



Developmental Issues on Sensory Motor Skills

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Developmental Issues on Sensory Motor Skills

- ✓ Sensory motor development represents a child's growing proficiency in producing movement
 - Movement that is appropriate to the current sensory stimuli and environmental demands
 - Child gains feelings of self control, competence and self esteem
 - Support the development of abilities in the areas of cognition, communication, adaptive skills, and social and emotional competence
 - Allows the expression of skills in the other domains
 - We need to understand where delays exist and how the motor deficits affect other aspects of development

Principles of Neuromotor Development

- Typical infant is born with all the requirements necessary for movement and have an intrinsic motivation to move

Theoretical Models of Neuromotor Development

- **Neuromaturational model**

- Progression of motor skills occur as the CNS matures
 - Movement goes from primitive-reflexive to voluntary control

- **Reflexive Control of Movement**

- Early movements are reflexive and have a discreet function in development of motor skills

- **Volitional Control of Movement**

- Reflexive model not sufficient
 - Infant to experiences movement, providing the possibility for volitional movement in the future

- **Heirarchical Model**

- Movement is controlled by an executor in the CNS that determines the motor plan that is

- **Systems Model**

- Motor development occurs as a function of structural change in the central nervous system
 - Change from lower level control to higher level control

Gross Motor: Typical Development

- ☞ Infants born in physiological flexion-head, arms, legs drawn toward the center of the body
- ☞ Gross motor development in the infant moves from flexion to
 - Extension
 - Head and limbs move away from the body
 - Flexion
 - From extension to moving body parts back to the center of the body
 - Coactivation and Rotation
 - Control of both flexion and extension together
 - The turning of one body part on another
 - Protection and Equilibrium Reactions
 - Protective reactions are when a child breaks their fall with hands
 - Equilibrium reactions are when a child shifts their weight in order to avoid a fall, maintaining their center of gravity
- This pattern repeats itself at each stage of the developmental sequence

Toddler and Preschool Development

- Development of gross motor skills depends on postural skills mastered and environmental influences
- Develop strength, balance, and coordination
 - Increase motor schemata to new environmental demands
 - Movements become smoother and more refined
 - Repetition allows smooth performance once the basic movement is mastered
 - Develop adequate motor planning for more involved tasks

Gross Motor Skills: Atypical Development

- Development is fairly predictable for typically developing infants
 - Developmental variations occur in sequence and timing for those with conditions that affect gross motor skills
- Disorders of Postural Tone**
 - Tone is the degree of tension present when the muscle is at rest
 - Hypotonicity-decreased low muscle tone throughout the body
 - Difficulty moving against gravity, with excessive range of motion at the joints
 - Hypertonicity- tight muscles that are spastic and rigid
 - Reduces range of motion and leads to deformities
 - Sensory Processing disorders can affect gross motor development as skillful execution of motor skills requires sensory input
 - Infant's early experience is sensory, resulting in the formation of neural connections in the brain which do not occur when sensory input is lacking
- Intervention**
 - Postural control is the initial intervention
 - Simple environmental modifications may prevent habits of poor posture
 - Adaptive equipment provides options for postural control
 - Positioning provides opportunities for good posture and success for the child

Fine Motor Skills: Typical Development

- ✔ Comprised of precise movements of the hands and fingers supported by the stability of the trunk and control of the shoulders and arm
 - Must have skilled preference of one hand
 - Be able to use both hands together
 - Adequate cognition and sensory processing of tactile, proprioceptive, and visual information
 - Defined as:
 - Ability to functionally reach, grasp, and release objects for purposeful manipulation
 - Reach: movement of arm toward object
 - Grasp: attainment of object with hand
 - Release: purposeful letting go of the object held in the hand

Toddler and Preschool Fine Motor Development

How children combine skills to perform tasks involved in play, prewriting, and cutting with scissors

- Bilateral Development

- Reaching with two hands, transferring from hand to hand, clapping, banging objects

- Hand preference

- Precise control of one hand

- In-hand Manipulation

- Ability to move objects within the hand

Fine Motor Skills: Atypical development

- ✓ Three distinct areas of concern
 - Ability to use body as a stable base
 - Development of the basic components of reach, grasp and release
 - The combined use of these components for object manipulation in functional activities
 - Difficulties may be a result of
 - atypical postural tone, sensory deficits, poor motor planning, perceptual difficulties and cognitive delay
 - Difficulties may involve low tone in the trunk, wrist instability, inability to isolate finger movement and poor motor planning
- ✓ Intervention must include strategies that will address what will address the functional performance of the child
 - Positioning of child during fine motor tasks may include: side lying, prone or supine lying, sitting, or standing
 - Positioning of objects at the child's midline minimizes reflexive actions
 - Fine motor materials include larger toys, large lacing beads, easy grip pegs, knobbed puzzles, and adapted scissors and pencil grips

Sensorimotor Development in Children with Special Needs

- ✓ Cerebral Palsy is a disorder of movement and posture caused by damage to the immature brain
 - Abnormalities of muscle tone: do not experience normal movement or compensatory patterns of movement and posture
 - Often accompanied by some degree of mental retardation and sensory deficits
 - Spastic quadriplegic children
 - have tensor tone in the lower extremities and flexor tone in the upper extremities
 - Spastic diplegic children have increased tensor tone in lower extremities causing a “bunny hop” gait
 - Hemiplegic children have increased tone on one side of the body resulting in asymmetrical posture and movement
 - Fine motor skills are affected by tonal abnormalities, sensory deficits and existence of postural reflexes
 - Hypertonia restricts range of motion
 - Hypotonia prevents lifting arms up against gravity to meet in the midline for reach
 - Bilateral control for lifting affected by tonal abnormalities

Traumatic Brain Injury and Brain Tumors

- Depending on severity, location and extent of injury, child may exhibit a variety of symptoms
- Problems in three areas
 - Physical
 - Muscle tone, balance, speech, vision, hearing
 - Cognitive
 - Short, long term memory issues
 - Behavioral-emotional
 - Extreme mood swings

Spina Bifida

- Neural tube defect caused by incomplete closure of spine during fetal development
- Muscles of lower extremities weakened or paralyzed
- Often no bowel or bladder control

Duchenne's Muscular Dystrophy

- ✓ Duchenne muscular dystrophy is the most common type of muscular dystrophy disorder.
 - Inherited sex linked disorder affecting 1 in 3,000 males
 - Principal clinical feature is proximal muscle weakness of the calf muscle and contractures of the hips and feet
 - May have learning disabilities or cognitive impairments
 - Underlying defect is decreased or absent dystrophin, a protein that stabilizes the muscle membrane during contraction
 - When dystrophin deficient, the muscle degenerates
 - Unaware of problems until the age 2 to 5 years when gross motor skills deteriorate
 - Becoming weaker and less mobile and usually confined to a wheelchair by the age of 12
 - All muscles are affected with leg weakness preceding arm weakness
 - Ultimately leading to damage of the involuntary muscles of the heart and diaphragm resulting in respiratory and heart failure

Down Syndrome

- ☞ Typically have low muscle tone and short stature affecting gross motor development
 - Developmental milestones are late
 - Problems with limited coactivation around the joints and low muscle tone
- ☞ Typically have short stubby fingers with small hands and slender bones with low set thumbs causing instability of the hand
 - Low muscle tone interferes with grasp
- ☞ May have difficulty receiving sensory input and have oral motor delays that include oral hyposensitivity

Models of Service Delivery

- ✓ Appropriateness of service delivery model determined by the needs of the child
- ✓ **Evaluation:**
 - Child's functioning in problem-solving, communication, self-care, and social and emotional development
 - Group of professional involved in evaluation
 - Specific tests for gross and fine motor development include the Peabody developmental Motor Scales for children from birth through 7 years
 - Occupational and physical therapists also use specific criterion referenced tests to determine motor skills and sensory processing
- ✓ **Services:**
 - **Occupational Therapist**
 - Addressed issues related to feeding, dressing, positioning, handwriting, and psychosocial needs and helps with adapting tasks and environment to optimal function
 - **Physical Therapist**
 - Concerned with child's function related to posture and movement involving mobility and gross motor skill acquisition
 - **Adaptive P.E. teacher**
 - Adapt physical education activities or provides programs to foster fitness and gross motor skills

Summary

- Understanding the gross and fine motor milestones of typical development help us to spot those children with atypical development and in need of help
- As early interventionists we are often the first to observe motor deficits
- We need to have a good understanding of the sensorimotor needs of children with special needs
- Understanding the musculoskeletal and neuromuscular systems help us understand disorders of the musculoskeletal system and the effects of these disorders on the children that we serve