understanding they have the potential to do these things)
  - Frequently prefers to be held
  - Throw with too much/too little force
  - Relies on adults for structured play, ask for help often
  - Does not enjoy physical activity as much
  - Kids start to become aware of their abilities and will make up excuses to stay on the sidelines.

Key Points of ADL Praxis/Motor Coordination Development

- Behavior
  - Attention, impulsivity, aggression, over-reactivity
    - Often internal disorganization and therefore external disorganization
    - Hard time expressing needs
    - Needs control/rigid preferences

Key Points of ADL Praxis/Motor Coordination Development

- Social Emotional
  - Simple tasks are much harder than their peers
  - Kids work VERY hard all the time
  - Less outgoing, poor self-confidence
  - Increased dyspraxia factors, increased anxiety

Key Points of Gross Motor Milestone Development

- Early Milestones (0-2 years old)
- Delayed onset or skipped whole body and bilateral coordination milestones
  - Rolling
  - Quadruped crawling* (key factor)
  - Pull to stand
- Atypical postural milestones
  - W-sitting
  - Deep squat sit
  - Asymmetrical weightbearing
- Overly early or late onset of independent ambulation
  - Skipped over or significantly shortened crawling phase
  - Difficulty to release from physical support

Key Points of Gross Motor Milestone Development

- Toddler to Pre-teen Milestones (2+ years old)
- Cessation of gross motor development
  - Peak in functional mobility or interest
- Delay or avoidance of whole body and bilateral coordination milestones
  - Step-to gait with stairs
  - Inability to climb playgrounds
  - Inability to perform jumping jacks, jump rope
  - Inability to pedal tricycle, bicycle, scooter
  - Lack of skipping, galloping
- Change in postural milestones
  - Slouching
  - Restless behavior in prolonged sitting


HOPSCOTCH
HOPSCOTCH

Key Points of Gross Motor Milestone Development

- Toddler to Pre-teen Milestones (2+ years old)
- Clumsy behavior beyond age-anticipated
  - Frequent falls
  - Running into walls/people/objects
- Poor single limb balance
  - Lack of body awareness
  - Limited ankle mechanics/core strength
- Toe walking
  - Beyond 2 years of age, consistent presentation

Key Points of Gross Motor Milestone Development

- Teen to Young Adult Milestones (13+ years old)
- Clumsy well-beyond age-anticipated
- Poor balance
- Toe walking
- Poor physical endurance and avoidance of physical activity
  - Lack of inclusion in team sports or peer physical play
  - Lack of desire (or overly aggressive desire)
  - Obesity

Important things to remember:

- Challenges with rhythmicity can bring challenges with self-organization, balance, body awareness
- Praxis is the ability to adaptively respond to environmental demands in a way that is meaningful and efficient
- Praxis involves ideation (idea for the action), motor organization (processing of tactile, proprioceptive, and visual-perceptual skills) and execution (precision and refinement of the end task.)
- Children with ASD face challenges with general dyspraxia, causing delayed milestones, challenges in ADLs and play skills, tactile/proprioceptive/vestibular sensory systems and postural control
- Children with ASD face limitations in basic gross motor skills and interpersonal synchronization that restrict playful peer opportunities

References

- As separate pdf supplied with course materials

Questions?

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