The Role of Experience on the Developing Brain

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“The brain is a work in progress, designed to be adjusted and fine tuned throughout life.”

Shore, 1997
Brain Development....... 

- What is the structure?
- How does it work?
- Why are we interested in the brain?
Advances in Technology

- MRIs
- fMRIs
- PET Scans
Rethinking the Brain: Early Childhood Brain Development-Presentation Kit, 1998. For full presentation, or research book, Rethinking the Brain, please contact the Families and Work Institute at www.familiesandwork.org
Neurons: The Building Blocks of the Brain

- Receive, analyze and transmit information
The Child’s Brain Is Unique

- Neurons are not yet fully insulated.
- Neurons are still moving into positions.
- Synapse development is exploding.
Pattern of Synaptic Development in the Child’s Developing Brain
CAUTION!

- There is controversy about Critical Periods!
- REMEMBER, the brain continues to grow throughout adolescence and adulthood!
Structure of the Brain
ANATOMY OF A TODDLER'S BRAIN

WHINE CENTER

- BARNEY'S THEME SONG
- ABCs, 1-2-3s, etc.
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-;?></p><p>- SPILL REFLEX
- NEATNESS CENTER
- DIRT LOCATOR
- PATIENCE CENTER
- INVoluntary "WHY?"
- FAKE CRY CENTER
- TANTRUM CENTER
- SUPER-TURBO TANTRUM CENTER
- WHAT TIME CEND IS ON
- DIRTY WORD PERMANENT STORAGE AREA
- SHORT LIST OF EDIBLE MEALS
- WAY TO NEGOTIATE CANDY
- EMBARRASSING QUESTIONS
- IMPULSE TO CONTRADICT
- REFLEX
ANATOMY OF A PARENT'S BRAIN (EARLY STAGES)

WORRY CENTER
- Ability to distinguish quiet from "too quiet"
- Dexterity to avoid all squeaks in floor of child's room
- New respect for your parent's full name
- Reflex to use child's "goodnight moon" word for word
- Effective ways to change the subject

BRAGGING CENTER
- Fear of losing babysitter
- Enhanced hearing
- "Goodnight moon" word for word

CURSE CONTROL
- Effective bribes
- Length of every children's video to the second
- Rotating list of good
- Memory of what life was like before
- Sleep gland
- Unsolicited advice to offer
- When rugrats is on
- Reflex to use child's "goodnight moon" word for word
-旋转列表的清单
- 效率的贿赂
- 每个儿童视频的长度秒
- 睡眠器官
- 未被邀请的建议提供
- 当小鬼是上的
Major Structures of the Brain

- Cerebral Cortex
- Diencephalon
- Cerebellum
- Brain Stem
- Limbic System
Cerebral Cortex: Frontal Lobe

- Higher intellectual reasoning
- Emotional expression and regulation, and
- Motor movements
Cerebral Cortex: Parietal Lobe

- Sensory Information
Cerebral Cortex: Occipital Lobe

- Visual images are processed
Cerebral Cortex: Temporal Lobe

- Specializes in auditory perception and language
- Analyzes auditory information that enable recognition of whole words
Diencephalon

Hypothalamus

Thalamus
Links to Neurological Problems

- Phantom pain
- Ringing in the ear
- Parkinson’s Disease
Example

- Links affective experience with physical reactions....
  - Anger
  - Insomnia
  - Loss of appetite
Cerebellum
Cerebellum

- Involuntary movement
- Balance
- Posture and eye movements
- Long term memory
Brain Stem

- Mid-Brain
- Pons
- Medulla Oblongata
Limbic System

- Key to emotional development
- Links conscious, intellectual functions:
  - with the cerebral cortex
  - autonomic functions of brain stem
Emotional Development

- Emotions are set by the limbic system and prefrontal lobes
- Limbic system forms an emotional blueprint for later use
- Prefrontal lobes regulate emotional responses
- Both lobes are developed and connected early in life (8-18 months)

Florida Starting Points Initiative, 1998
Emphasis on the Early Years

- Brain has capacity to change in the first decade
- Enriched environment can increase the number of synapses
- Negative experiences can be more detrimental
Relationships

- Strong secure attachments to nurturing caregiver provides a protective biological function and helps to buffer later stress!
Enriched or Deprived: Environment’s Influence on Brain Development

Use it or Lose it!
Positive Impact of High Quality Child Care

- Increased IQ scores
- Improved rate of brain processing information

Ramey & Ramey, 1996
Deprived Environments Negatively Influence Development

- Decreased IQ
- Slower EEG maturation rate

Otero, 1996
What happens to a baby who is stressed?

- Cortisol and adrenaline are released in response to stress
- Cortisol reduces # of synapses
- Adrenaline increases blood pressure and heartbeat and tightens muscles

Gunnar, 1996
What does research tell us?

- Children exposed to constant stress, adrenaline does not subside = hyperaroused state.  
  
  Perry, 1993

- Baboons exposed to constant stress had major shrinkage in their hippocampus-related to learning and memory.

  Sapolshky, 1996
What helps buffer stress?

- Babies who receive nurturing care in first year, are less likely to respond to minor stress and produce less cortisol.
- Suggests that social emotional environment may help to shape the regulatory capacities of brain.

Dawson, et al., 1992
What are the effects of depression on a developing brain?

- How do you think a mother’s depression affects her interaction?
Depression’s Impact on Young Infants

- Babies were more withdrawn and less active
- Babies had shorter attention spans and less motivation to master new tasks
- Reduced brain activity (40%) in left frontal region of the cortex - which is related to outwardly directed emotions
- Greatest period of risk - 6-18 months

Dawson, et al., 1992
Can the impacts of depression be changed?

- For many babies, once their mothers were treated for depression, the babies’ brain activity returned to normal.

Dawson, 1992
What are the implications for practice?
Growth of the Mind

- Consistent, nurturing relationships with the same caregivers, early in life, are the cornerstones of emotional and intellectual competence.

Greenspan (1992)
Primary Care

- During infancy the most important relationships are with the primary caregivers.

- Through primary care, the caregivers and children begin to develop bonds of comfort, familiarity, trust, and love.

- The relationships between children and caregivers are deepened through the sharing of daily routines.
Caregiver’s Contribution to the Relationship

- Positive emotional climate
- Sensitivity and responsivity to the child’s cues
- Enriched environmental experiences
- Appropriate developmental activities
The Responsive Process

- Watch
- Act
- Adapt
You can make a difference in a child’s life!
References


Florida Starting Points Initiative (1998). Maximizing Nebraska’s Brain Power: We need to use it or lose it.


