

# First Do No Harm:

## *Trauma-Informed, Age-appropriate Care in the NICU*

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# Objectives

Upon completion the participant will be able to:

1. The learner will describe the impact of toxic stress on the developing brain.
2. The learner will list 3 traumatic experiences of the hospitalized infant associated with an NICU stay.
3. The learner will identify 3 evidence-based age-appropriate care strategies that mitigate toxic stress in the NICU.

# Trauma-informed Care

- \* Concept of traumatic stress emerged in the field of mental health 4 decades ago
- \* Trauma is a widespread public health concern and occurs as a result of an emotionally harmful experience
- \* Individual trauma results from an event, series of events, or set of circumstances that is experienced by an individual as ***physically or emotionally harmful or life threatening*** and that has lasting adverse effects on the individual's functioning and mental, physical, social, emotional, or spiritual well-being.

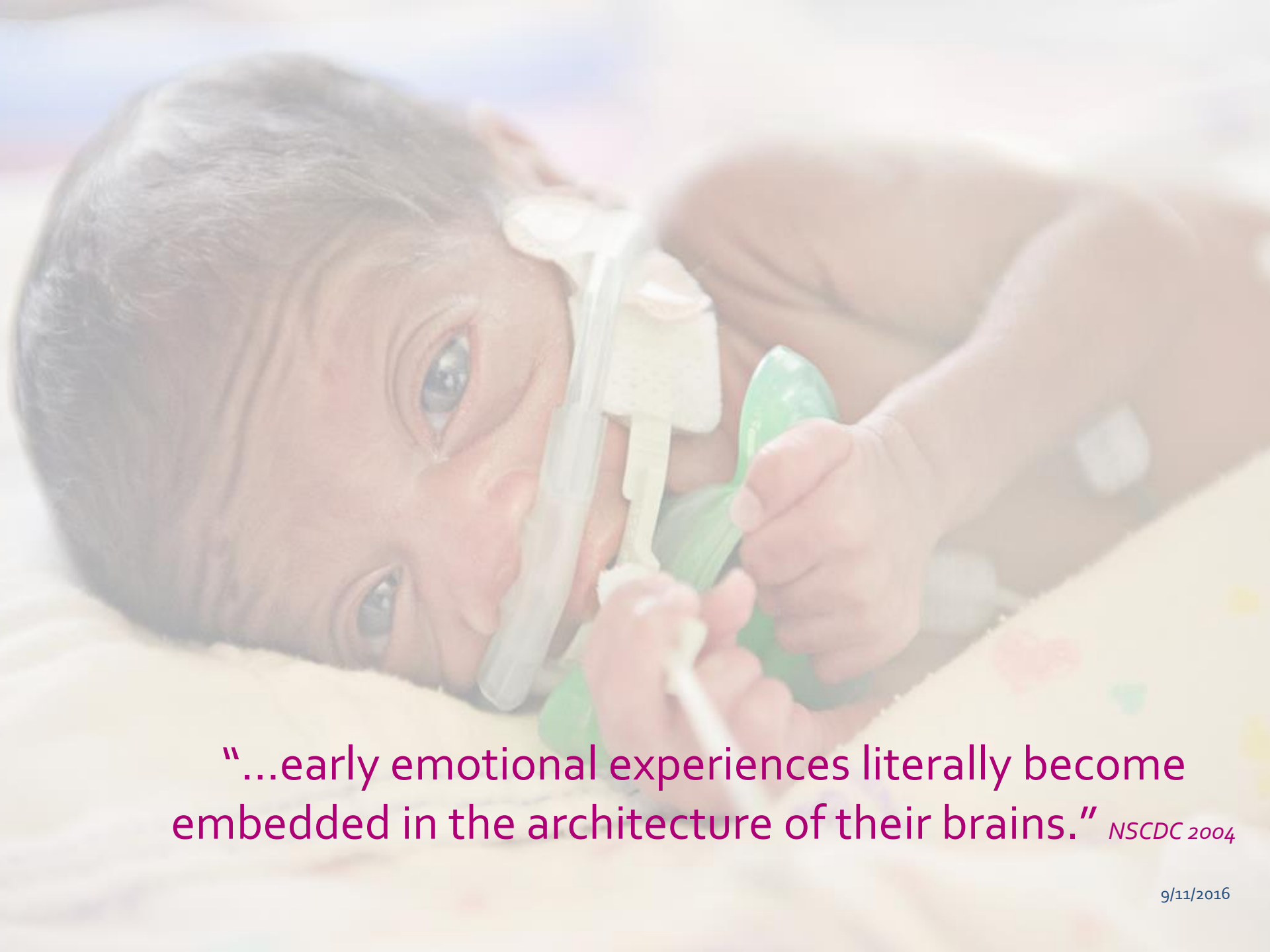
# Trauma-Informed Care

## Healthcare Providers' Guide to Traumatic Stress in Ill or Injured Children

...AFTER THE ABCs, CONSIDER THE DEFs

<b>D</b>	<b>DISTRESS</b>	<ul style="list-style-type: none"><li>• Assess and manage pain.</li><li>• Ask about fears and worries.</li><li>• Consider grief and loss.</li></ul>
<b>E</b>	<b>EMOTIONAL SUPPORT</b>	<ul style="list-style-type: none"><li>• Who and what does the patient need now?</li><li>• Barriers to mobilizing existing supports?</li></ul>
<b>F</b>	<b>FAMILY</b>	<ul style="list-style-type: none"><li>• Assess parents' or siblings' and others' distress.</li><li>• Gauge family stressors and resources.</li><li>• Address other needs (beyond medical).</li></ul>

<http://www.healthcaretoolbox.org/index.php/what-providers-can-do/d-e-f-protocol-for-trauma-informed-pediatric-care.html>



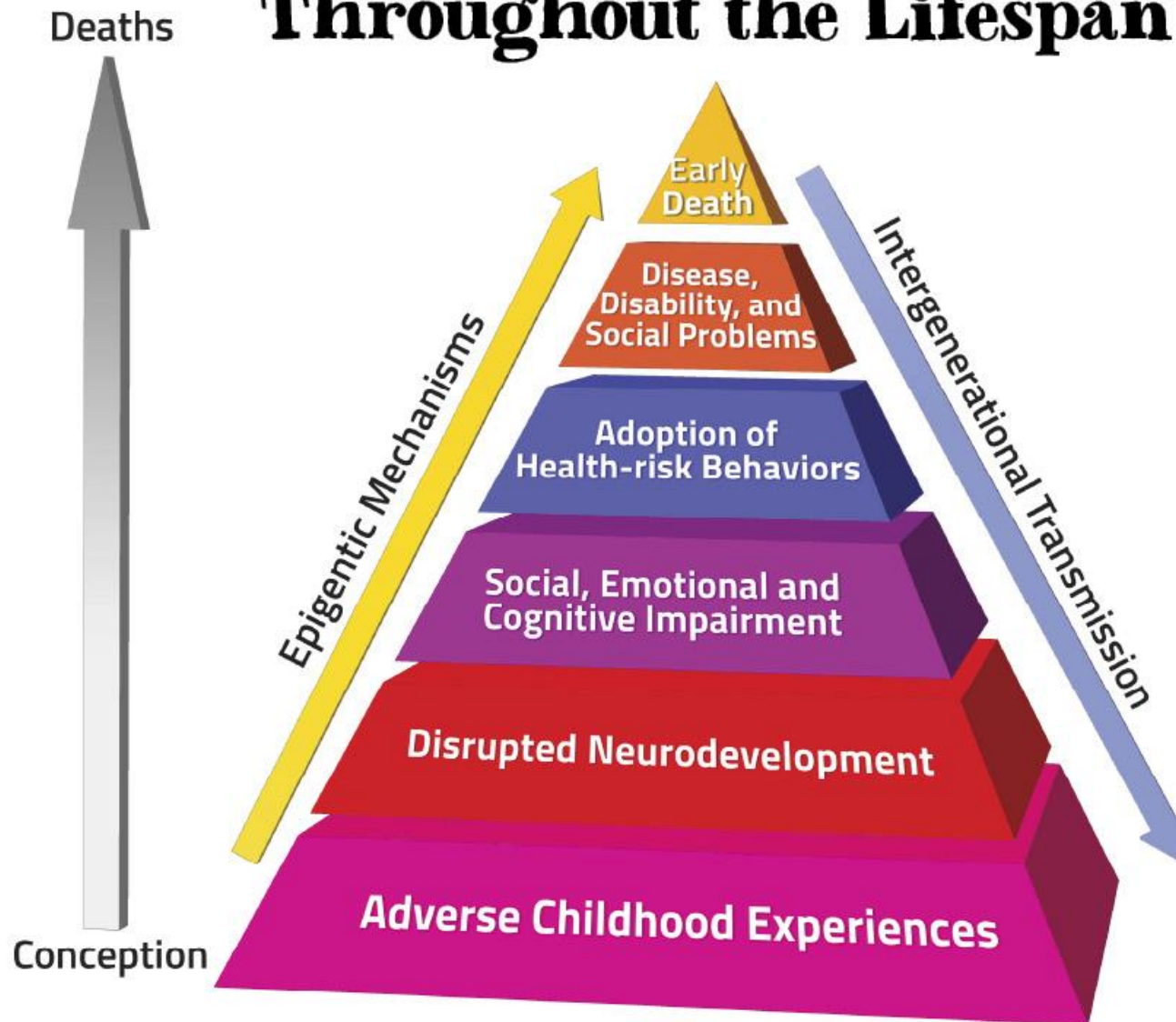
“...early emotional experiences literally become embedded in the architecture of their brains.” *NSCDC 2004*

# The Adverse Childhood Experience Study

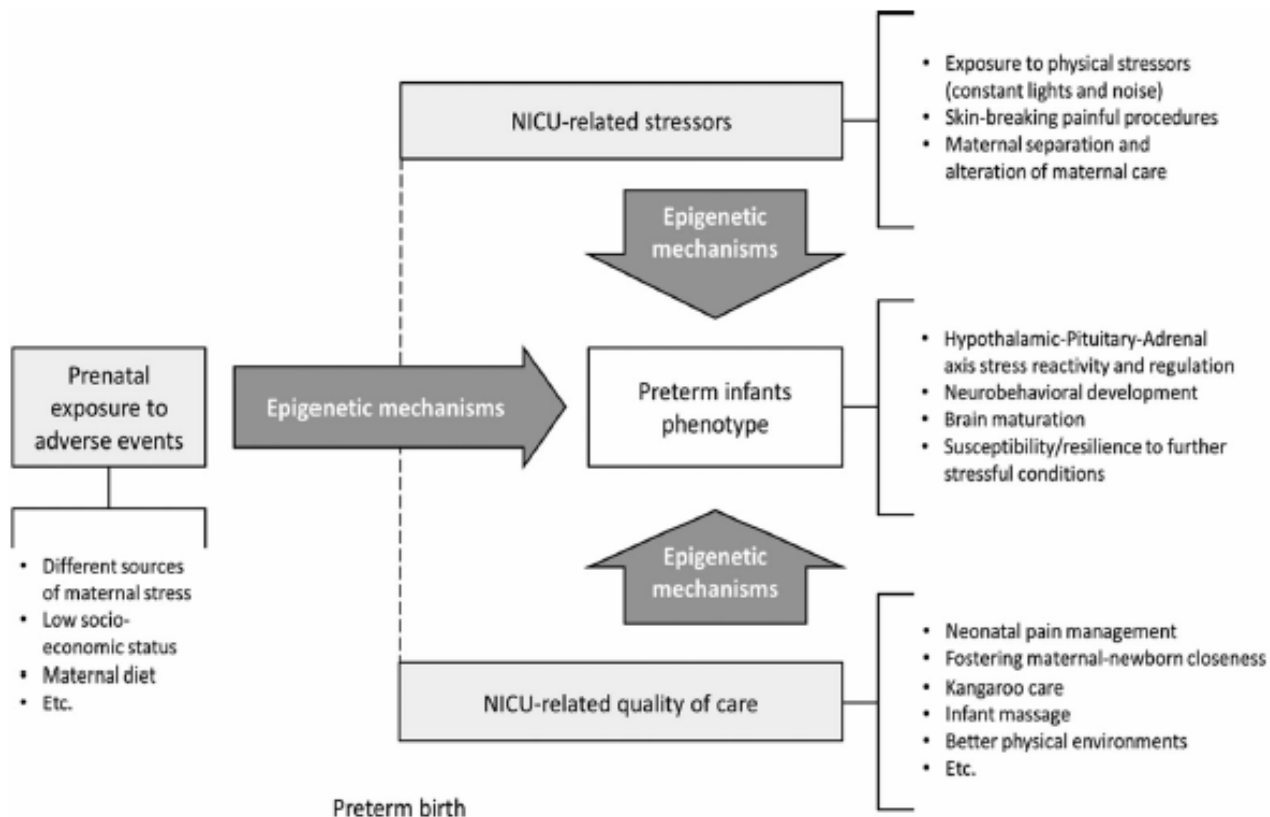
## ACE Categories

- \* Abuse
  - \* Emotional; physical; sexual
- \* Household Dysfunction
  - \* Mother treated violently; household substance abuse; household mental illness; parental separation or divorce; incarcerated household member
- \* Neglect
  - \* Emotional; Physical

# Mechanisms by which Adverse Childhood Experiences Influence Health and Well-being Throughout the Lifespan

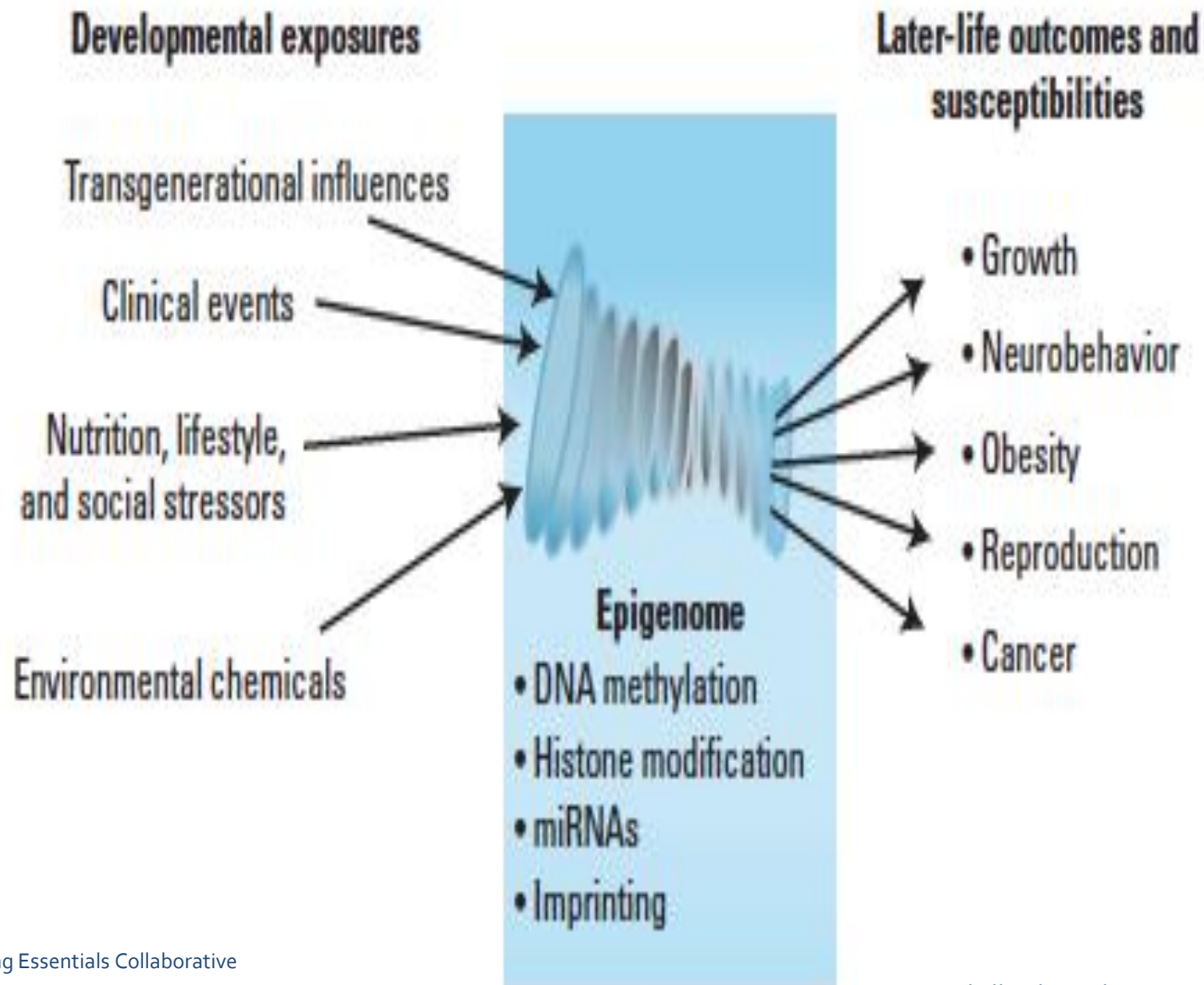


“Preterm birth is an early adverse experience characterized by exposure to high levels of stress and altered buffering effects of maternal care.”



**Figure 2.** A prospective model to inform preterm behavioral epigenetic studies.

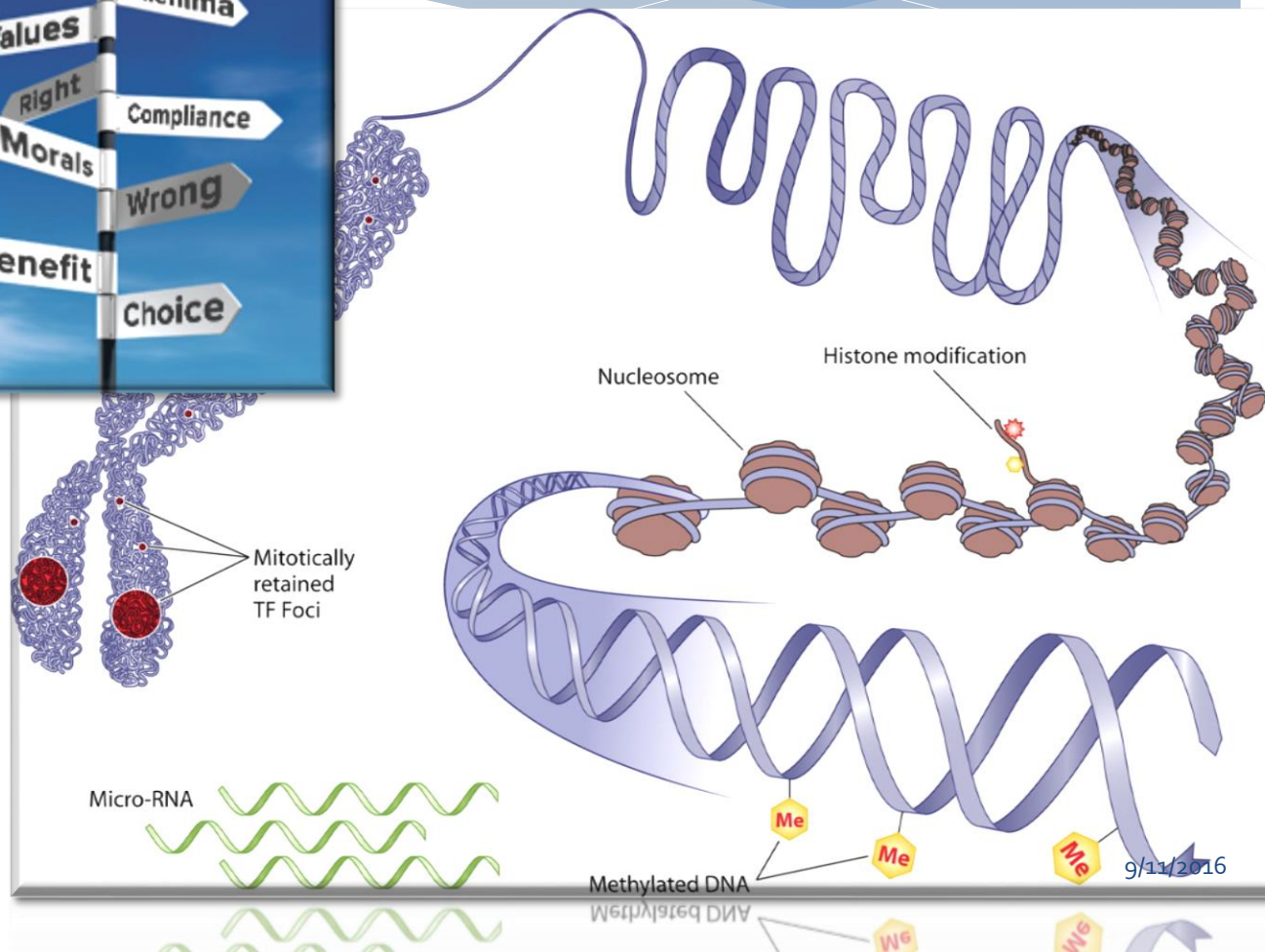




# 'Epigenethics'



*Provenzi & Montirosso 2015*



# Vulnerability of the Developing Brain



20 weeks



35 weeks



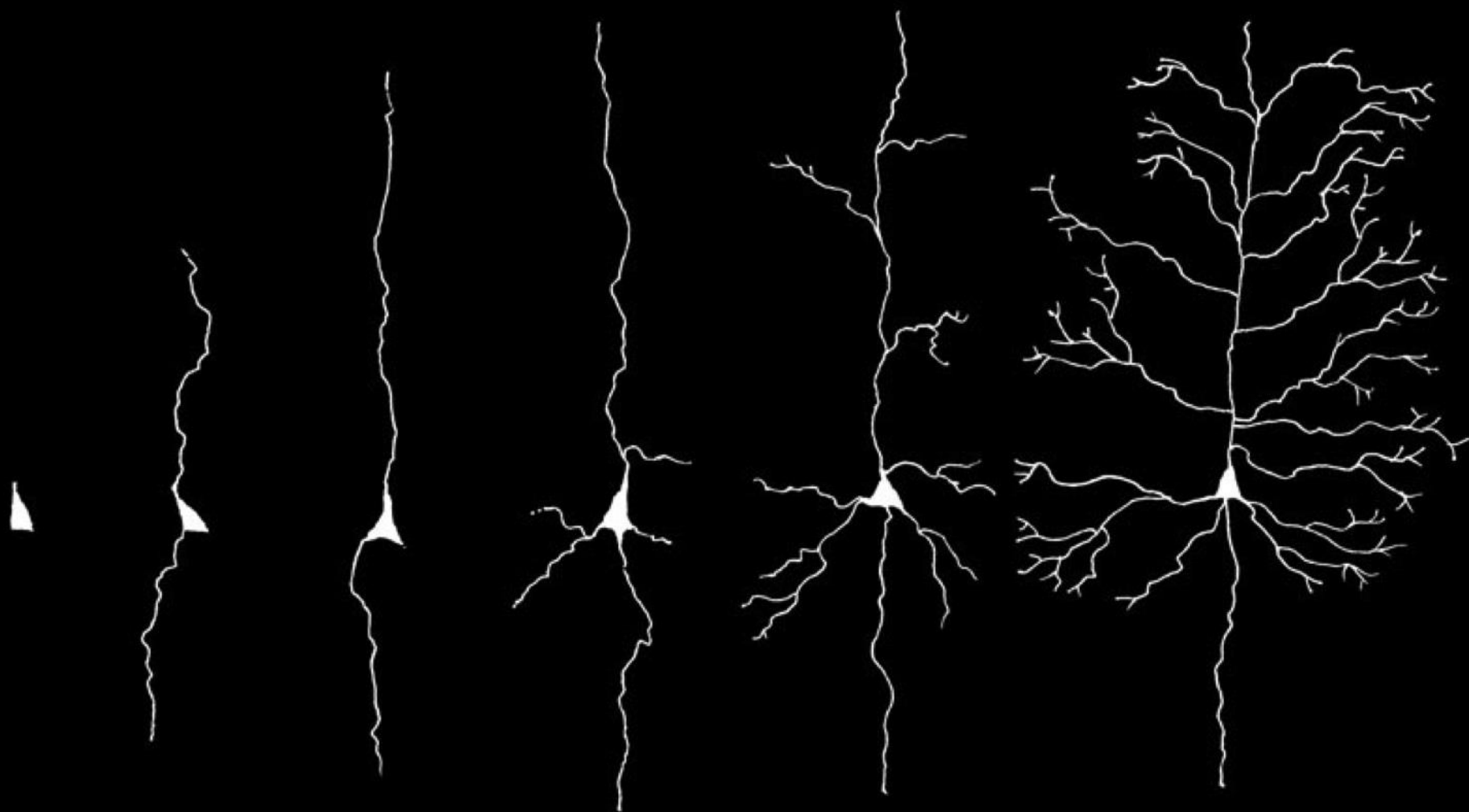
40 weeks

*Easily hurt or harmed physically, mentally, or emotionally*

# Susceptibilities of the Developing Human



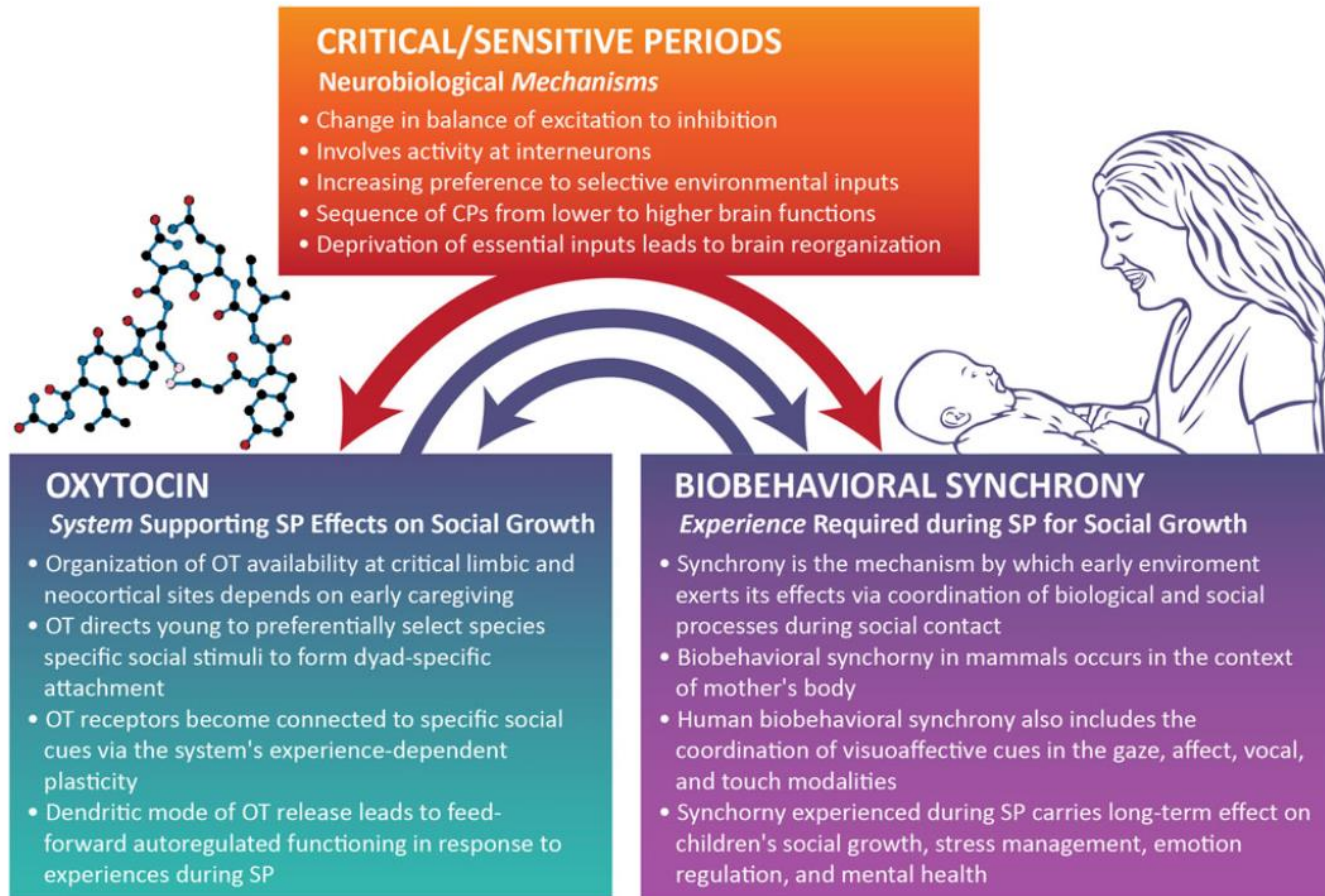
*The state of being easily affected, influenced, or harmed by something*



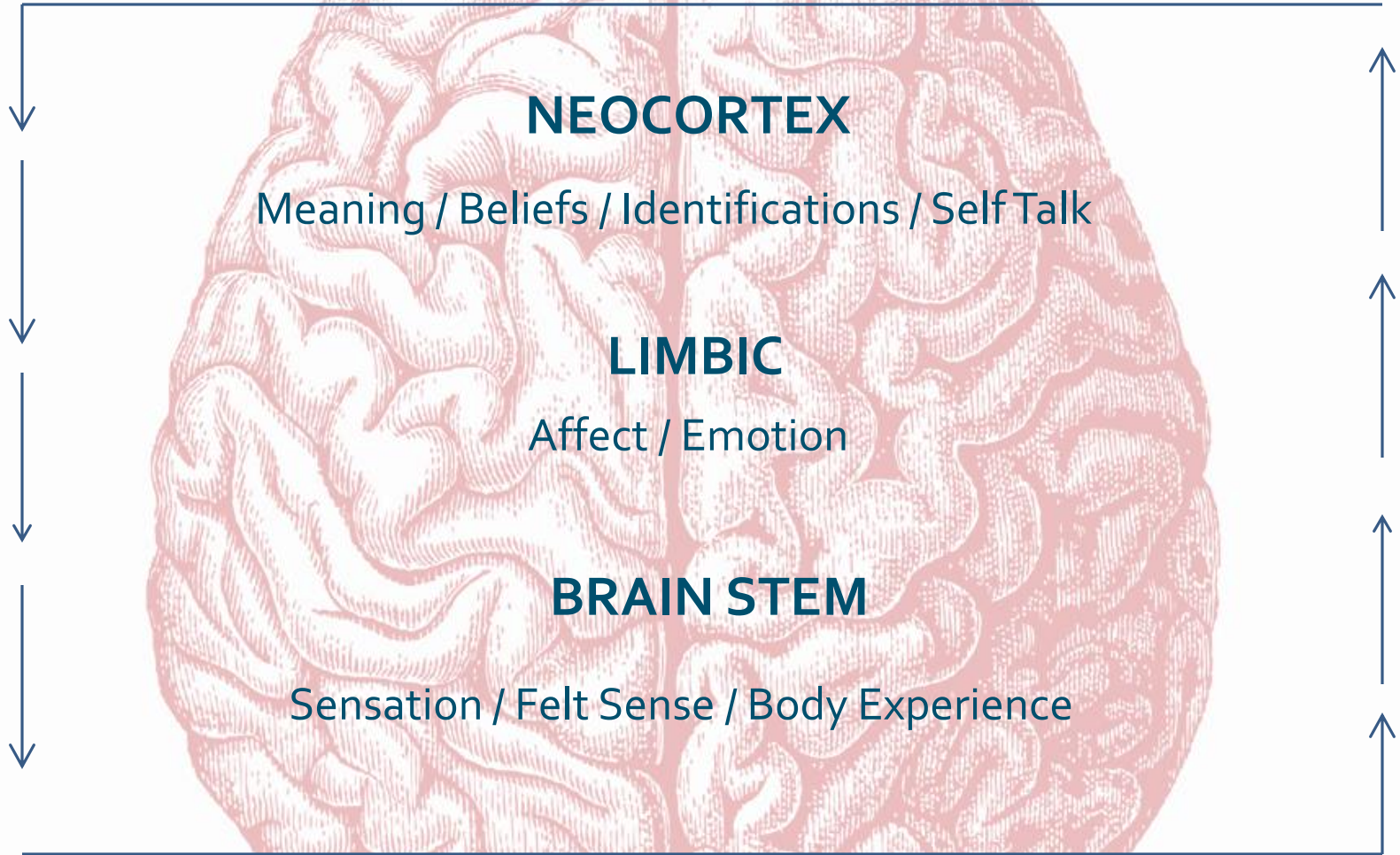
Growing Dendrites = Learning



# Critical and Sensitive Periods of Development



# Meaning-Making



*Tronick & Beeghly 2011*

# Organs of Emotion

## The Cerebral Cortex

- \* The Frontal Lobe
  - \* The Dorsolateral Cortex
  - \* Orbitofrontal Cortex
  - \* The Anterior Cingulate Cortex
- \* The Temporal Lobe
  - \* The Amygdala
  - \* The Hippocampus
- \* The Insula

## The Hypothalamic-Pituitary Axis & Septal Area

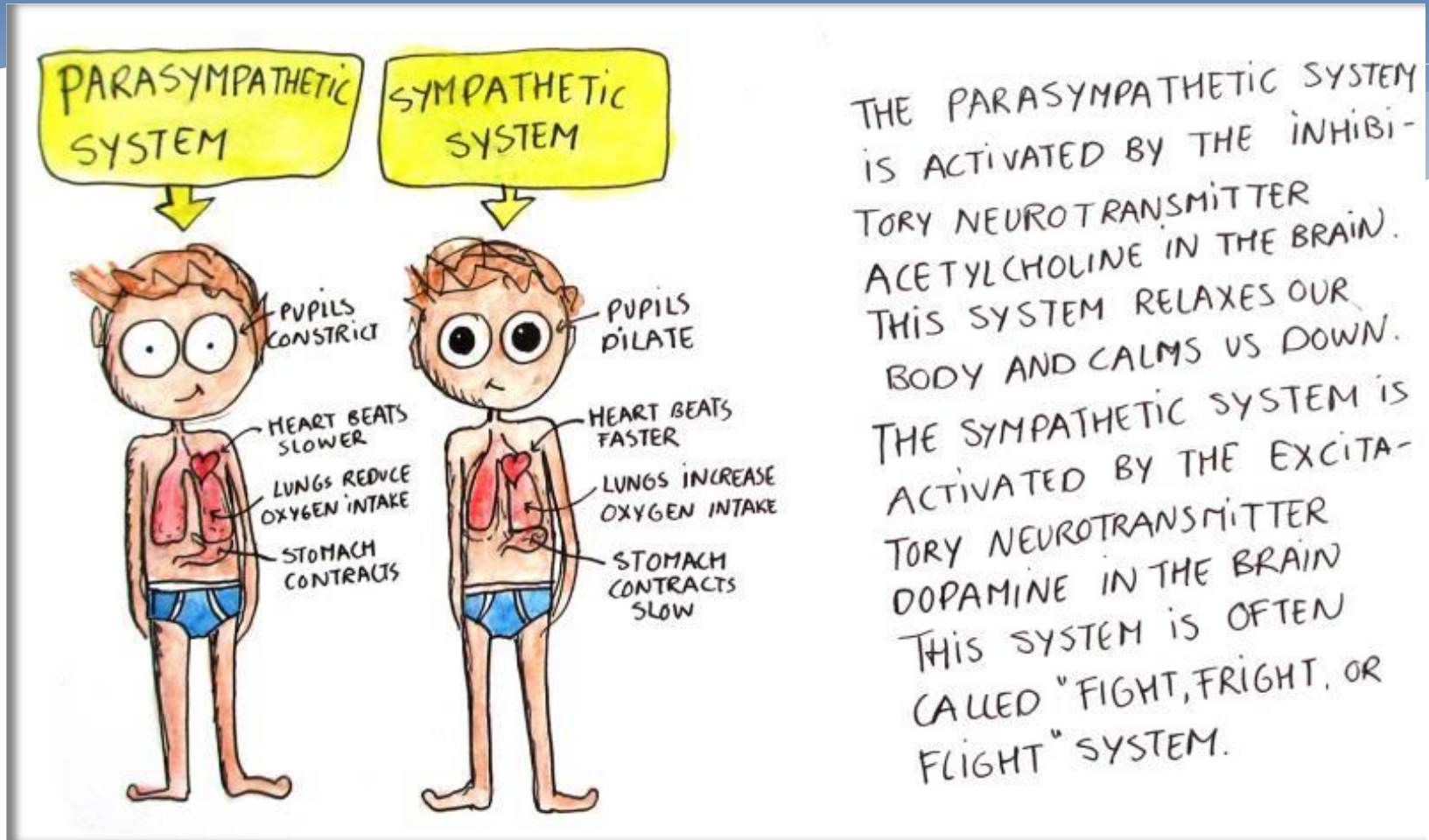
- \* The Hypothalamus
- \* The Pituitary Gland
- \* The Septal Area

## The Thalamus & Basal Ganglia

- \* The Thalamus
- \* The Subthalamic Nucleus
- \* The Striatum & Pallidum
- \* The Nucleus Accumbens



# Emotion and Stress





**Positive Stress**



**Tolerable Stress**



**Toxic Stress**



Three Core Concepts in Early Development

# 3 Toxic Stress Derails Healthy Development

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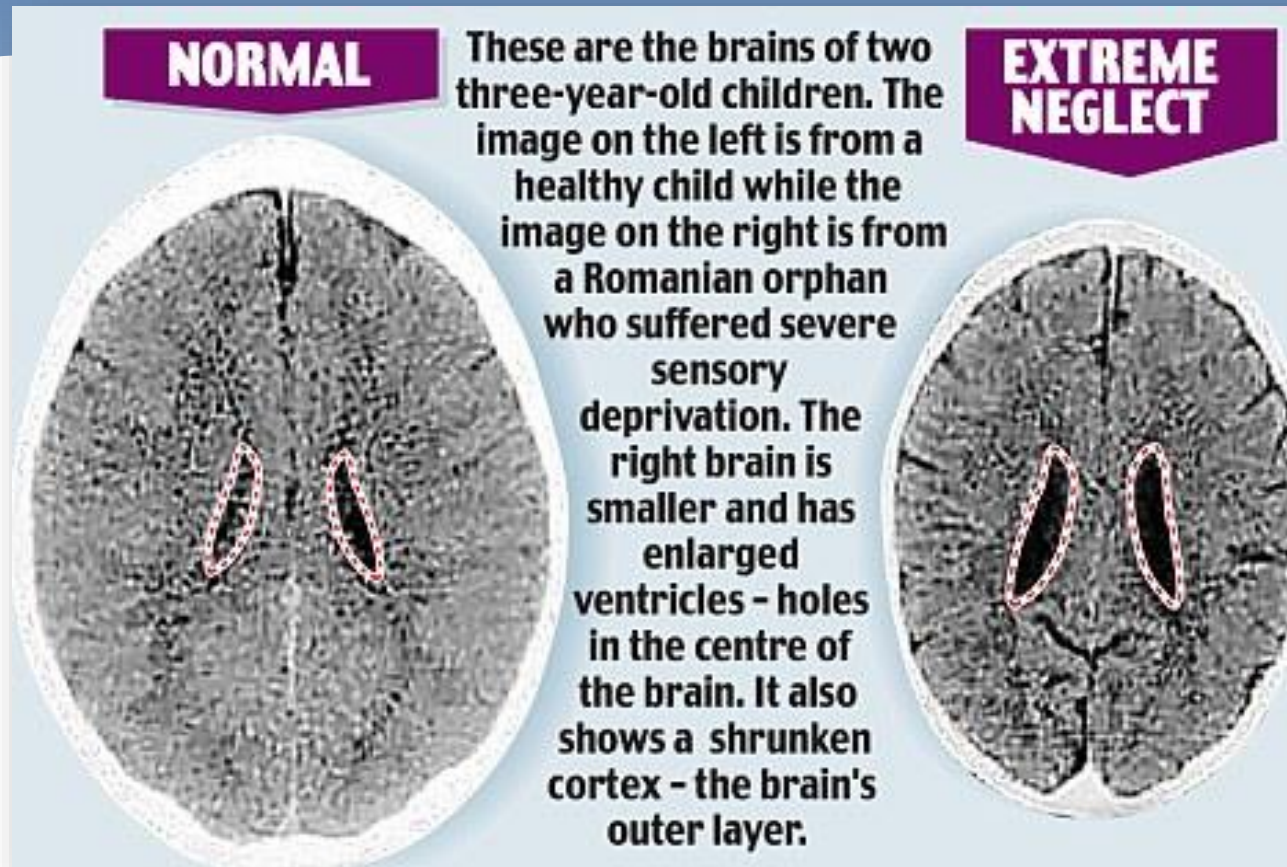
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**“Sustained activation of the stress response system can lead to impairments in learning, memory, and the ability to regulate certain stress responses.” *NSCDC 2014***



# Toxic Stress

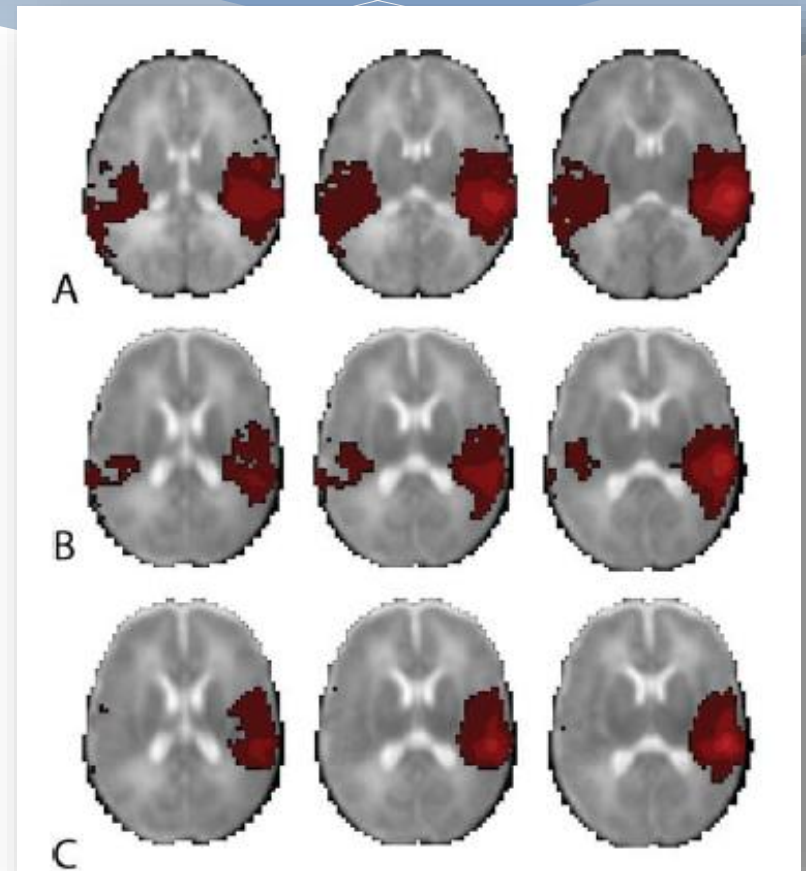


“Toxic stress is the extreme, frequent, or extended activation of the stress response, without the buffering presence of a supportive adult.”

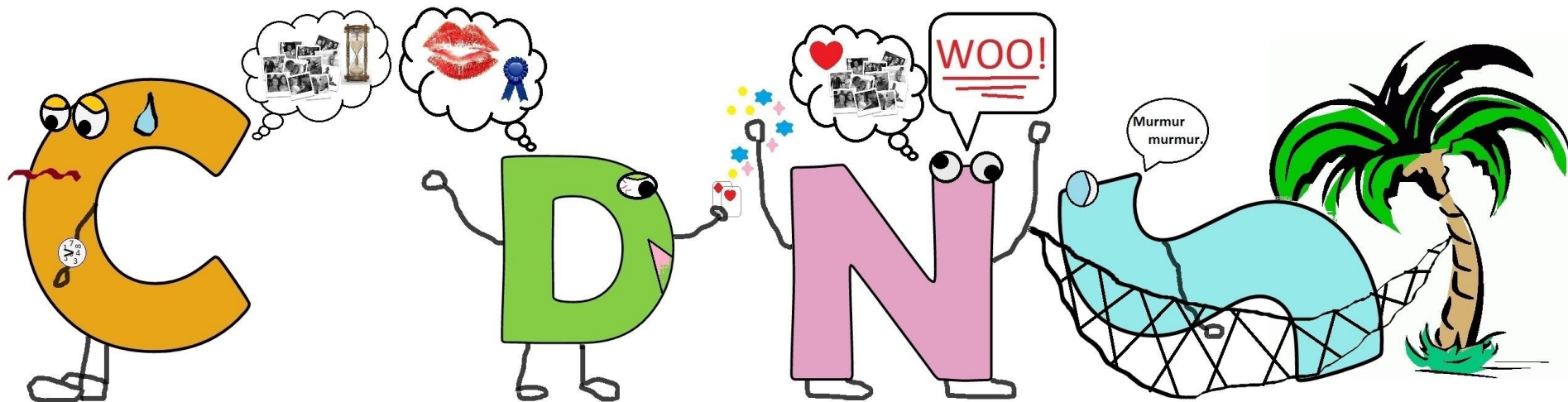
# Toxic Stress

“high stress exposure is associated with differences in the brain on both an *anatomic and a functional level*... data suggest an important vulnerability of the preterm brain to stressful exposures, independent of measures of severity of illness,... and thus potentially affect neurodevelopmental outcomes.”

*Smith et al 2011*



# Neurobiology of Attachment



## Cortisol

- Steroid released when stressed

## Dopamine

- Pleasure & reward
- Arousal & desire
- Addictions

## Norepinephrine

- From dopamine
- Increased memory for new stimuli

## Serotonin

- Mood stabilizer
- Stops obsessive-compulsive behavior



# Attunement

- being or bringing into harmony; a feeling of being "at one" with another being





## Mother-Infant Separation

“Multiple regression models revealed that, controlling for baseline family and maternal characteristics and indicators of family instability, the occurrence of a mother-child separation of a week or longer within the first two years of life was related to higher levels of child negativity (at age 3) and aggression (at ages 3 and 5). The effect of separation on child aggression at age 5 was mediated by aggression at age 3, suggesting that the effects of separation on children’s aggressive behavior are early and persistent.”

*Howard et al 2011*



"Psychosocial deprivation within any caregiving environment during early life must be viewed with as much concern as any debilitating childhood disease."

*Johnson & Gunnar 2011*

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## INBRIEF

# Disease Independent Neonatal Outcomes

- \* It is estimated that 50-70% of infants born preterm develop behavior problems including internalizing and externalizing problems and symptoms of Attention Deficit/Hyperactivity Disorder (ADHD)
- \* Infants hospitalized for CHD increase their risk for neurodevelopmental compromise if their postop LOS is > 2 weeks

*(Vanderbilt & Gleason 2011; Marino et al 2012)*

↑ Risk of violent suicide attempts patients born prematurely (OR [95%] = 2.38 [1.12–5.08] *(Blasco-Fontcella et al 2013)*

↑ Risk of cardiovascular disease in adulthood *(Lewandowskia et al 2013)*

↑ Risk of metabolic syndrome and obesity in adulthood *(Thomas et al 2012; Finken et al 2011)*

# Compared with term births:

- \* Infants born 32-36 weeks were:

- \* 1.6 x more likely to have nonaffective psychosis (schizophrenia)
- \* 1.3 x more likely to have depressive disorder
- \* 2.7 x more likely to have bipolar disorder

- \* Infants born < 32 weeks were:

- \* 2.5 x more likely to have nonaffective psychosis (schizophrenia)
- \* 2.9 x more likely to have depressive disorder
- \* 7.4 x more likely to have bipolar disorder

*Nosarti et al 2012*

# Why Should we Care?

- \* Toxic stress is a mediator between early childhood adversity and suboptimal outcomes in learning, behavior, and health
- \* Understanding the biology underlying these well established associations opens up new opportunities for *primary prevention* and *early intervention*



“It is an absolute human certainty that no one can know his own beauty or perceive a sense of his own worth until it has been reflected back to him in the mirror of another loving, caring human being.”  
— John Joseph Powell







# Policy Update from AAP



## *Mitigate 'toxic' stress*

**A new science of early childhood reveals urgency of protecting developing brains**

Andrew S. Garner and Jack P. Shonkoff

*AAP News* 2012;33;29

DOI: 10.1542/aapnews.2012331-29

American Academy  
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

TECHNICAL REPORT

## The Lifelong Effects of Early Childhood Adversity and Toxic Stress

Shonkoff et al 2012

# The Role of the Neonatal Clinician?

## PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

**Early Childhood Adversity, Toxic Stress, and the Role of the Pediatrician:  
Translating Developmental Science Into Lifelong Health**  
Committee on Psychosocial Aspects of Child and Family Health, Committee on Early  
Childhood, Adoption, and Dependent Care, and Section on Developmental and  
Behavioral Pediatrics, Andrew S. Garner, Jack P. Shonkoff, Benjamin S. Siegel, Mary  
I. Dobbins, Marian F. Earls, Andrew S. Garner, Laura McGuinn, John Pascoe and  
David L. Wood

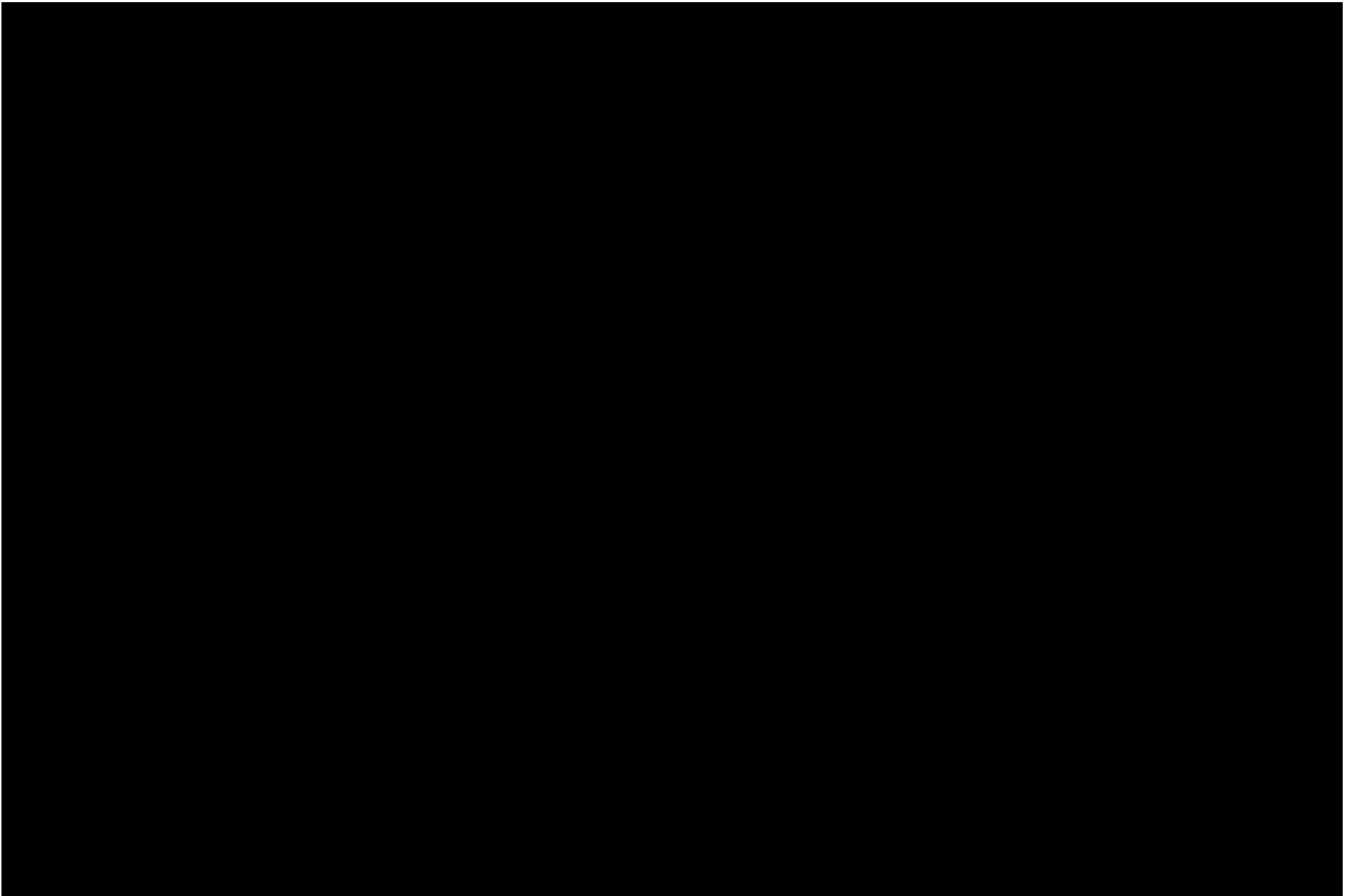
*Pediatrics* 2012;129:e224; originally published online December 26, 2011;  
DOI: 10.1542/peds.2011-2662

Evidence-based

# Core Measures for Age-appropriate Care

# Age-Appropriate

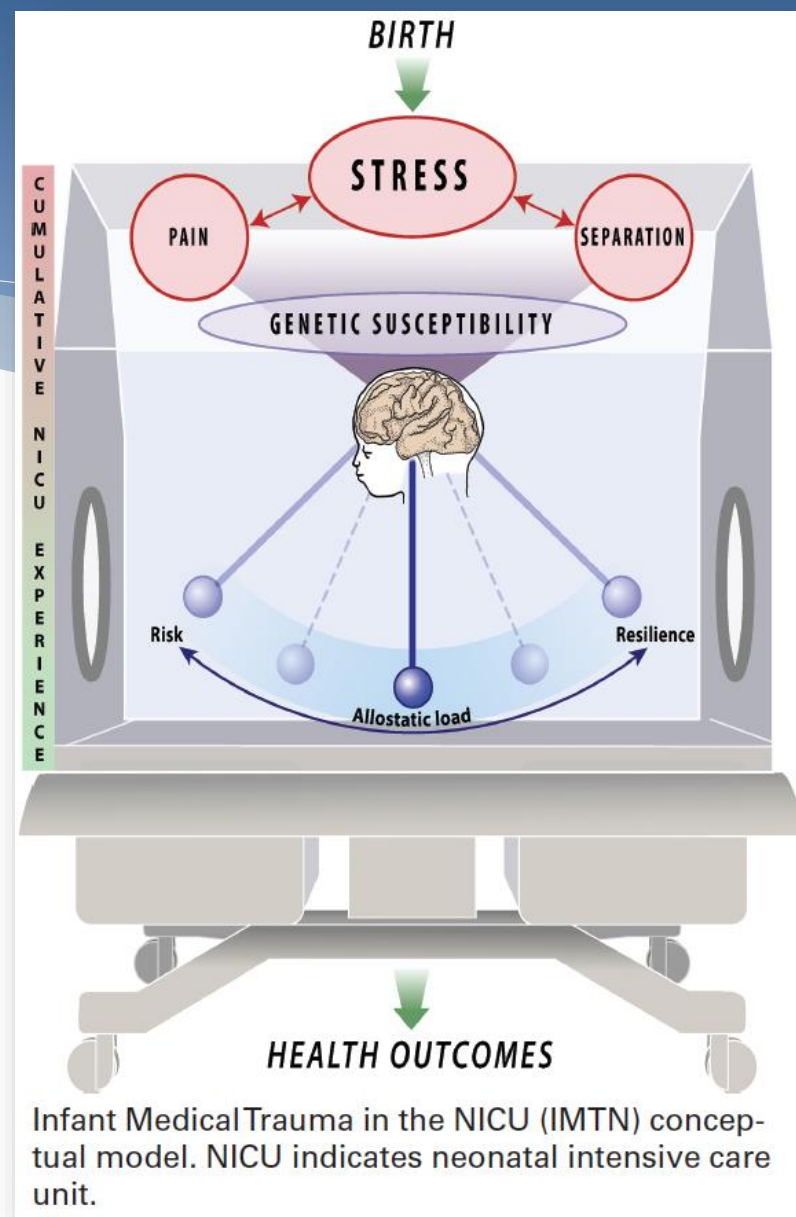




# Infant Medical Trauma in the NICU

## Assumptions of IMTN Concept

1. Following birth, the infant's health status is compromised
2. Primary care of the infant is transferred to NICU caregivers
3. NICU experience differs from routine hospital stay
4. Infant experiences increased stress, parental separation, & pain
5. NICU experiences contribute to infant's allostatic load increasing vulnerability & risks for poorer outcomes



# Erikson Life-Stage Virtues


- \* HOPE – basic trust vs. mistrust (0-1)
- \* WILL – autonomy vs. shame & doubt (1-3)
- \* PURPOSE – initiative vs. guilt (3-6)
- \* COMPETENCE – industry vs. inferiority (6-11)
- \* FIDELITY – identity vs. role confusion (12-mid 20's)
- \* LOVE – intimacy vs. isolation (young adult – mid 20's to early 40's)
- \* CARING – generativity vs. stagnation (40's to 60's)
- \* WISDOM – ego integrity vs. despair (>60's)

# Serve & Return Shapes Brain Circuitry

Three Core Concepts in Early Development

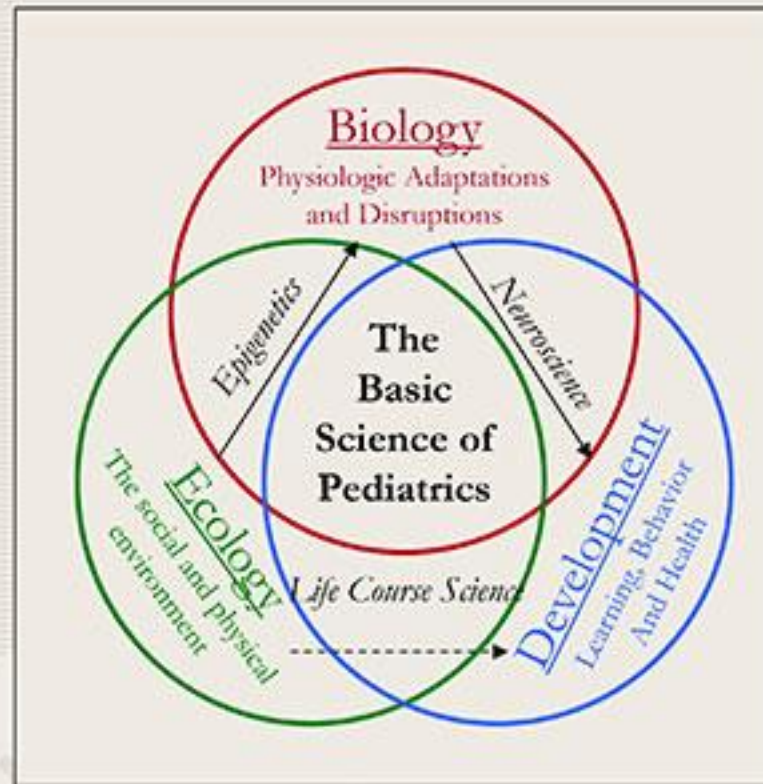
## 2 Serve & Return Interaction Shapes Brain Circuitry

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# Eco-Bio-Developmental Model of Human Health and Disease



AAP 2012

**Ecology**  
Becomes **biology**,  
And together they drive **development** across the lifespan

# Core Measures for Age-Appropriate Care



# What's the frequency in which you provide the following?

1. Prevent procedural pain (using appropriate pharm/non-pharm strategy)

- ☐ Never
- ☐ Occasionally
- ☐ Sometimes
- ☐ Often
- ☐ Always

2. Modify caregiving practices based on the infant's behavioral stress cues

- ☐ Never
- ☐ Occasionally
- ☐ Sometimes
- ☐ Often
- ☐ Always

3. Ensure that the first oral feeding is at the breast for breastfeeding mothers

- ☐ Never
- ☐ Occasionally
- ☐ Sometimes
- ☐ Often
- ☐ Always

4. Respond to infant alarms or cries regardless of patient assignment status

- ☐ Never
- ☐ Occasionally
- ☐ Sometimes
- ☐ Often
- ☐ Always

# Missed Care in the NICU

- \* Most frequently missed cares (self report by nurses)
  - \* Participating in rounds
  - \* Discharge planning
  - \* Oral care for ventilated infants
  - \* Educating and involving parents in care
  - \* Comfort care
  - \* Oral feedings

*Rocheffort & Clarke 2010; Tubbs-Cooley et al 2014*

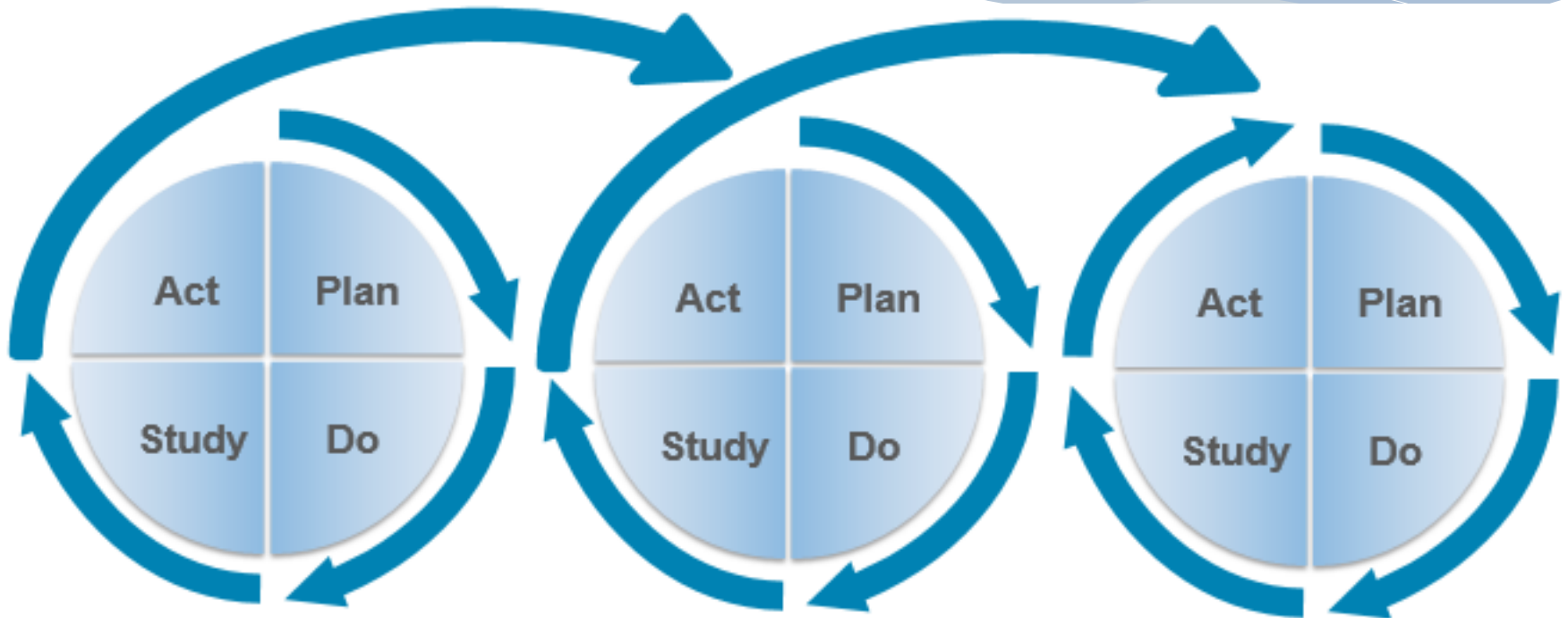
# Making it REAL!

# Strategy Implementation Model



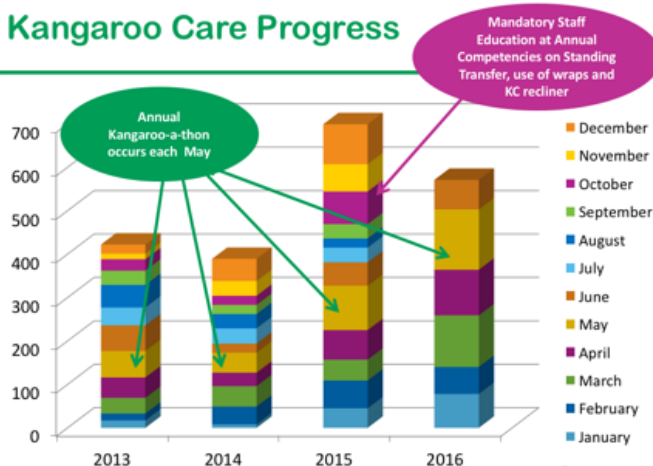


# Improvement Methodology



# What gets measured gets managed!

## Kangaroo Care Progress

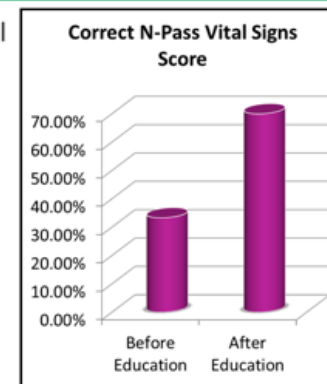


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## Pain Assessment Documentation Improvement

- Transition to N-PASS tool for pain assessment challenging for staff
- Project with CHOA data analytics showed no correlation between VS score and actual VS
- Improvement after bedside nurse-to-nurse education

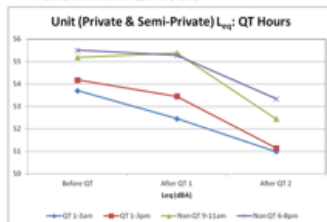


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## Quiet Time Outcomes

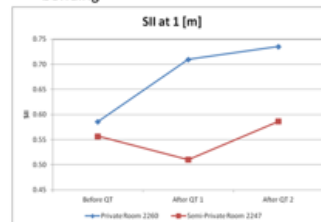
### Decreased Sound Levels Overall

- Sounds levels measured in four areas of the unit
- Measurements during QT and two random non-QT hours



### The Speech Intelligibility Index

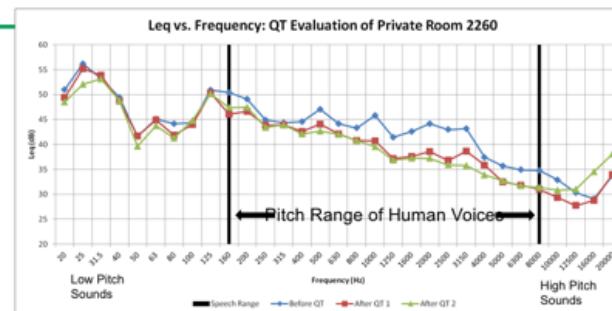
- QT could promote patient safety by improving communication
- QT could contribute to parent-infant bonding



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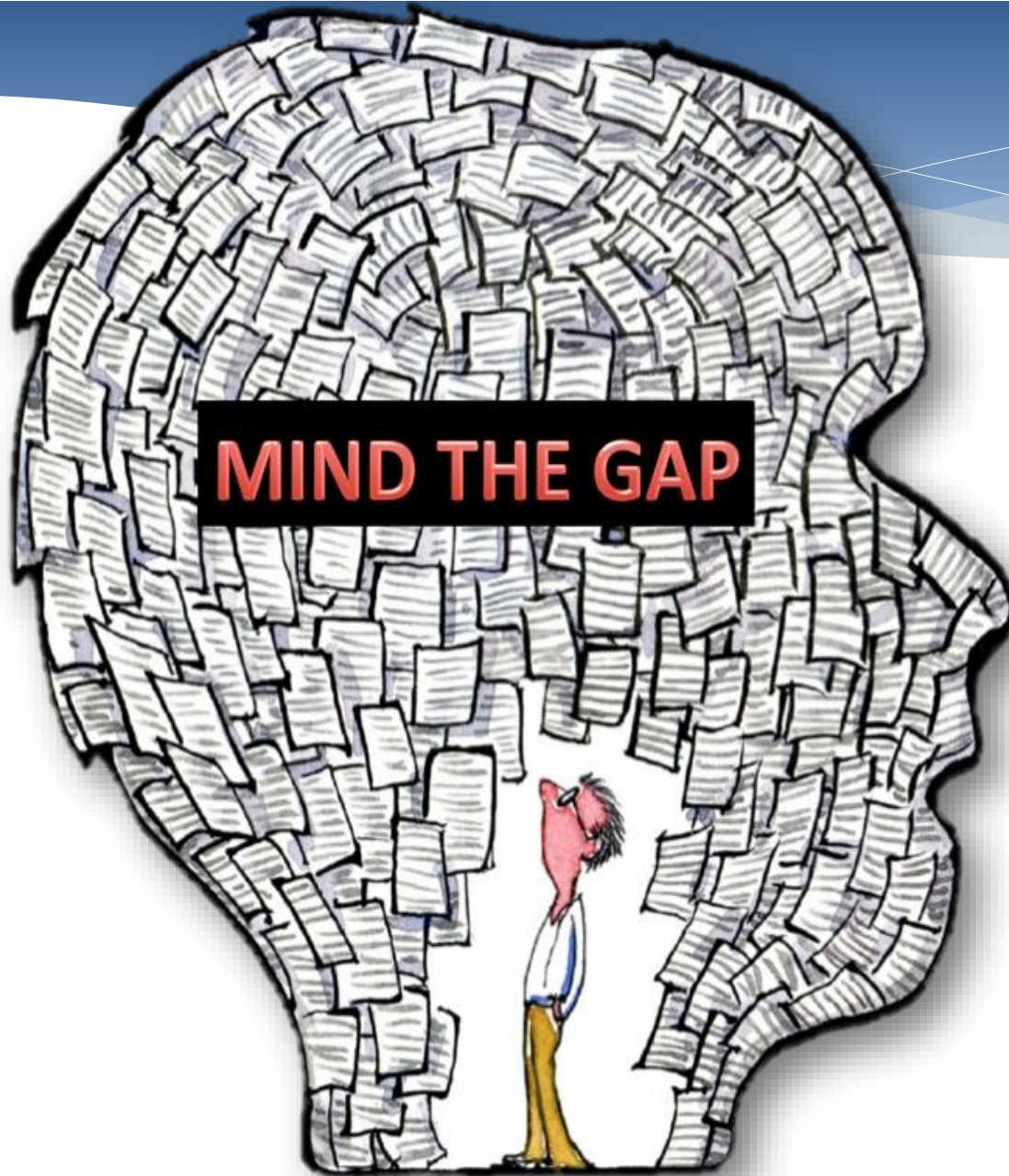
## Sustainability of Quiet Time



- Overall sound levels at vocal frequencies (160-8000Hz) decreased after initiation of Quiet Time. Because of this, it would appear that Quiet Time is a sustainable project because the decrease in sound is due to changes in staff behavior, not background environmental noise.

Children's Healthcare of Atlanta

9/11/2016






A woman with long brown hair tied back, wearing black-rimmed glasses and a white lab coat over a grey turtleneck, is seated in a blue hospital chair. She is gently cradling a newborn baby wrapped in a white blanket. The baby is sleeping peacefully. In the background, medical equipment, including a blue monitor on a stand, is visible, suggesting a hospital or clinical setting.

“It is easier to build strong children  
than to repair broken men.” - *Frederick Douglas*



A close-up of a cartoon elephant's face, looking upwards with a small pink flower in its trunk. The elephant has large ears and a gentle expression. The background is a soft-focus green landscape.

**“A person is a person,  
no matter how small”**

\* [mary@marycoughlinrn.com](mailto:mary@marycoughlinrn.com)

\* [www.marycoughlinrn.com](http://www.marycoughlinrn.com)



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