



NC Infant Mental Health Association

Promoting strong minds from the start

Improving Youth Child Mental
Health in North Carolina:
Learning and Action Workshops
March – May 2013

Connection Station Topic #2

What should we all know about early brain development and how it is affected by the environment before and after birth?

Prenatal Environment

- Prenatal nutrition, maternal stress hormones, chemical exposure (alcohol, drugs, tobacco) all play a role in fetal brain development. Timing of events makes a big difference.

Childbirth:

- Potential risk period for difficulties in the birth process that impact future development

Preterm Birth Effects on Development

- Age of viability still controversial; may be as early as 22-23 weeks
- Brain structural abnormalities, attention and learning deficits, sensory impairments, poor motor coordination, language delays, are some difficulties that may persist.

Development during Infancy/Toddlerhood: Complex interaction between genes, environment

- Information processing, memory, sensory-motor experience, “scaffolding” from parents all interact to support cognitive development
- Cultural variations in social experiences affect mental strategies.
- Regardless of socio-economic status and ethnicity, an organized, stimulating physical setting and parental affection, involvement, and encouragement of new skills repeatedly predict better language and IQ scores in toddlerhood and early childhood. Complex effects of poverty; emerging strategies to improve outcome and extensive research on impacts of intervention exist.

Recent work on the impact of experience on brain development

- **“Timing and quality of early experiences combine to shape brain architecture.”**
Quoted directly from the Harvard University’s Center on the Developing Child Working

Paper, “The foundations of brain architecture are established early in life through a continuous series of dynamic interactions in which environmental conditions and personal experiences have a significant impact on how genetic predispositions are expressed. **Because specific experiences affect specific brain circuits during specific developmental stages—referred to as sensitive periods—it is vitally important to take advantage of these early opportunities in the developmental building process.** That is to say, the quality of a child’s early environment and the availability of appropriate experiences at the right stages of development are crucial in determining the strength or weakness of the brain’s architecture, which, in turn, determines how well he or she will be able to think and to regulate emotions.”

- **“Excessive Stress Disrupts the Architecture of the Developing Brain.”** The following quotations are taken from this Working Paper.
 - “Neural circuits for dealing with stress are particularly malleable (or “plastic”) during the fetal and early childhood periods.
 - Sustained or frequent activation of the hormonal systems that respond to stress can have serious developmental consequences, some of which may last well past the time of stress exposure.
 - **The relationships children have with their caregivers play critical roles in regulating stress hormone production during the early years of life.**
 - Young children who are maltreated have abnormal patterns of cortisol production that can last even after the child has been moved to a safe and loving home.”

- **“Early exposure to toxic substances damages brain architecture.”** This Working Paper highlights that mature brains have barriers that restrict the entry of some chemicals from the bloodstream into brain tissue, but that protective barrier is absent in the fetus and only reaches maturity in the first year after birth. Categories of highly toxic chemical substances that can harm the developing brain before or after birth are (1) environmental chemicals, such as lead, mercury, and organophosphates; (2) recreational drugs, such as alcohol, nicotine, and cocaine; and (3) certain prescription medications. Disorders caused by these neurotoxins can be seen right away, OR not emerge until much later. They can produce a range of outcomes from mild to severe impairments.

Where can I get more information?

Berk, L E. (2008). *Infants, Children and Adolescents*. Boston, MA: Pearson Education Inc.

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National Scientific Council on the Developing Child (2007). *The Timing and Quality of Early Experiences Combine to Shape Brain Architecture: Working Paper No. 5*. Retrieved from www.developingchild.harvard.edu

Elliot, Lise (2000) *What's Going on in There: How the Brain and Mind Develop in the First Five Years of Life*, Bantam Books, NY

The National Research Council, Institute of Medicine (2000) *From Neurons to Neighborhoods: The Science of Early Childhood Development*, National Academy Press

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