2017 Texas Symposium on DeafBlindness
The Impact of Stress on
Brain Architecture and Resilience
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Power Point Content

The Impact of Stress on Brain Architecture and Resilience

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Figure 1 Three photos: (l-r) Mother holding an infant as they gaze at each other; child sits in adult lap as they read a book together; and two children, a girl and boy, look at a book together.

The Foundations of Lifelong Health are Built in Early Childhood

Figure 2 Four photos: (l-r) Mom holds her daughter as she shows her various bell peppers in the market; a young girl sits in a classroom of children and raises her hand; a baby grasps the thumb of the adults; and a young child running.
Four Core Concepts of Development

1. Brain Architecture Is Established Early in Life and Supports Lifelong Learning, Behavior, and Health

2. Stable, Caring Relationships and “Serve and Return” Interaction Shape Brain Architecture

3. Toxic Stress in the Early Years of Life (ACE’s) Can Derail Healthy Development

4. Resilience can be Built through “Serve and Return” Relationships, improving Self-Regulation, and Executive Functions, and Giving Children a Sense of Mastery.

Healthy Child Development

**Slide 4**

Figure 3 Graph showing Mother’s Speech and Child Vocabulary from Huttenlocker et al, Developmental Psychology 27: 236-248, 1991. The left side of the chart shows the size of vocabulary in words and the bottom of the chart shows age in months. The higher the level of Mother’s speech the higher the child’s vocabulary when compared over 26 months.
Experience Shapes Brain Architecture by Over-Production Followed by Pruning

Figure 4 Photo showing development of neural network from birth to 14 years. Very few fibers at birth, a great many more at 3 years, and a slightly reduced amount at 14 years, a natural process of pruning.

Neural Circuits are Wired in a Bottom-Up Sequence (700 synapses formed per second in the early years)

Figure 5 Graphic showing the growth of neural circuits for Sensory Pathways (Vision and Hearing), Language, and Higher Cognitive Function from 4 months after conception to 19 months of age. The Sensory Pathways reach their peak first, then language, then higher cognitive functions primarily within the first year of life.
Experiences Build Brain Architecture

Figure 6 Image from the video, Experiences Build Brain Architecture: A toddler places her ear to her mother's pregnant belly.

The Growing Brain

Figure 7 cover of The Growing Brain
Stable, caring relationships play a key role in building brains

Figure 8 Series of pictures showing children in interactions with adults and other children.

Serve & Return Relationships Buffer the Developing Brain

Figure 9 Image from the video Serve & Return Relationships Buffer the Developing Brain.

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Figure 10 Image of a toddler with the words, "engagement", "self-confidence", "interest" circling around her. Above her in all capital letter is the word “CARE”, and below “SUPPORT” and “ENCOURAGEMENT”
“Connecting” is very important to promote the learning process
www.simpleinteractions.org

Figure 11 Stylized faces of adult-child interaction: in the top the adult and child smile at each other in the bottom pair they do not. These images are used as part of Simple Interactions training.

“Serve and Return” interactions are critical for learning
www.simpleinteractions.org

Figure 12 More stylized drawings reflecting an adult-child "serve and return" interaction.

“Progression” is a very important part of the learning process

Figure 13 Another stylized drawing from Simple Interactions reflecting progression.
Early Life Stress Impacts Life-long Health

Figure 14 Graphic - see description below.
An arrow points to a circle.
Inside the arrow appears the following text:
Biology of Health
Physiological Adaptations or Disruptions:
• Cumulative Over Time
• Embedded During Sensitive Periods
Within the circle in the middle it reads: Health and Development Across the Lifespan
Moving around this text from top moving clockwise are the words:
• Preconception
• Prenatal
• Early Childhood
• Middle Childhood
• Adolescence
• Adulthood

What are the Long-term Impacts of Toxic Stress in Early Life?
How do stress and neglect impact the brain?

1. **Brain Architecture** Is Shaped by Early Life Stresses
2. **Gene Expression in the Brain** Changes in Response to Stress Exposure
3. **Hormone Secretion** Changes in Response to Stress Exposure
4. Early Stresses Change the **Way You See the World**

**Adverse Early Life Experiences Change How You See the World**

Pollak & Kistler (2002)

![Figure 15 Chart showing perceptual categories for continua of emotions used in a research study by Pollak and Kistler (2002).](image)

**Toxic Stress Derails Healthy Development**

![Figure 16 Image of a brain](image) from the video Toxic Stress Derails Healthy Development.
Can We Prevent Long-term Health Impacts of Early Life Stress and Neglect?

Current Conceptual Framework

Figure 17 Graph to show how significant adversity impairs healthy development, but parenting education, sound nutrition, stimulating experiences and health-promoting environments improve development.

Protective Interventions Can Improve Life-long Health

Figure 18 The same graph as above with the addition of New Protective Interventions which improve life-long health.
Figure 19 Drawing of a child standing at the center balance point (fulcrum) of a scale with negative outcomes on the left of the scale and positive outcomes on the right. Below the drawing are the words, “When positive experiences outweigh negative experiences, a child’s “scale” tips toward positive outcomes.”

Figure 20 A similar drawing to the one above except in this drawing the fulcrum has been moved off-center towards the positive outcomes side. The text appears below the drawing: "The initial placement of the fulcrum affects how easily the scale tips toward positive or negative outcomes."
Figure 21 Similar image as the one above except this time the fulcrum is moved off-center toward the negative outcomes. The text appears below the image: "Over time, the cumulative impact of positive life experiences and coping skills can shift the fulcrum's position, making it easier to achieve positive outcomes."

Capabilities that help with stress management

- Focusing Attention
- Problem Solving
- Planning Ahead
- Behavior Regulation
- Controlling Impulses
- Adjusting to New Circumstances

*Executive Function and Self Regulation*
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Figure 22 Image of mother and baby gazing at each other.

Addressing Community Issues:

- How can communities provide children with stable, caring relationships?
  - Strengthening family relationships
  - Providing other relationships
- How can interventions be provided early?
- How to get the community involved?

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Posters

Figure 23 Poster - The Growing Brain

Games

Figure 24 Two images of The Brain Architecture Game
Activities

Figure 25 Examples of three activity cards.

Working for Kids: Building Skills

Figure 26 Image from the video Working for Kids: Building Skills.

Dr. Cameron has included two papers from Harvard University’s Center on the Developing Child which you may download:

In Brief: The Science of Early Childhood Development
In Brief: The Science of Resilience
Texas School for the Blind & Visually Impaired
Outreach Programs

Figure 27 TSBVI logo.

Figure 28 IDEAs that Work logo and OSEP disclaimer.

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