




**התפתחות בלא נחת –
טראומה והשפעתה על
התפתחות המוח בילדים**

פרופ' איתי ברגר, MD



The Biology of Health

Everything we do, feel and say from infancy to the end of life reflect the functioning of our brain.

The architecture of the brain depends on the mutual influences of the following

- Genetics
- Environment
- Experience

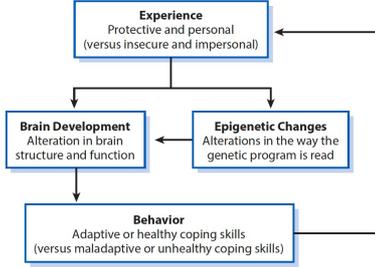
Source: National Scientific Council on the Developing Child, Working Paper 5, The Timing and Quality of Early Experiences Combine to Shape Brain Architecture. Center on the Developing Child at Harvard University.

Eco-Bio-Developmental Model of Human Health and Disease

- Multidisciplinary science of development - model for understanding the evolution of human health and disease
- Epidemiology, developmental psychology and neurology, focusing on early childhood interventions have demonstrated significant associations between the ecology of childhood and a wide range of developmental life-long outcomes
- Advances in developmental neuroscience and epigenetics, have made parallel progress in beginning to elucidate the biological mechanisms underlying these important associations (Shonkoff & Garner, Pediatrics 2012)

3

Development is a Dance Between Nature and Nurture



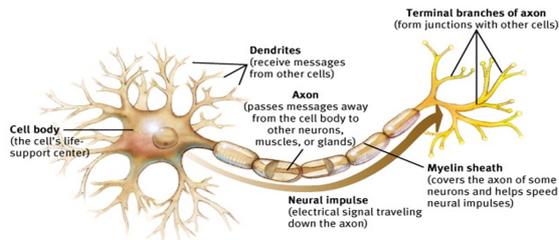
From Bright Futures Guidelines for Health Supervision of Infants, Children and Adolescents, 4th ed. Modified with permission from Garner A, Forkey H, Stirling J, Nalven L, Schilling S, American Academy of Pediatrics, Dave Thomas Foundation for Adoption, Helping Foster and Adoptive Families Cope With Trauma. Elk Grove Village, IL: American Academy of Pediatrics; 2015. <https://www.aap.org/traumaguide>. Accessed July 19, 2018.

Seeing the Environment Through This Framework

- Promotes understanding of the environment and brain development
- Shows why early support is important
- Highlights psychosocial protective factors and stressors as every bit as biological as nutrition
- Emphasizes the dimension of time

The Neuron

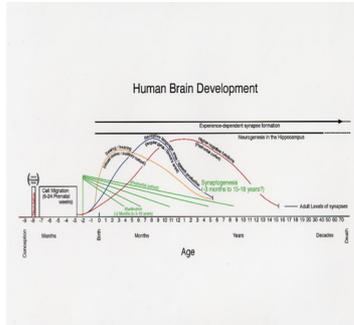
- The neuron is the basic building block of the nervous system



Why Early Experiences Matter


Newborn Brain
Average Weight
333 grams


2 Year Old's Brain
Average Weight
999 grams



The Foundations of Health

- Stable and responsive environment and relationships
- Safe and supportive physical, chemical and built environments
- Appropriate nutrition
- Safe places to learn
- Places free of toxins
- Places that support families



Source: Center on the Developing Child at Harvard University

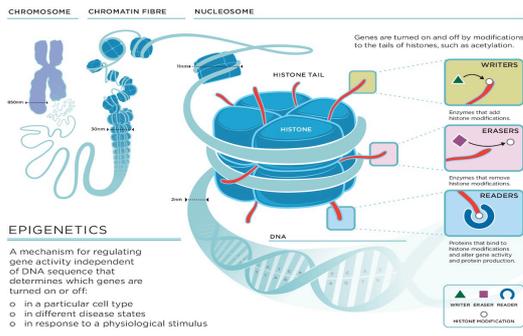
When children suffer brain damage, cognitive processes are usually impaired; these processes often improve gradually showing the brain's *plasticity*

The brain's organization is somewhat flexible and if damaged the brain can make some new connections

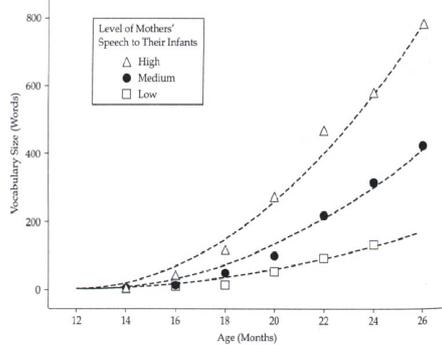
Experience Can Change the Actual Structure of the Brain

- Brain development is “activity-dependent”
- Every experience excites some neural circuits and leaves others alone
- Neural circuits used over and over strengthen, those that are not used are dropped resulting in “pruning”

EPIGENETICS



Effects of Mothers' Speech on Infant Vocabulary



Brain Architecture

- Built in a **cumulative, bottom-up manner**
- Solid foundation required for future skills
- Interaction between genes and experience shapes the architecture of the developing brain



Research has Shown that Successful Scaffolding Results in Healthy Brains

- Faster rates of language learning
- Increased task persistence
- Increased self-control
- More appropriate requests for help
- Increased self-monitoring during tasks
- Increased ability to learn
- Moderates risk factors

NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD

Excessive Stress Disrupts the Architecture of the Developing Brain

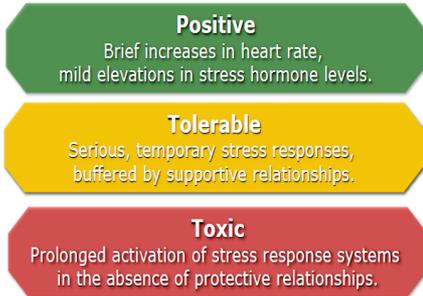
- Healthy development can be derailed by excessive or prolonged activation of stress response systems in the body and the brain
- A poorly controlled response to stress can be damaging to health and well-being if activated too often or for too long
- Sustained activation of the stress response system can lead to impairments in learning, memory, and the ability to regulate
- certain stress responses
- The relationships children have with their caregivers play critical roles in regulating stress hormone production¹⁸ during the early years of life

Children and Stress



- Biologically predisposed to more physiologic stress
- Brain structures that modulate this stress mature later
- Young children need **safe, stable, and nurturing relationships** to assist them in regulating their stress

Three Levels of Stress



23

Toxic Stress

- Strong and prolonged activation of the body's stress management systems in the absence of the buffering protection of adult support
- Precipitants include extreme poverty, physical or emotional abuse, chronic and serious neglect, enduring maternal depression, family violence
- Disrupts brain architecture and leads to stress management systems that respond at relatively lower thresholds, thereby increasing the risk of stress-related physical and mental illness

Child Maltreatment

- **Childhood trauma is defined as - exposure to actual or threatened death, serious injury, or sexual violence (DSM-5, 2013)**
- **Includes:**
 - experiences of direct trauma exposure
 - witnessing trauma
 - learning about trauma that happened to a close friend or relative



25

Shaping the Capacity of the Brain

- **The interactive influences of genes and experiences shape the architecture of the developing brain**
- **Brains are built from the bottom up**



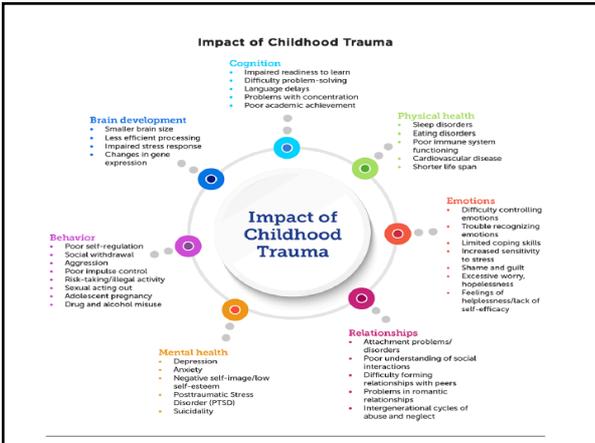
POVERTY AND CHILD HEALTH DISPARITIES

State of the Art Review: Poverty and the Developing Brain

Sara B. Johnson, PhD, MPH^{1,2}; Jenna L. Riss, PhD, MHS³; Kimberly G. Noble, MD, PhD⁴

In the United States, >40% of children are either poor or near-poor. As a group, children in poverty are more likely to experience worse health and more developmental delay, lower achievement, and more behavioral and emotional problems than their more advantaged peers; however, there is broad variability in outcomes among children exposed to similar conditions. Building on a robust literature from animal models showing that environmental deprivation or enrichment shapes the brain, there has been increasing interest in understanding how the experience of poverty may shape the brain in humans. In this review, we summarize research on the relationship between socioeconomic status and brain development, focusing on studies published in the last 5 years. **Drawing on a conceptual framework informed by animal models, we highlight neural plasticity, epigenetics, material deprivation (eg, cognitive stimulation, nutrient deficiencies), stress (eg, negative parenting behaviors), and environmental toxins as factors that may shape the developing brain.** We then summarize the existing evidence for the relationship between child poverty and brain structure and function, **focusing on brain areas that support memory, emotion regulation, and higher-order cognitive functioning (ie, hippocampus, amygdala, prefrontal cortex) and regions that support language and literacy (ie, cortical areas of the left hemisphere).** We then consider some limitations of the current literature and discuss the implications of neuroscience concepts and methods for interventions in the pediatric medical home.

abstract



“The 4th Vital Sign”

1) Respiration 2) Heart Rate 3) Blood pressure
4) Relationships

To heal from toxic stress, children need recognition and understanding from their caregivers

What We Know About Disability and Maltreatment (CDC)

- Parents can more easily become stressed with the demands placed on them by parenting a child with a disability
- Kids with behavior problems, like ADHD or CD, may be more likely to experience physical abuse because parents can become frustrated by the child’s difficult behavior and respond harshly
- Kids who are less able to do things independently rely more on adults for their care. These children may be more likely to be sexually abused or neglected by adults
- Abusers may take advantage of kids who have problems speaking, hearing or who don’t understand social situations very well. These children may be more likely to experience sexual abuse

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CLINICAL REPORT

Maltreatment of Children With Disabilities

Guidance for the Clinician in Rendering Pediatric Care

Roberta A. Hibbard, MD, Larry W. Desch, MD, and the Committee on Child Abuse and Neglect and Council on Children With Disabilities

ABSTRACT
Widespread efforts are being made to increase awareness and provide education to pediatricians regarding risk factors of child abuse and neglect. The purpose of this clinical report is to ensure that children with disabilities are recognized as a population that is also at risk of maltreatment. Some conditions related to a disability can be confused with maltreatment. The need for early recognition and intervention of child abuse and neglect in this population, as well as the ways that a medical home can facilitate the prevention and early detection of child maltreatment, are the subject of this report.

31

Abuse of Children With Intellectual Disabilities

By Leigh Ann Davis, M.S.S.W., M.P.A.



Are Children With Disabilities at a Higher Risk of Being Abused?

Children with disabilities of any kind are not identified in crime statistic systems in the U.S., making it difficult to determine their risk for abuse (Sullivan, 2003). A number of weak and small-scale studies found that children with all types of disabilities are abused more often than children without disabilities. **Studies show that rates of abuse among children with disabilities are variable, ranging from a low of 22 percent to a high of 70 percent (National Research Council, 2001).** Although the studies found a wide range of abuse prevalence, **when taken as a whole, they provide consistent evidence that there is a link between children with disabilities and abuse (Sobsey, 1994).**

One in three children with an identified disability for which they receive special education services are victims of some type of maltreatment (i.e., either neglect, physical abuse, or sexual abuse) whereas one in 10 nondisabled children experience abuse. Children with any type of disability are 3.44 times more likely to be a victim of some type of abuse compared to children without disabilities. (Sullivan & Knutson, 2000).

What Is The Arc's Position?
People (including children) with intellectual disabilities must be free from abuse, neglect, or any kind of mistreatment. Read the full Position Statement at <http://www.thearc.org/pages.aspx?pid=2357>

32

“Social-emotional buffering is the primary factor distinguishing tolerable from toxic level of stress.”



Andrew Garner, MD, PhD, FAAP
Chair, AAP EBCD Leadership Work Group (2012-2014)

Development is a Dance Between Nature and Nurture

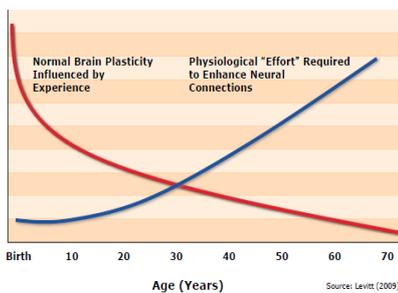
- **What you can do:**
 - Apply an **eco-bio-developmental framework**
 - **Recognize adverse psychosocial factors**
 - Collaborate with families and social service providers
 - Conduct developmental and behavioral monitoring and screening

Brain Plasticity Declines with Age



- Brain's ability to rewire itself in response to changes in the environment is waning by kindergarten
- Remediation, while possible, is much more difficult

Intervene Early Because the Brain Becomes Less Plastic With Development



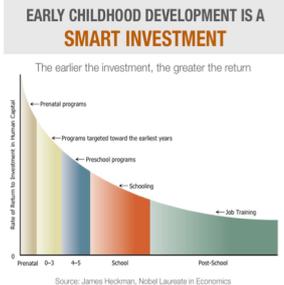
Getting It Right the First Time

- Creating the right conditions in early childhood is **more effective** and **far less costly** than addressing a multitude of problems later on



Investing In Children

James Heckman, a Nobel-prize winning economist, found that every dollar invested in Head Start yields approx \$10 as the program's alumni enter the work force and start contributing to society



CENTER FOR THE ECONOMICS OF HUMAN DEVELOPMENT
The University of Chicago

Promoting EBCD

The First 1,000 Days: Examples for Promoting EBCD consistent with Bright Futures Guidelines for Health Supervision of Infants, Children and Adolescents, 4th ed

Encouraged to	Explore the child's environment	Build relationship reciprocity	Observe milestones	Develop parenting confidence
General Information	What pediatricians might briefly assess during well-child care	How pediatricians might strengthen the parent-child bond or attachment	What pediatricians might teach parents about development	How pediatricians might support parents as they explore their child's development
Brief Description	Assess foundational needs: food and sleep; safety and emotional supports; "strengths and barriers to access"	Describe (or notice) parent-child interactions, emphasize the importance of responsive caregiving, and support the parent-child relationship ("dyadic dance")	Explain current and emerging developmental skills	1) Praise and encourage age-appropriate but responsive caregiving; 2) Praise and encourage parental self-care and the nurturing of social supports
Well Child Care Visit				
Prenatal/Newborn/Week 1	Assess for food (plans to breastfeed? safety, and parental support)	Explain that relationships and everyday interactions build the baby's brain	Explain the importance of parent-baby interaction during the infant's "parent alert" state	Encourage parents to consider the way they were parented. Explore what they plan TO do and NOT to do as parents.
2-4 weeks	Assess overall parental well-being (maternal depression or substance use?)	Encourage responsive caregiving (responding promptly to cues of distress builds trust)	Prepare parent for the emerging social smile	Find opportunities to reassure and praise the parents, and encourage them to support each other
2 months	Assess for family adjustment – parent self-care, return to work/childcare, time with partner; impact of new infant on siblings	Encourage smiling back at the baby's social smile (the beginning of the parent-child interaction, or "dyadic dance" that leads to cooing, feeding, and speaking)	Anticipate cooing conversations	Enjoy interactions with an increasingly social baby

*This goal is not intended to be a comprehensive review, but rather provide examples of some evidence-informed actions consistent with the Bright Futures Guidelines for Health Supervision of Infants, Children and Adolescents, 4th ed. https://www.aap.org/in-us/advocacy-and-policy/health-initiatives/EBCD/Documents/EBCD_Well_Child_Card.pdf

The First 1000 Days: Examples for Promoting EBCD consistent with Bright Futures Guidelines for Health Supervision of Infants, Children and Adolescents, 4th ed. https://www.aap.org/in-us/advocacy-and-policy/health-initiatives/EBCD/Documents/EBCD_Well_Child_Card.pdf. Accessed August 28, 2018

PEDIATRICS
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

The Lifelong Effects of Early Childhood Adversity and Toxic Stress
Jack P. Shonkoff, Andrew S. Garner, THE COMMITTEE ON PSYCHOSOCIAL ASPECTS OF CHILD AND FAMILY HEALTH, THE COMMITTEE ON EARLY CHILDHOOD ADIPTION, AND DEPENDENT CARE, AND SECTION ON DEVELOPMENTAL AND BEHAVIORAL PEDIATRICS, Benjamin S. Siegel, Mary F. Dobbins, Marian F. Earls, Andrew S. Chanen, Laura McQuinn, John Pascoe, and David L. Wong
Pediatrics 2012;129:e232
DOI: 10.1542/peds.2011.2063 originally published online December 26, 2011.

An Ecobiodevelopmental Framework for Early Childhood Policies and Programs

Ecology

- Policy and Program Levers for Innovation:** Primary Health Care, Public Health, Child Care and Early Education, Child Welfare, Early Intervention, Family Economic Stability, Community Development, Private Sector Actions.
- Caregiver and Community Capacities:** Time and Commitment, Financial, Psychological, and Institutional Resources, Skills and Knowledge.
- Foundations of Healthy Development:** Stable, Responsive Relationships, Safe, Supportive Environments, Appropriate Nutrition.

Biology

- Biology of Health and Development:** Gene-Environment Interactions, Prenatal Development, Embodied During Sensitive Periods.

Health and Development

- Outcomes to Lifelong Well-Being:** Health-Related Behaviors, Educational Achievement and Economic Productivity, Physical and Mental Health.

FIGURE 2
An ecobiodevelopmental framework for early childhood policies and programs. This was adapted from ref 1. See text for details.

40

ACEs Often Last a Lifetime . . . But They Don't **Have To**

- **Healing can occur**
- **Cycle can be broken**
- **Safe, stable, nurturing relationships heal parent and child**
