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Understanding Early Childhood Brain Development

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Understanding Early Childhood Brain Development

Why should caregivers know about brain development?

The brain is the part of the body that allows us to feel joy and despair, to respond to others in a loving or angry way, to use reason, or to simply react. These capabilities don't just magically appear; they result from the interplay between a child's heredity and the experiences they have during childhood.

At birth, the brain is unfinished. The parts of the brain that handle thinking and remembering, as well as emotional and social behavior, are underdeveloped. The fact that the brain matures in the world, rather than in the womb, means young children are deeply affected by their experiences. Their relationships with parents and other important caregivers don't just influence their moods, but actually affect the way the children's brains become "wired". Researchers now confirm that the way infants are interacted with and experiences provided for them have a major impact on the child's emotional development, learning skills, and how they function later in life.

How does the brain form "connections"?

At birth, the brain contains about 100 billion brain cells that are yet to be connected into functioning networks. By the time a child is three, the brain has formed about one thousand trillion connections between these brain cells. Some of these connections become permanent, while others disappear as the child grows. How does the brain know what connections to keep? Connections that are used repeatedly during the child's early years become the foundation for the brains organization and function throughout life. In contrast, a connection that is not used results in a lack of development or even the disappearance of these connections. For example, a child who is rarely spoken to or read to in the early years may have difficulty mastering language skills later on. By the same token, a child who is rarely played with may have difficulty with social adjustment as he or she grows.

Brain cells are designed for making connections. Each cell sends signals out to other brain cells and receives input from other cells. The signals, in the form of electrical impulses, travel down the length of the nerve cell. With the help of

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chemicals (such as serotonin) they travel from cell to cell, creating connections. Repeated activation of networks of neurons strengthens these connections.

Principles of Brain Development:

- The outside world shapes the brains wiring
- The outside world is experienced through the senses – seeing, hearing, smelling, touching, and tasting – enabling the brain to create or modify connections
- The brain operates on a "use it or lose it" principle
- Relationships with other people early in life are the major source of development of the emotional and social parts of the brain.

What should be done to encourage appropriate brain development?

As a mother feeds her child, she gazes lovingly into his eyes. A father talks gently to his newborn daughter as he changes her diaper. A caregiver sings a child to sleep. These are the everyday moments, the simple, loving encounters that provide essential emotional nourishment.

Touching, rocking, talking, smiling and singing all affect brain development. Babies experience relationships through their senses. They read the way you look into their eyes. They see the expressions on your face. They hear you cooing, singing, talking, and reading. They feel you holding or rocking them, and they take in familiar smells. Touch is especially important, holding and stroking stimulates the brain to release important hormones necessary for growth.

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Gross Motor Development

The human body has two muscular systems:

Gross Motor System, or Large Muscles
- Head
- Torso
- Legs
- Arms

Fine Motor System, or Small Muscles
- Eyes
- Hands
- Fingers
- Development

Development occurs first in the head region, then the torso, and last in the legs and feet. Development also progresses from the center of the body outward to the fingers and toes. This means that infants can control the movement of their head, neck, and shoulders before they can control their hands and feet.

Children's motor development may be divided into 4 phases:
1. Reflexive Motor Phase
2. Rudimentary Motor Phase
3. Fundamental Motor Phase
4. Sport-Related Movement Phase

Reflexive Motor Phase

During the first 6 months of the reflexive motor phase:
- Sucking
- Gasping
- Blinking
- Yawning
- Coughing

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These actions are involuntary. Other actions such as movement of legs and arms in kicking or waving motions are random and uncontrolled.

Rudimentary Motor Phase

Includes:

- Rolling over
- Sitting
- Crawling
- Creeping
- Standing
- Walking

These are children's first voluntary actions.

Fundamental Motor Phase

Includes:

- Running
- Jumping
- Hopping
- Skipping
- Galloping
- Throwing
- Catching
- Pincer movements

Sport Related Movement Phase

More mature movements that can be applied to games. Children can now engage in vigorous exercise, organized games, and detailed handicrafts with increased skills and confidence.

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Value of Motor Development

- Contributes to the child's overall physical health and development
- Is a source of pride and accomplishment
- Prepares the child for participation in sports and other group activities later in life

Movement activities help develop:

- Build muscular strength
- Strengthen the heart
- Enhances aerobic capacity
- Promotes muscle and joint flexibility
- Promotes healthy body composition
- Eye-hand coordination
- Eye-foot coordination

Movement Activities increase:

- General body awareness
- Visual awareness
- Auditory awareness
- Tactile awareness
- Directional awareness

Among their many social and emotional benefits, movement activities…

- Provide enjoyment for children
- Provide opportunities for children to feel successful
- Promote cooperation with other children

Movement activities also provide opportunities for…

- Cognitive learning
- Problem solving
- Language development
- Exploration, discovery, and creativity

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Developmental Goals by Age Groups

0- to 12-months

- Holds head and chest up
- Rolls to side
- Swipes
- Crawls
- Holds bottle
- Turns body

12- to 24-months (1-year olds)

- Crawls after ball
- Pulls up
- Walks with support
- Walks without support
- Squats
- Walks backwards

Note that this age group needs lots of practice on:

- *What happens when they step on objects*
- *How far they can lean without tipping over*
- *How fast they can go without stumbling*

24- to 36-months (2-year olds)

- Carries large objects
- Kicks ball
- Jumps in place
- Balances on one foot
- Rides a tricycle
- Walks on tiptoes

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3-year olds

Note – 3-year olds are more mature at this stage; large muscle movement now seems automatic, smoother and coordinated; develops good posture at this point.

- Walks on tiptoes
- Walks on balance board
- Jumps from stool
- Hops on one foot
- Catches ball
- Throws ball

4-year olds

Note – 4-year olds seem more skillful; can now coordinate the different body parts to perform different functions; now building strength.

- Balances on one foot
- Gallops
- Dances
- Explores space

5-year olds

Note – 5-year olds can now perform acrobatic type actions; very skillful; can ride bikes.

- Skip
- Catches different types of balls
- Walks backwards

3 Types of Fundamental Movement Skills

When planning movement activities, include all three:

- Locomotor Activities - those used to move through space, such as walking, running, jumping, hopping, leaping, skipping, galloping, sliding, and dancing
- Non-Locomotor Activities – such as twisting, swinging, bending, stretching, pushing, pulling, weight transfer, and balance
- Manipulative Skills – such as throwing, bouncing, rolling, dribbling, kicking, striking, catching

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Tips for Adding Music to Your Movement!

- Be an active, enthusiastic participant during singing and movement. Your involvement will encourage children to join in!
- Talk to the children about various ways they can move their bodies.
- Find ways to incorporate music and movement throughout the day. Sing without recordings, most children love the teacher's voice!
- Have Fun!

Cognitive Advantages to Adding Music to Your Movement

- Knowledge is the ability to recognize, extend, and create patterns. The earliest patterns children are exposed to are sound patterns. Music helps children recognize and organize patterns through refrains and repetitions.
- The endorphins produced by the brain during exposure to and participation in musical activities act to fix or cement information in memory.
- Music making contributes to the development of essential cognition, which includes reasoning, creativity, thinking, decision-making, and problem solving.
- Movement integrates and anchors new information into our neural networks. Every time we move in an organized manner, full brain activation and integration occur, and THE DOOR TO LEARNING OPENS. To pin down a thought, there must be movement.
- Many children are kinesthetic learners and must move to learn. Moving is the only thing that unites all brain levels.