

It Takes a Village to Raise a Child Equity from The Start – Part 1

Early Child Development:

Jean M Clinton B.Mus MD FRCP(C)

Clinical Professor

McMaster University

Zero to Three fellow

Child Trauma Academy Fellow

clintonj@mcmaster.ca

@drjeanforkids



Infant and Early Childhood Mental Health: “It Takes a Village” – Part 2 on December 3rd, 2020 – 1:00pm – 2:00pm

Dr. James Reynolds

Dr. Chaya Kulkarni

Dr. Diane Philips

Why is Early Child Development Important?



It is a Determining Influence on
Subsequent
Life Chances and Health





Closing the gap in a generation

Health equity through action on
the social determinants of health

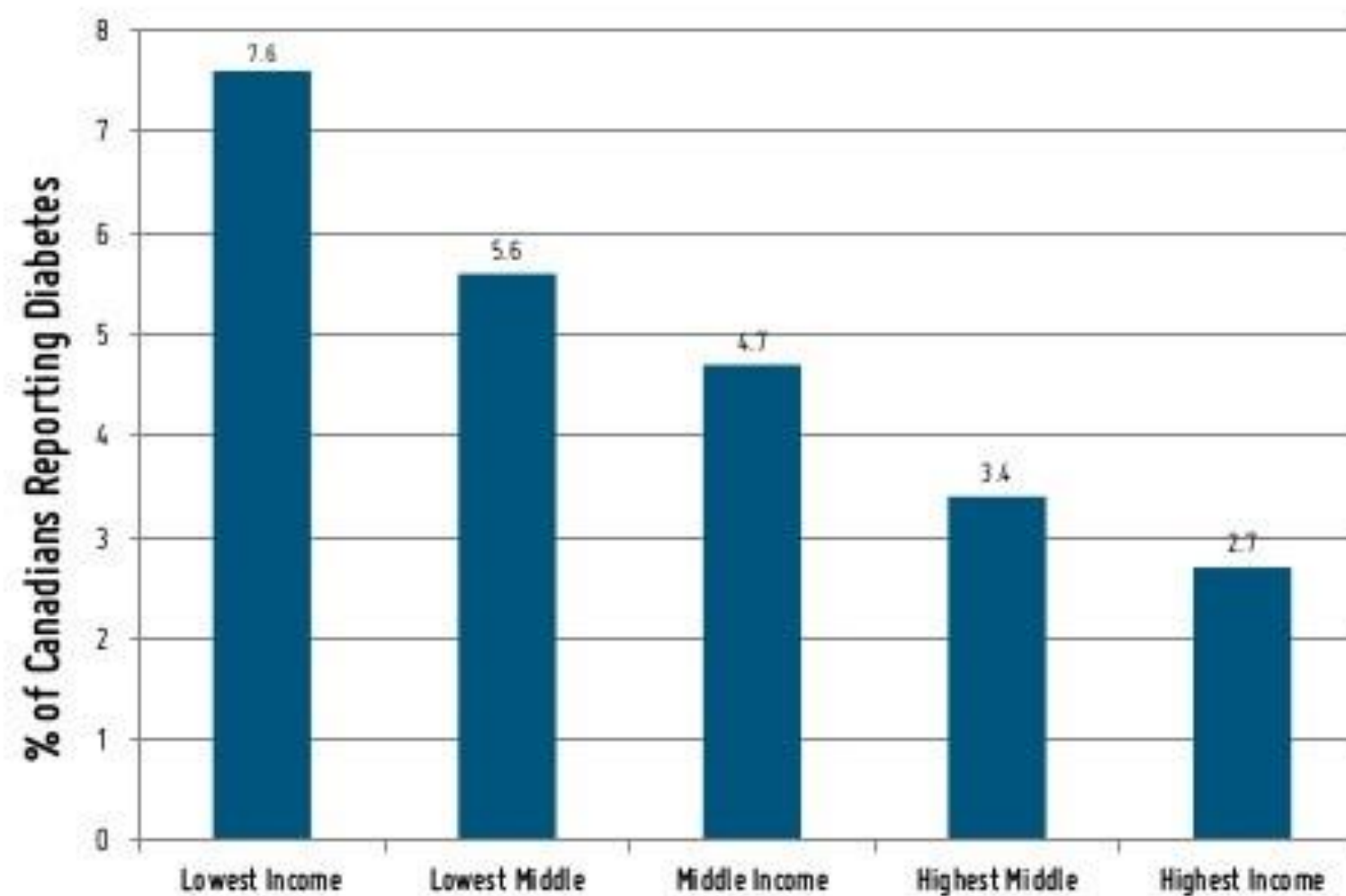


“Poor social
policies, unfair
economics and
bad politics are
killing people on
a grand scale.”

Sir Michael
Marmot



THE SOCIO-ECONOMIC GRADIENT IN HEALTH



[Statistics Canada, Canadian Community Health Survey, 2005]



Do we need to worry about social determinants of health in Hamilton, in Ontario, in Canada?

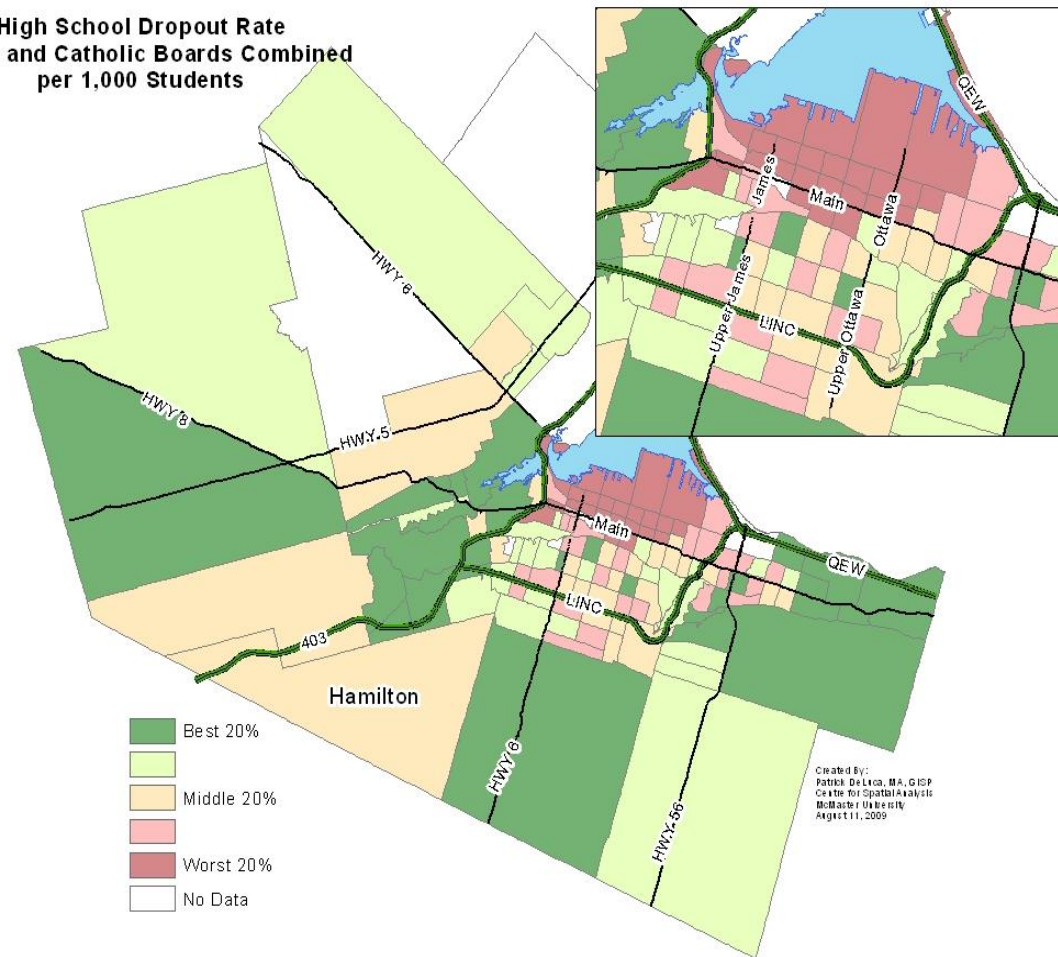
In a word

YES...WE DO

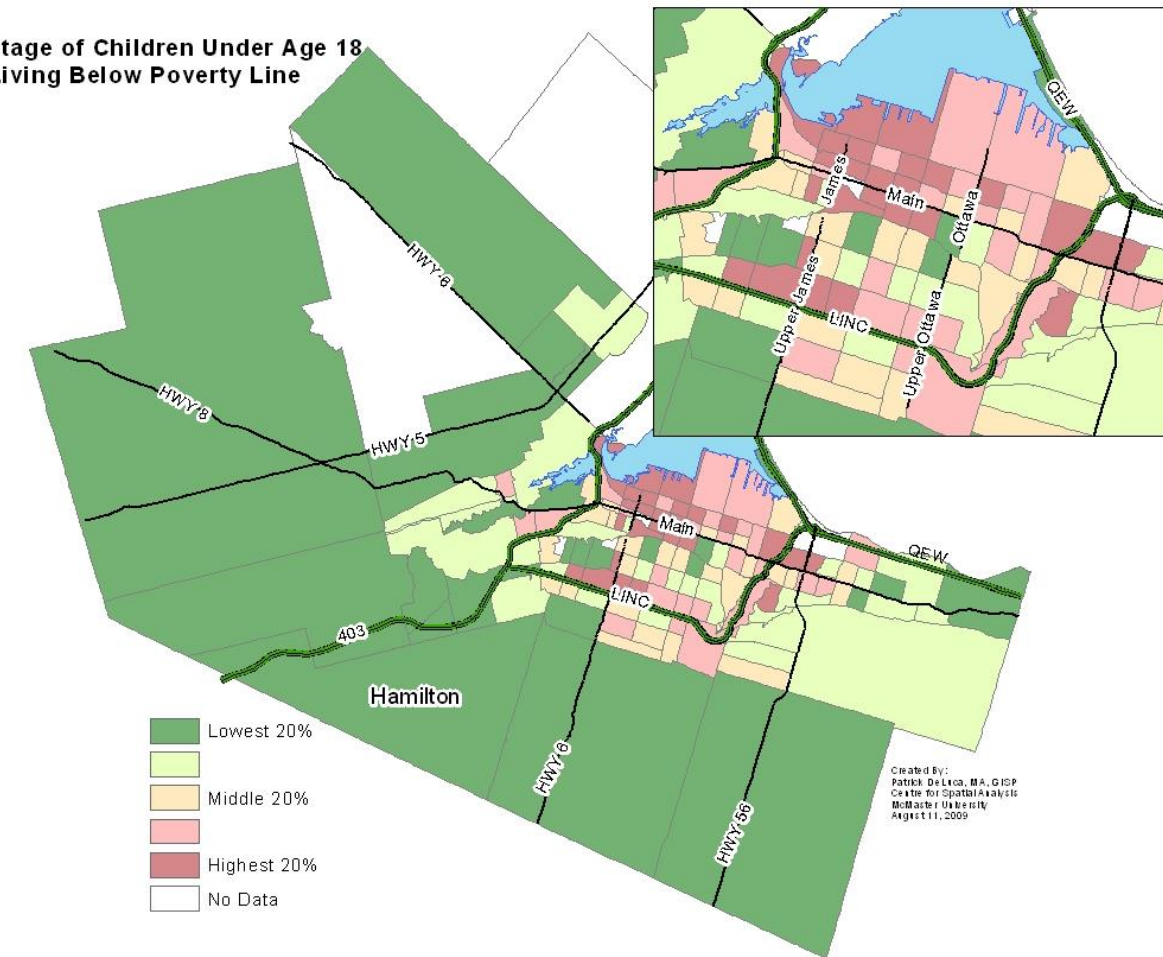


CODE RED HAMILTON

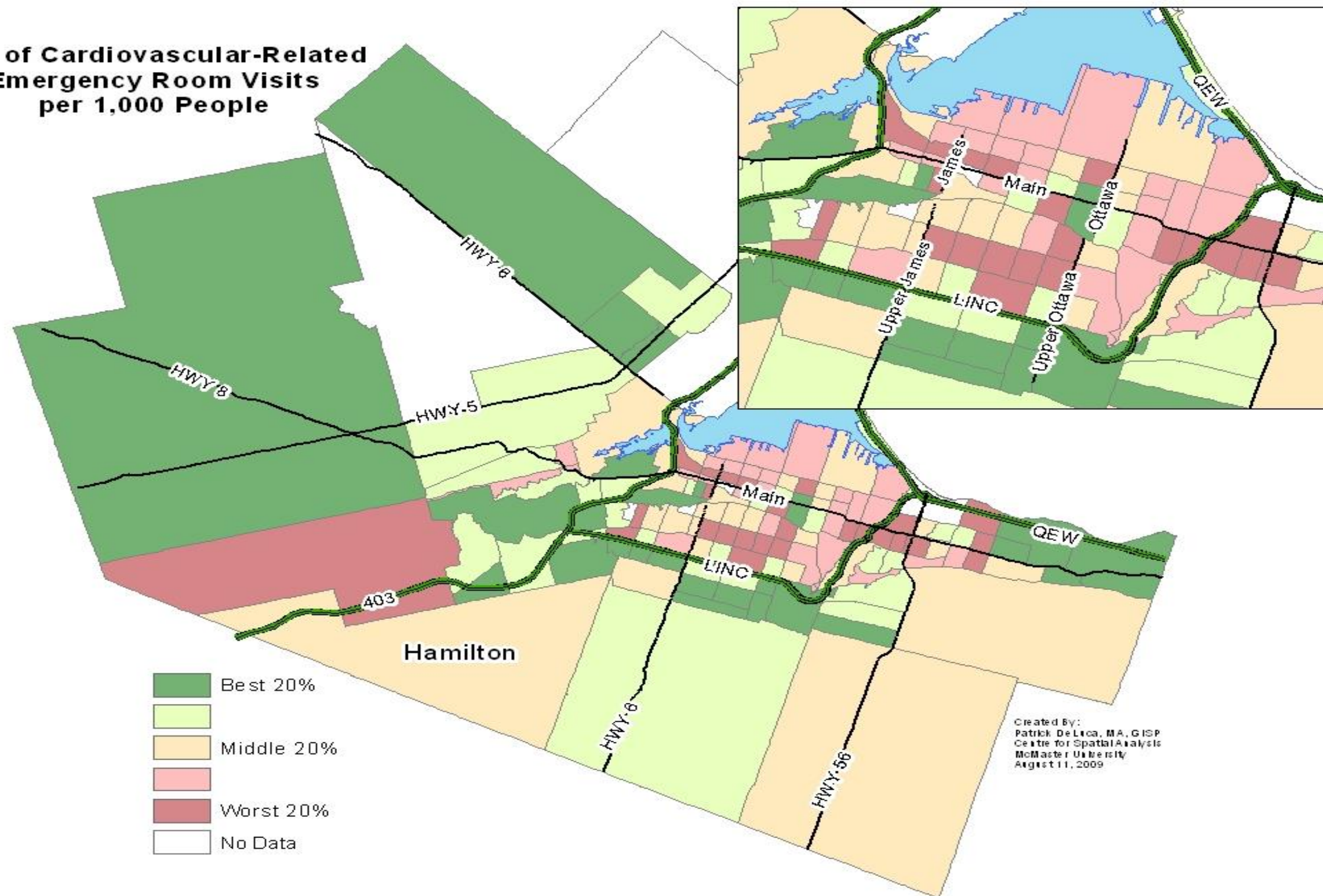
High School Dropout Rate
Public and Catholic Boards Combined
per 1,000 Students



Percentage of Children Under Age 18
Living Below Poverty Line



Rate of Cardiovascular-Related Emergency Room Visits per 1,000 People



Families or Society

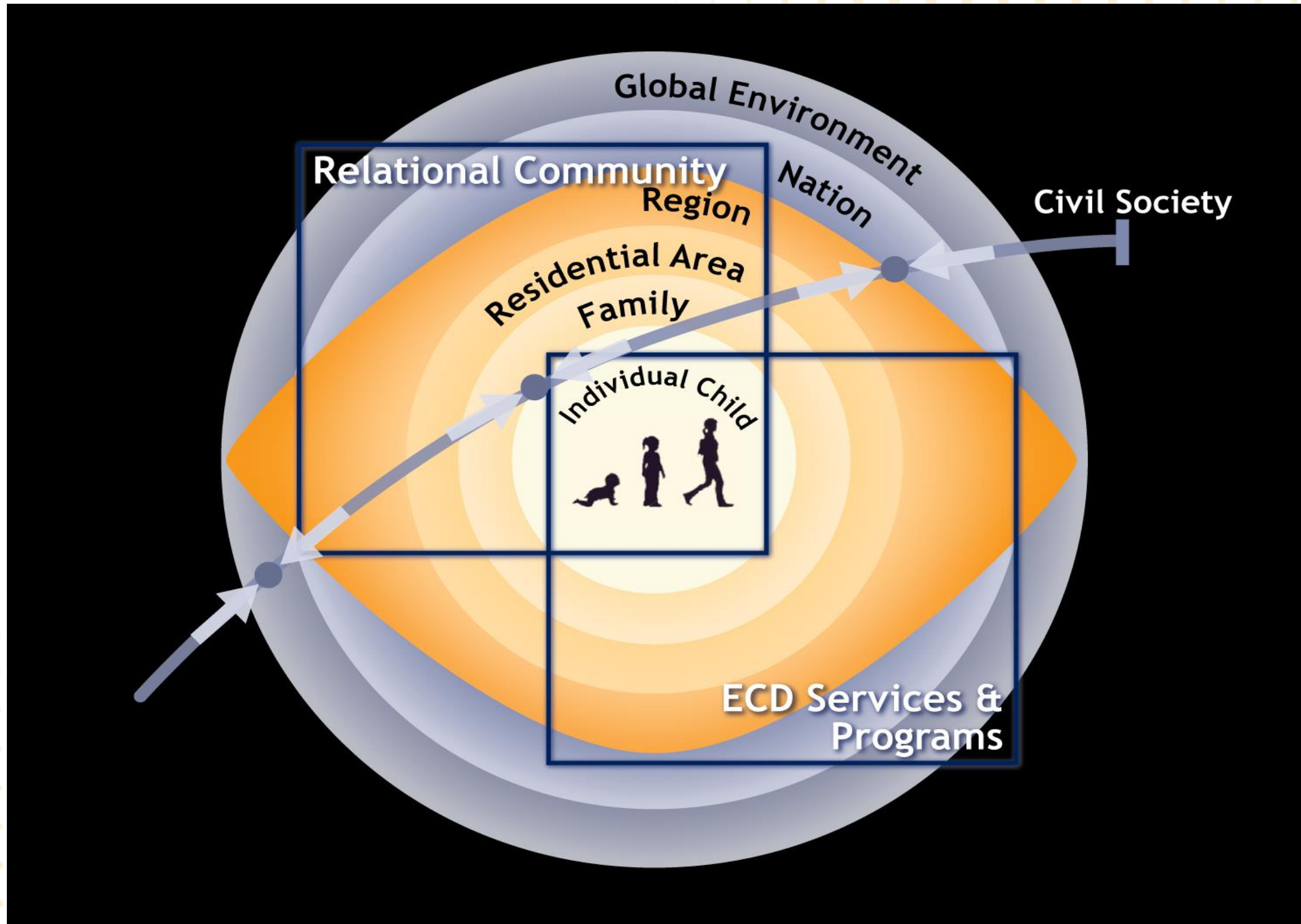


What Influences Early Child Development?

The experiences children have in
the environments where they grow
up, live and learn.

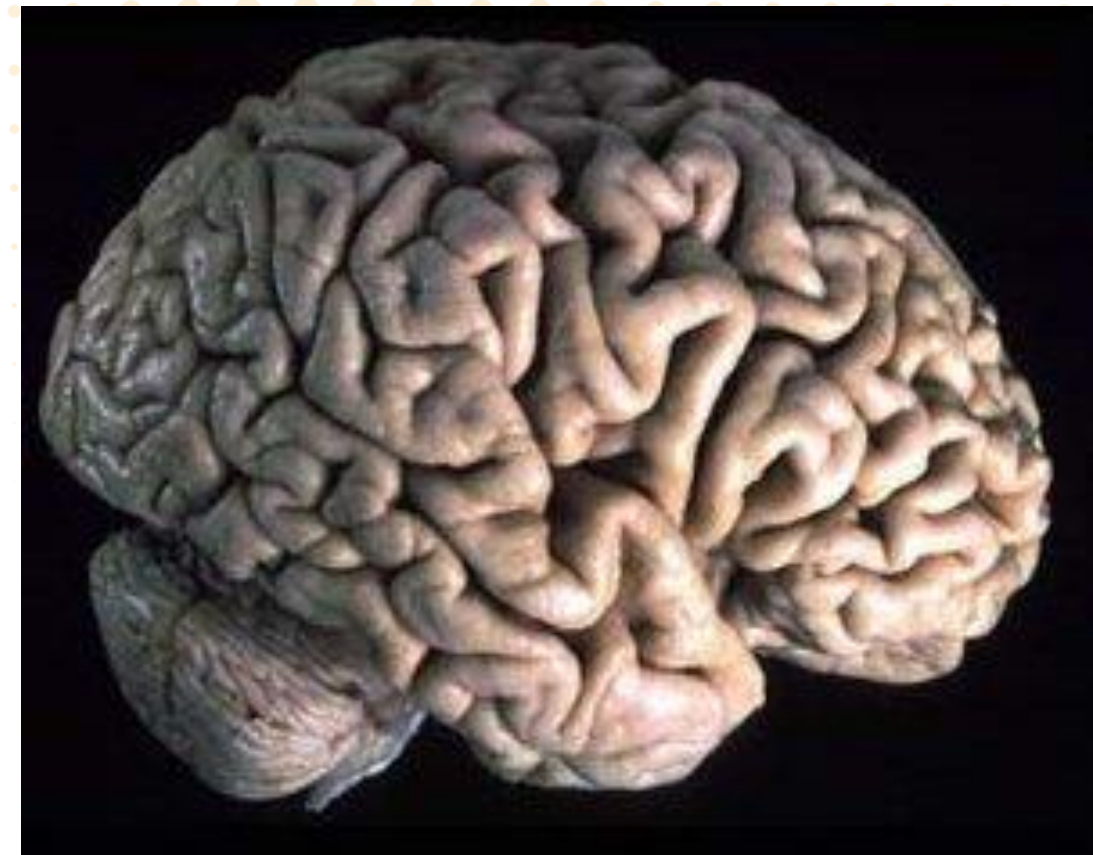


Which Environments Matter?





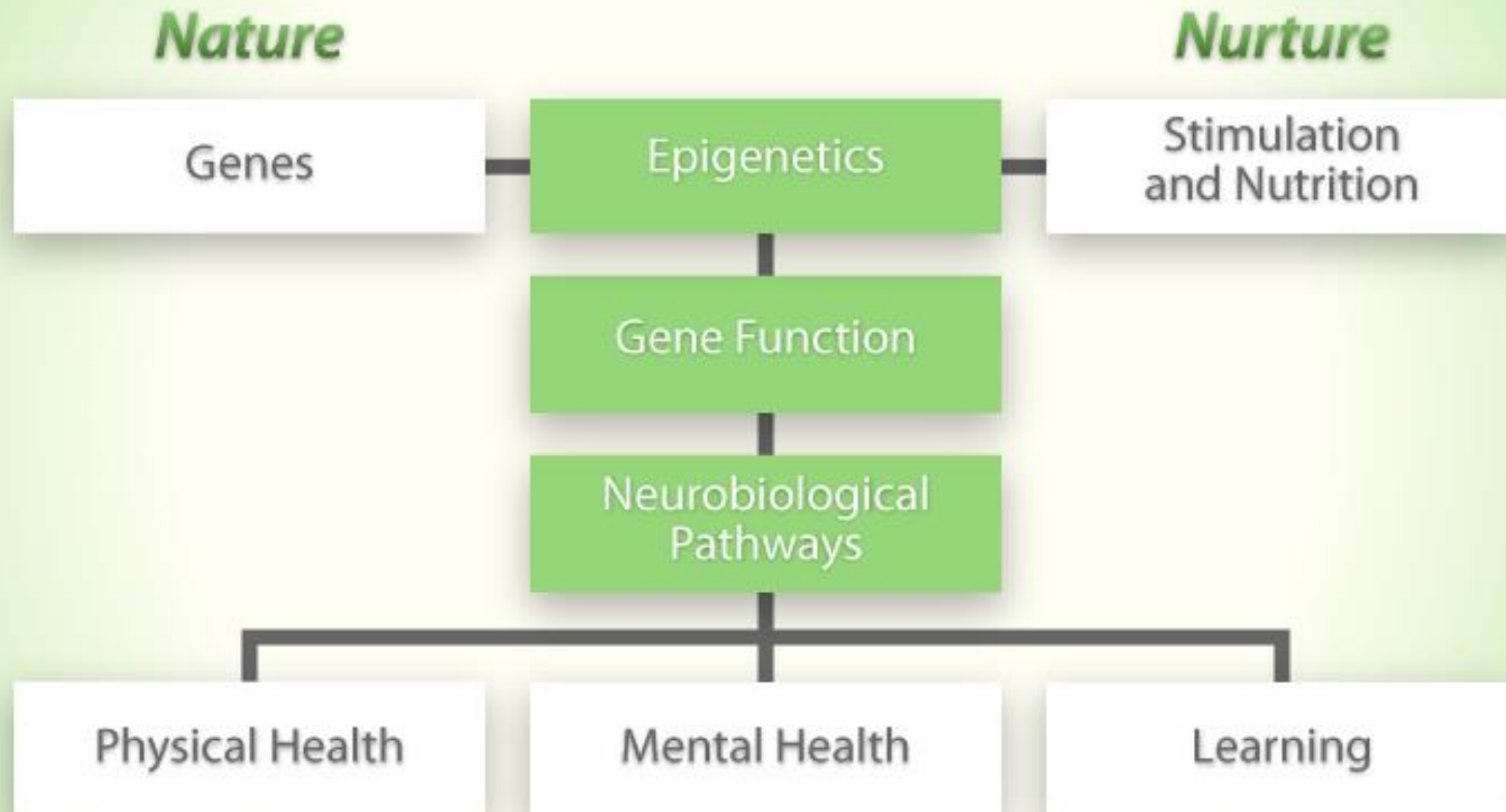
Time Magazine from the MEHRI Neuroscience lab



Watching the Brain Learn!!



Experience-Based Brain Development



Source: Fraser Mustard, Founder's Network, 2010

National Scientific Council on the Developing Child (2010). Early Experiences Can Alter Gene Expression and Affect Long-Term Development: Working Paper No. 10. Retrieved from www.developingchild.harvard.edu September 28, 2010.



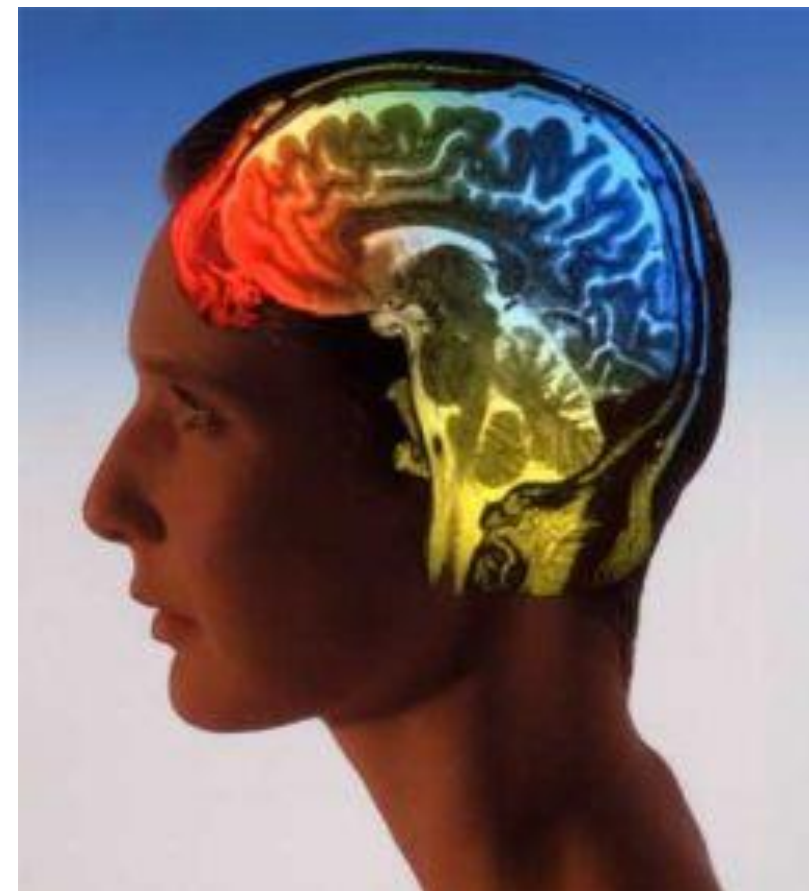
What is experience?

Everything that you encounter
both *pre- and postnatally* as
well as in adulthood...

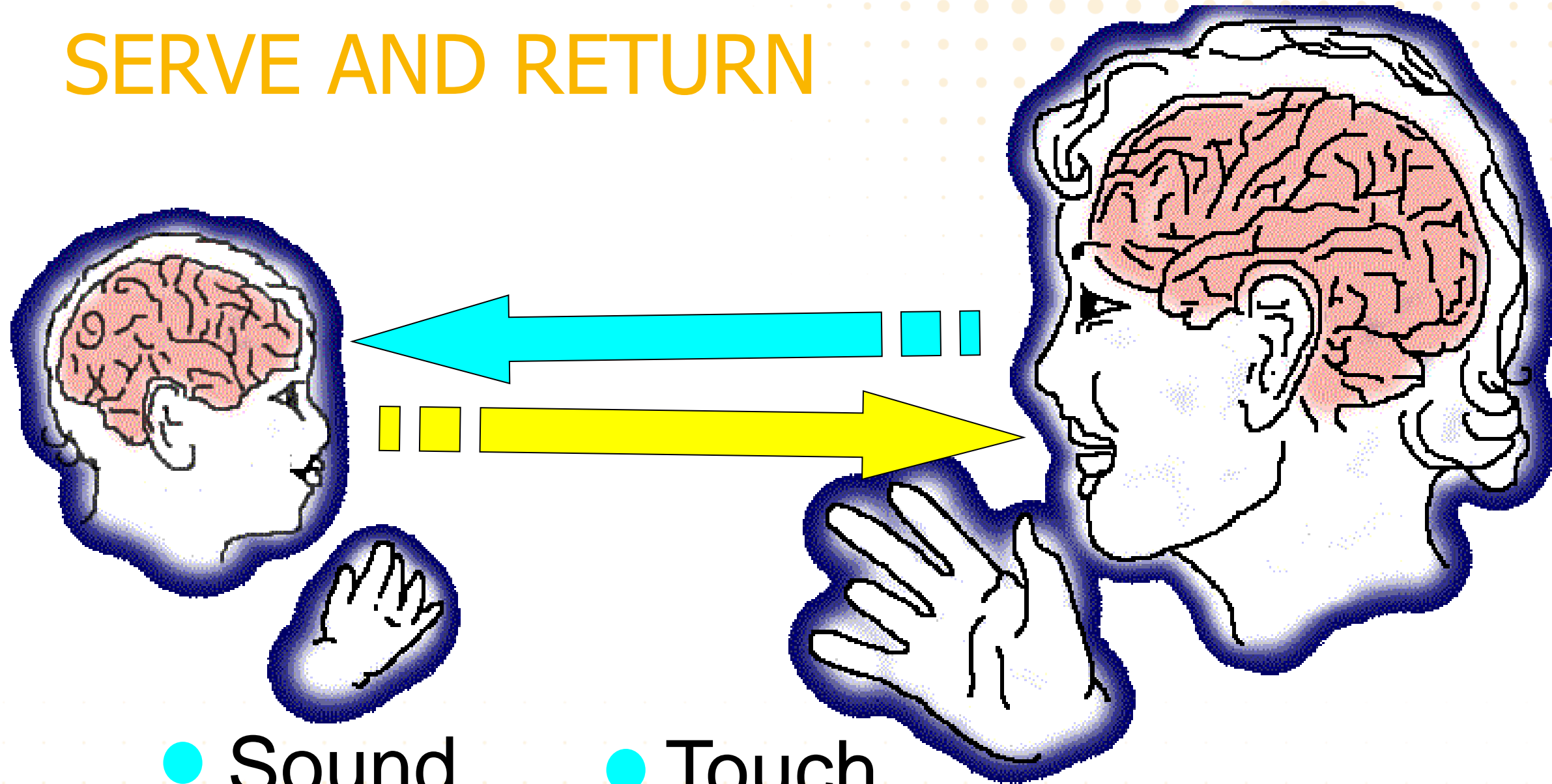
Examples: sounds, touch, light,
food, thoughts, drugs, injury,
disease...



Plasticity



SERVE AND RETURN



- Sound
- Vision
- Smell

- Touch
- Proprioception
- Taste

Concept also from Centre on the Developing Child at Harvard University

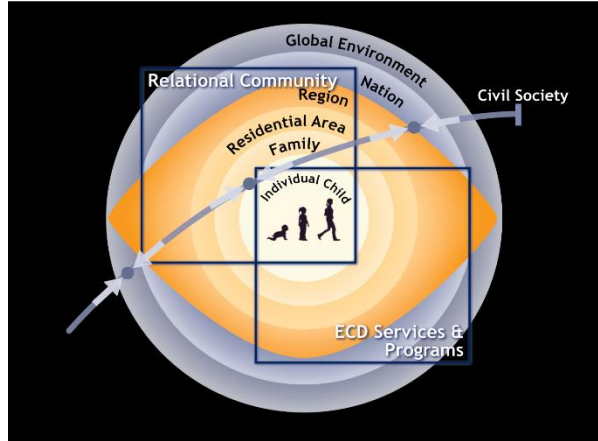


The early years of life matter

- because early experiences affect the architecture of the maturing brain.
- As it emerges, the quality of that architecture establishes either a sturdy or a fragile foundation for all of the development and behavior that follows ---

Schonkoff- Frameworks Institute





Childhood Mental Health Is...

The developing capacity of the child to:

- *form close and secure adult and peer relationships,*
- *experience, manage and express a full range of emotions*
- *explore the environment and learn –*

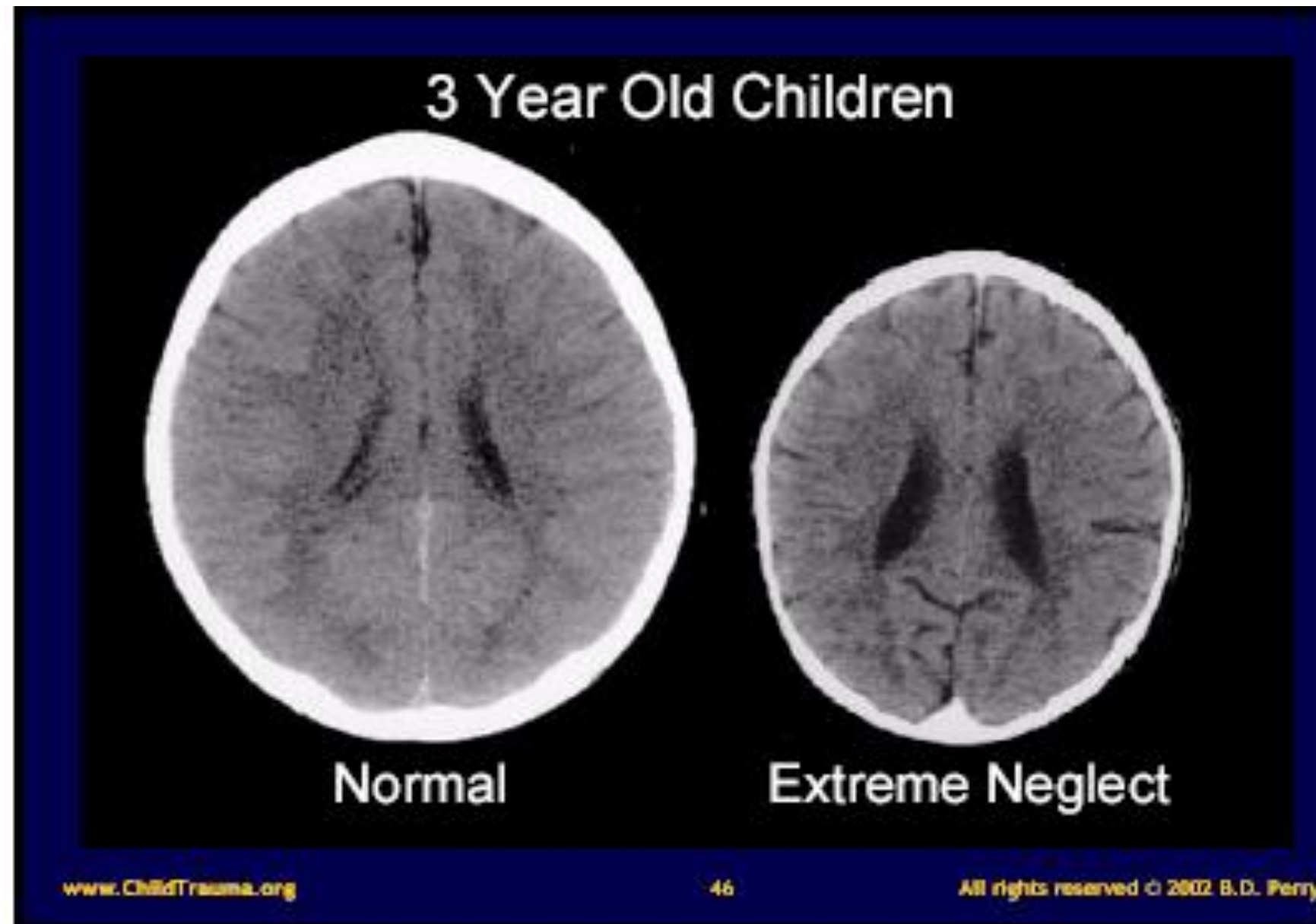
All in the context of family, community, and culture

Cohen, Oser & Quigley, 2012 Zero to Three



USE IT OR LOSE IT !

The more a system, or set of brain cells is activated, the more that system changes in response. The stronger the repetitions the stronger the memory.



What Does the EDI Measure?

Social
Competence

Emotional
Maturity

Language
& Cognitive

Physical Health
& Well-Being

Communication Skills





Australia: % vulnerable by SES

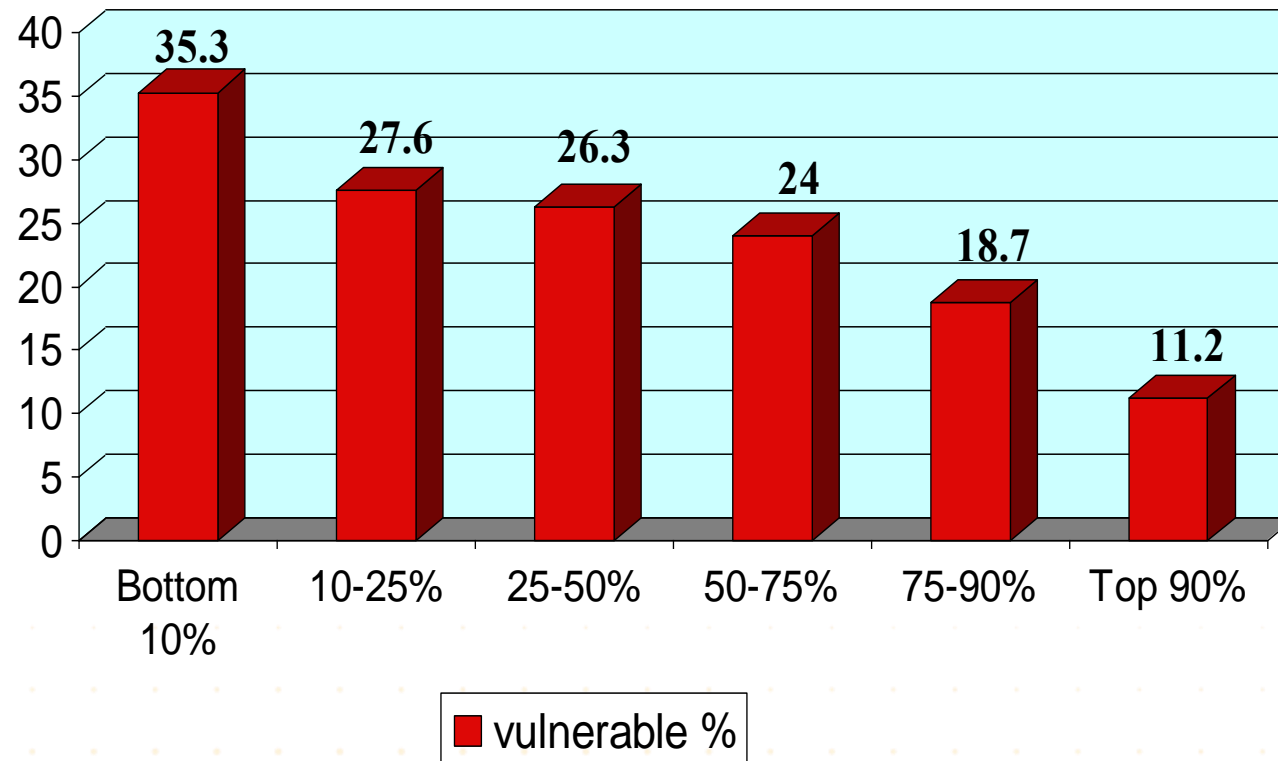
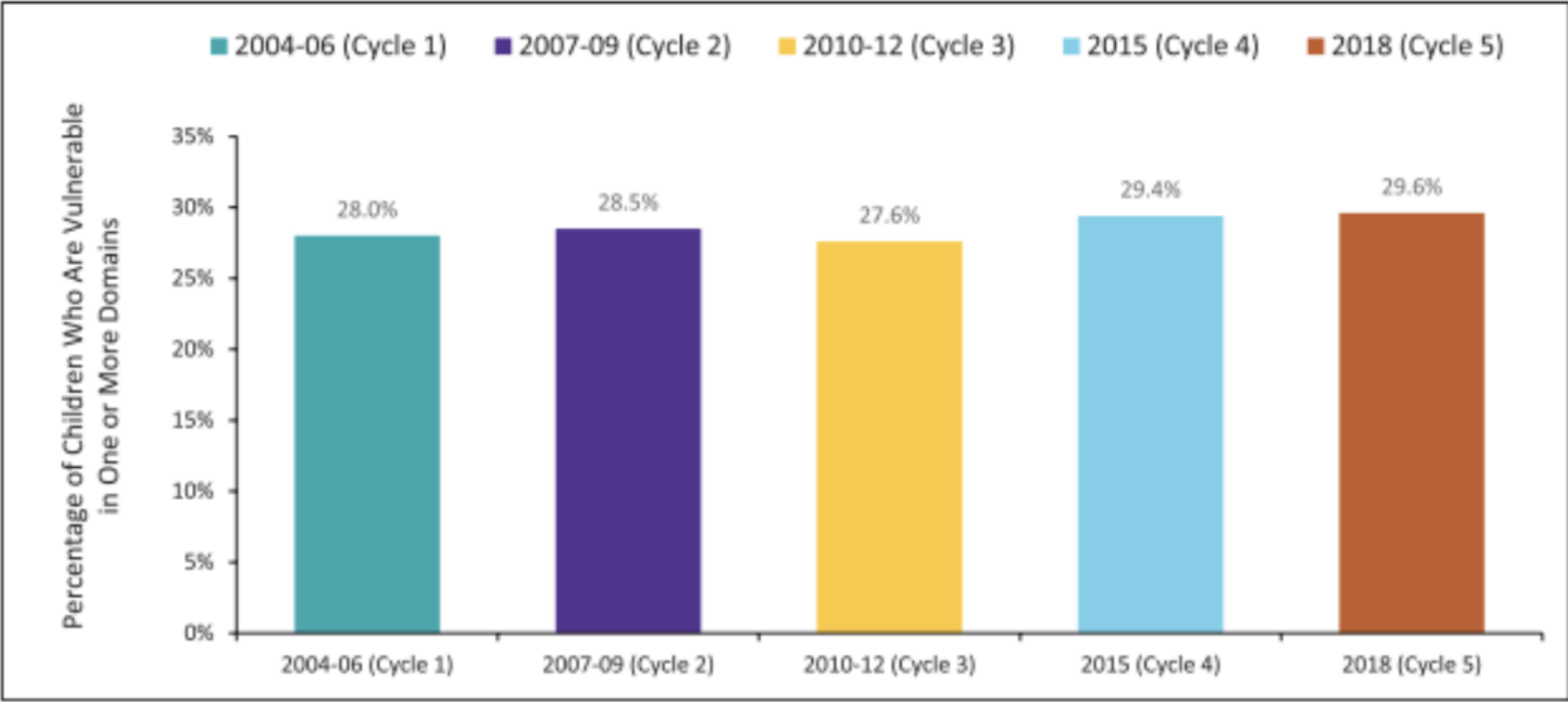


Figure 14: Percentage of Children Who Are Vulnerable in One or More EDI Domains, 2004-18



Data source: Offord Centre for Child Studies, McMaster University



Stressdon' t go NUTS

- Novelty,
- Unpredictability,
- Threat to the ego,
- Sense of loss of control

Dr Sonia Lupien Centre for Studies on Human Stress

<http://www.humanstress.ca/>



Stress Pathway and Health

Cortisol – Over Production

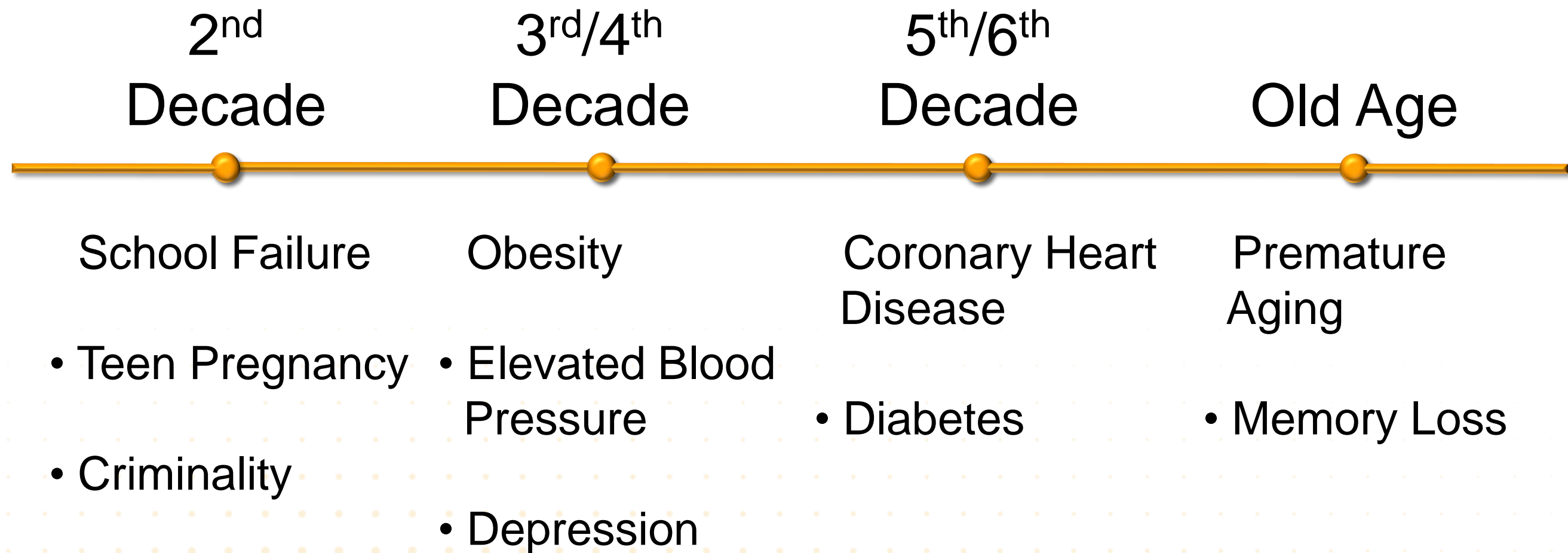
Behaviour, depression, type II diabetes, cardiovascular disease, memory, immune system function, drug and alcohol addiction

Cortisol – Under Production

Chronic fatigue syndrome, fibromyalgia, immune system (autoimmune disorders) rheumatoid arthritis, allergies, asthma



Life Course Problems Related to Early Life



The Impact of Toxic Stress

Poverty as an example



Poverty (and early adversity) is associated with lower cognitive readiness for school

- Attention skills-sustaining attention and following instructions
- Language skills (vocabulary and grammatical understanding)
- Memory skills, (Working memory and memory)

Karen Bierman, Ph.D. Penn State University



The Long Reach of Early Childhood

- The longer children lived in poverty, the higher the measured stress load and lower score on working memory tests
- A plausible contributor to the income-achievement gap is working memory impairment in lower- income adults caused by stress-related damage to the brain during childhood”

Evans and Schamberg PNAS 2009



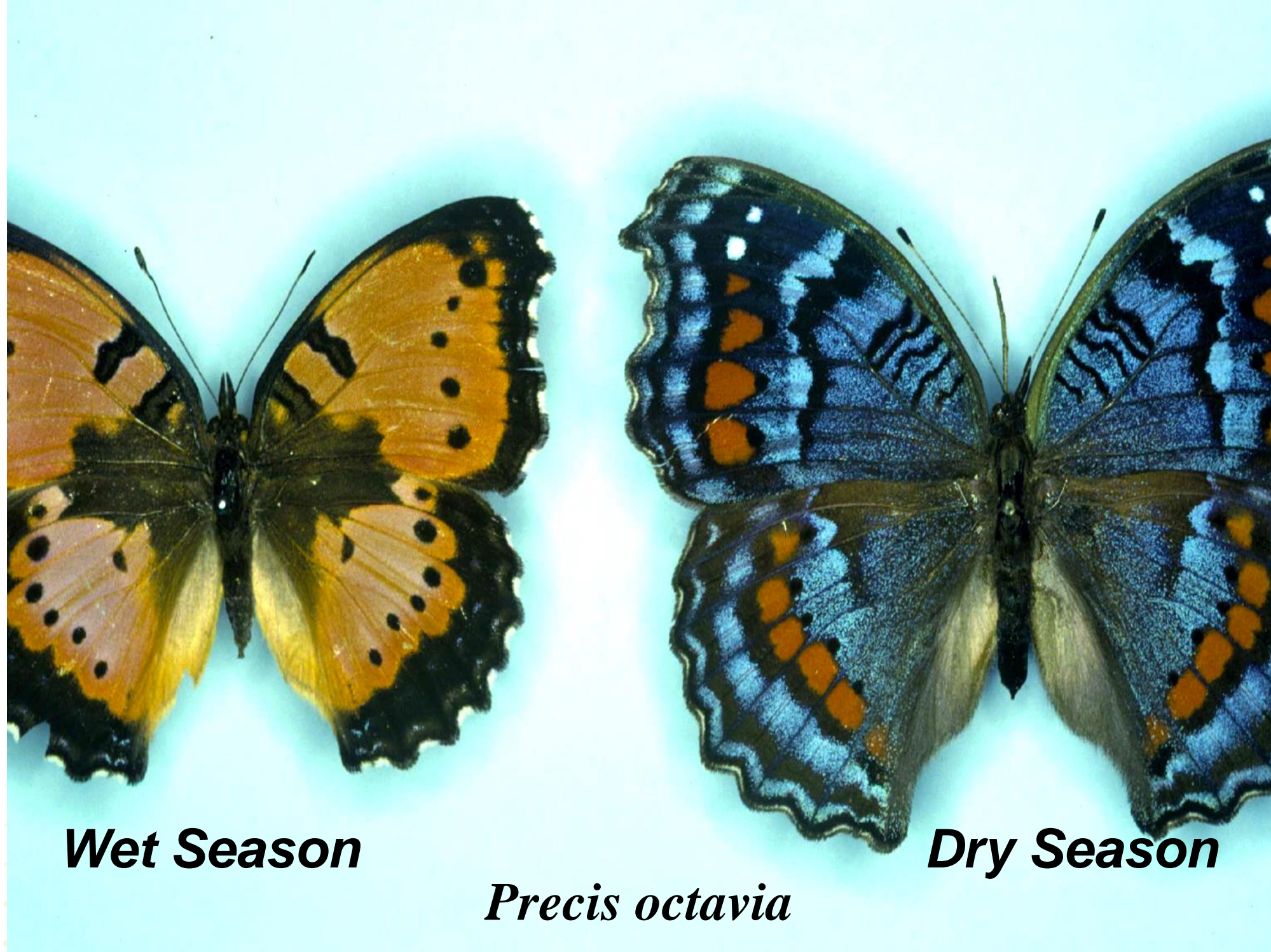
Biological Embedding

Biological embedding occurs when...

- experience gets under the skin and alters human bio-development;
- systematic differences in experience in different social environments lead to different bio-developmental states;
- the differences are stable and long-term; they influence health, well-being, learning, and/or behaviour over the life course.





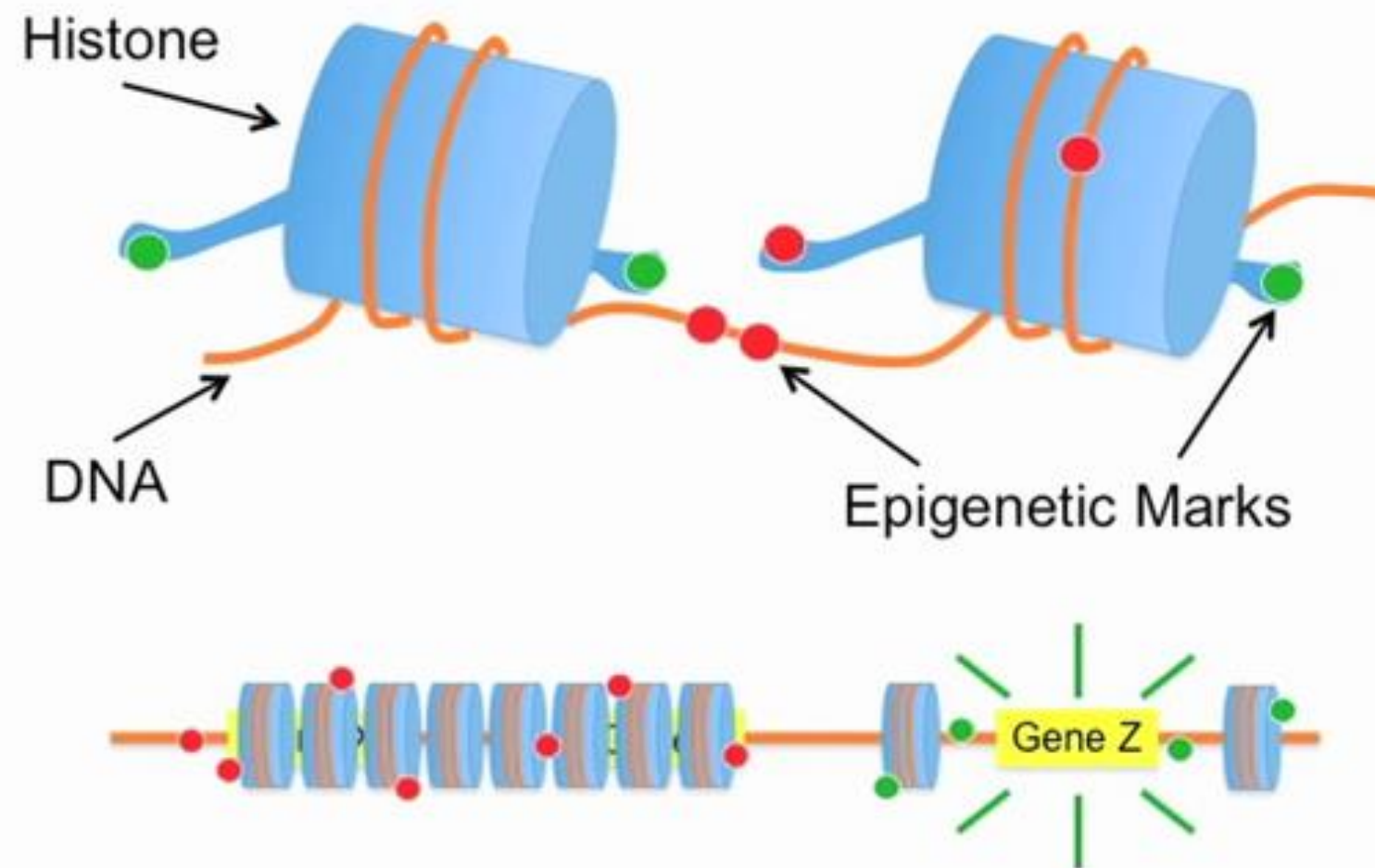


Wet Season

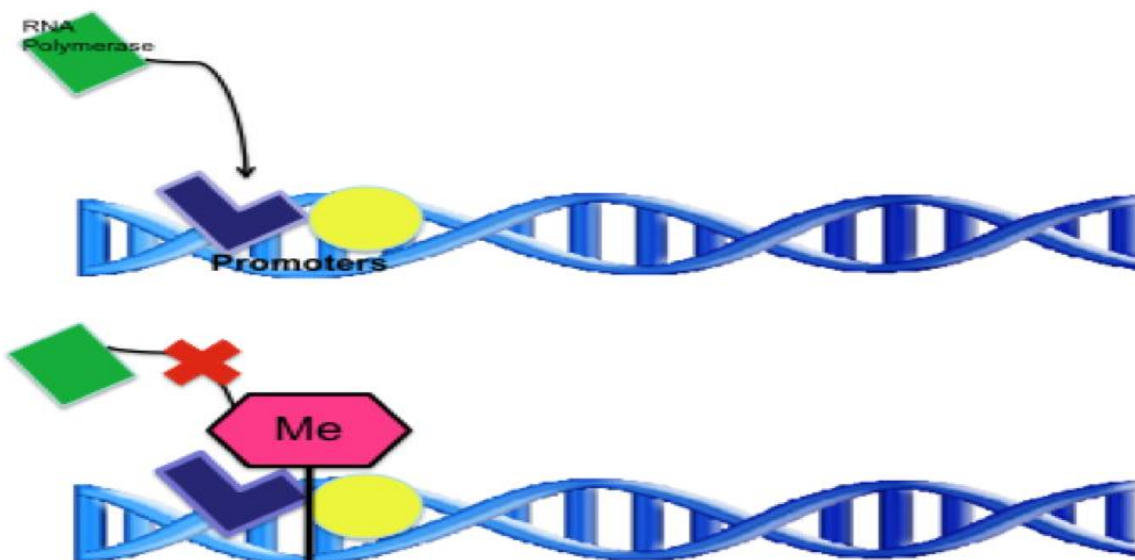
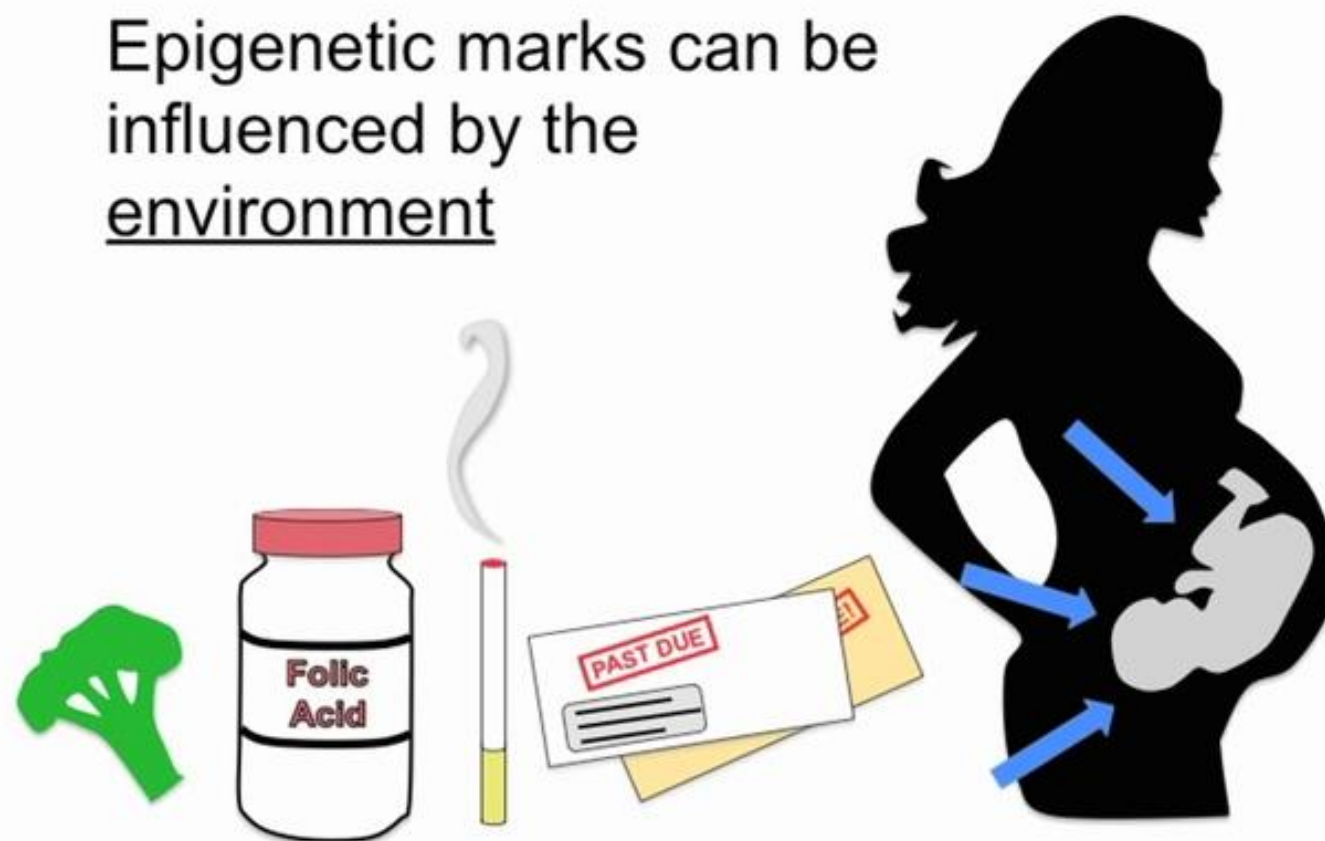
Precis octavia

Dry Season

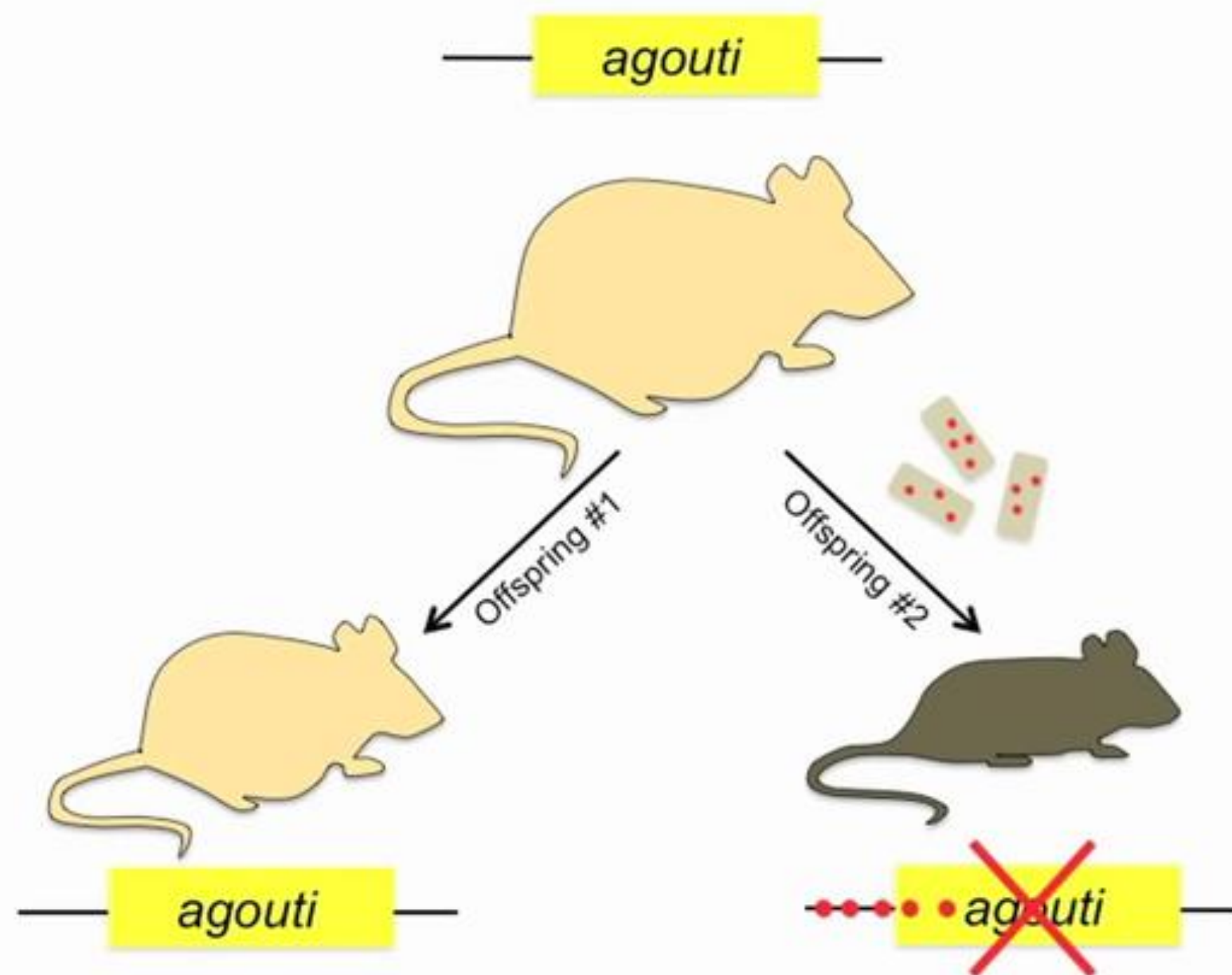
Chromatin



Epigenetic marks can be
influenced by the
environment







Waterland and Jirtle, 2003, *Mol. Cell. Biol.* 23: 5293-5300



Agouti “Twin” Sisters



What's new about this?

It does not only occur during basic fetal development, when cells are specializing.....it can continue after birth and be influenced by the broader environment!



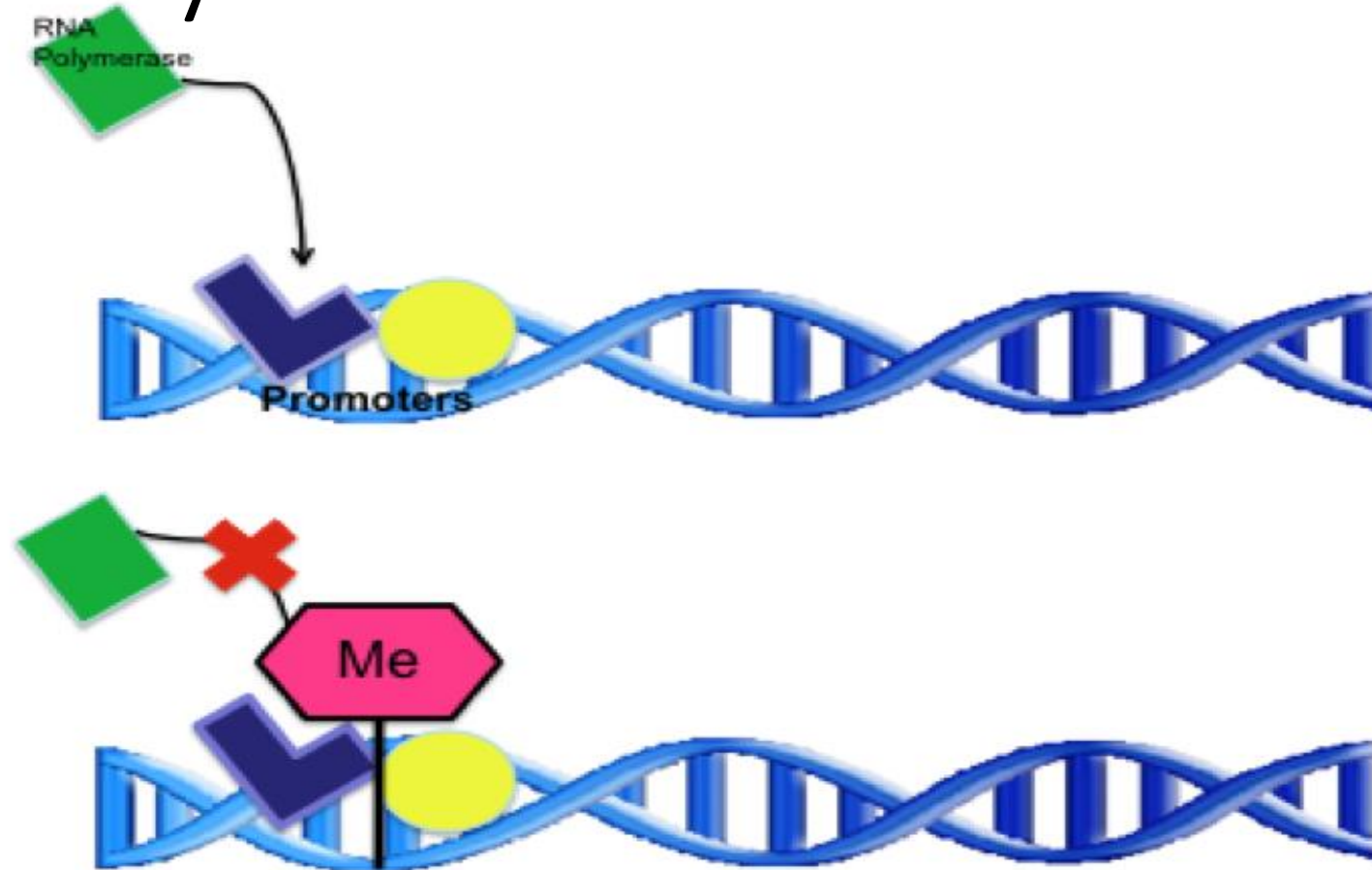
Parents change us too...



Epigenetics

Is any process that can alter gene activity without changing the DNA sequence.

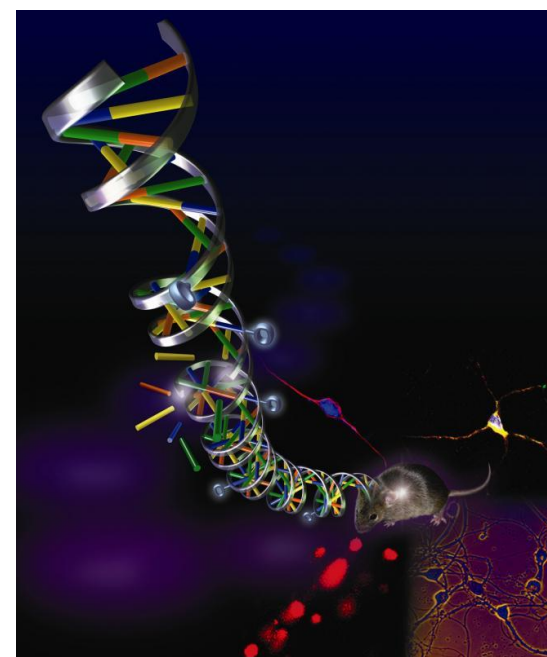
Methylation



Dr R Gibb U of Lethbridge



Epigenetics?



DNA Is Not Destiny

The new science of epigenetics rewrites the rules of disease, heredity, and identity.



GO BPA FREE™
BABY BOTTLE SAMPLER





Epigenetics of touch

Science News

from research organizations

Holding infants -- or not -- can leave traces on their genes

Amount of close and comforting contact from caregivers changes children's molecular profile

Date: November 27, 2017

Source: University of British Columbia

Summary: The amount of physical contact between infants and their caregivers can affect children at the molecular level. The study of DNA methylation patterns showed that children who had been more distressed as infants and had received less physical contact had a molecular profile that was underdeveloped for their age. This is the first study to show in humans that the simple act of touching, early in life, has deeply-rooted and potentially lifelong consequences on genetic expression.



[Article](#)[Supplementary materials](#)[Metrics](#)

Volume 29, Special Issue 5 (Biological and Behavioral Effects of Early Adversity on Multiple Levels of Development)

December 2017 , pp. 1517-1538

Cited by **10**

[Get access](#)

Epigenetic correlates of neonatal contact in humans

Sarah R. Moore ^(a1) ^(a2), Lisa M. McEwen ^(a1) ^(a2), Jill Quirt ^(a1), Alex Morin ^(a1) ... [+](#)

<https://doi.org/10.1017/S0954579417001213> Published online: 22 November 2017

Abstract

Animal models of early postnatal mother–infant interactions have highlighted the importance of tactile contact for biobehavioral outcomes via the modification of DNA methylation (DNAm). The role of normative variation in contact in early human development has yet to be explored. In an effort to translate the animal work on tactile contact to humans, we applied a naturalistic daily diary strategy to assess the link between maternal contact with infants and epigenetic signatures in children 4–5 years later, with respect to multiple levels of child-level factors, including genetic variation and infant distress. We first investigated DNAm at four candidate genes: the glucocorticoid receptor gene, nuclear receptor subfamily 3, group C, member 1 (*NR3C1*), μ -opioid receptor M1 (*OPRM1*) and oxytocin receptor (*OXTR*; related to the neurobiology of social bonds), and brain-derived neurotrophic factor (*BDNF*; involved in postnatal plasticity). Although no candidate gene DNAm sites significantly associated with early postnatal contact, when we next examined DNAm across the genome, differentially methylated regions were identified between high and low contact groups. Using a different application of epigenomic information, we also quantified epigenetic age, and report that for infants who received low contact from caregivers, greater infant distress was associated with younger epigenetic age. These results suggested that early postnatal contact has lasting associations with child biology.



What are the Adverse Childhood Experiences?

- ◆ Emotional abuse
- ◆ Physical abuse
- ◆ Sexual abuse
- ◆ Emotional neglect
- ◆ Physical neglect
- ◆ Mother treated violently
- ◆ Household use of drugs or alcohol
- ◆ Household mental illness
- ◆ Parental Separation or Divorce
- ◆ Incarcerated household member



The three types of ACEs include

ABUSE



Physical



Emotional



Sexual

NEGLECT



Physical

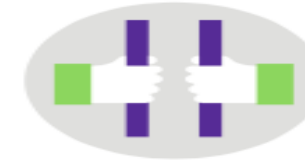


Emotional

HOUSEHOLD DYSFUNCTION



Mental Illness



Incarcerated Relative



Mother treated violently



Substance Abuse



Divorce

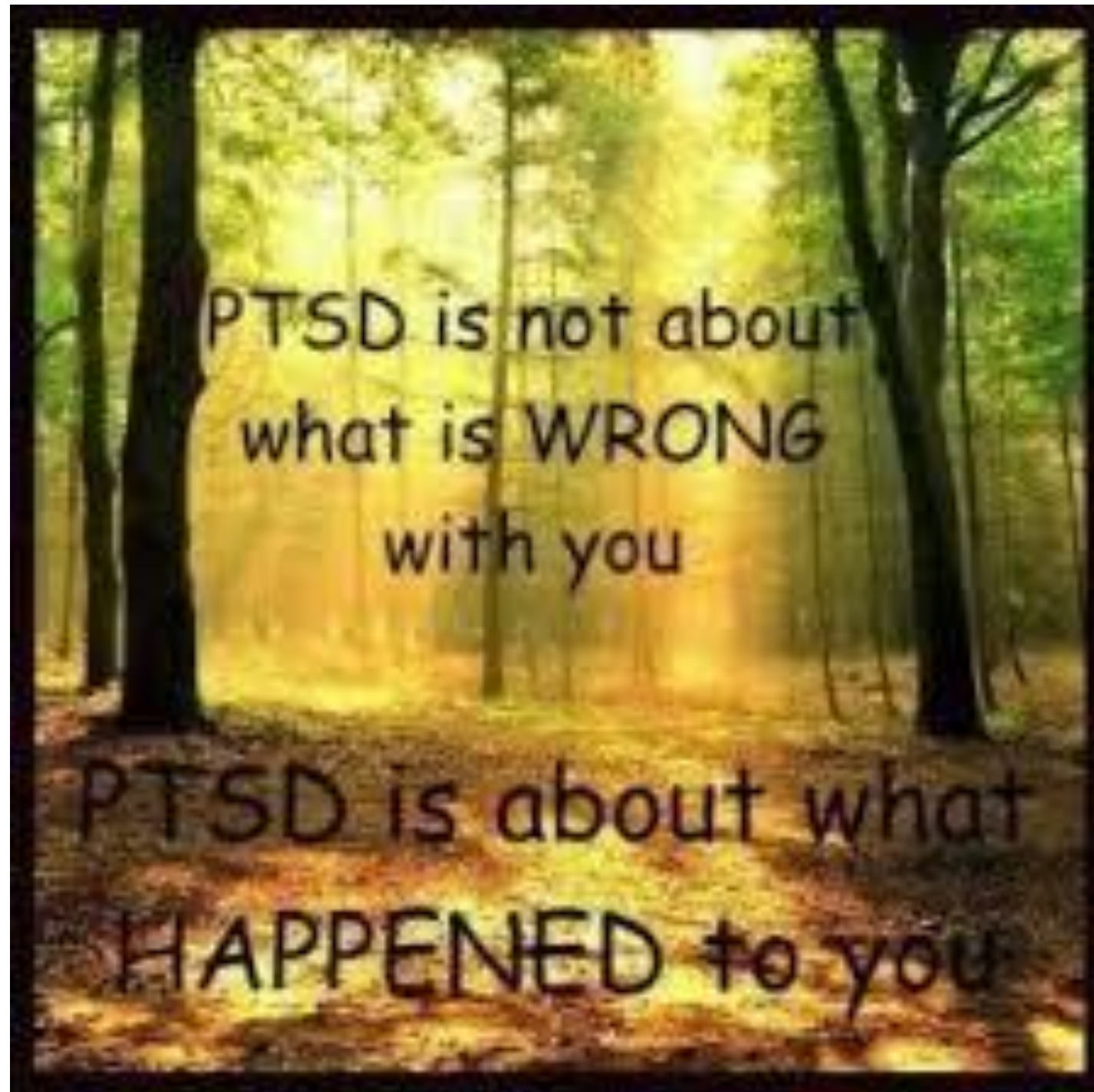
Types of Adverse Childhood Experiences
Image courtesy of the Robert Wood Johnson Foundation



A PERSON WITH 4 OR MORE ACES IS:

- 5.13 times as likely to suffer from depression
- 2.42 times as likely to have chronic obstructive pulmonary disease (COPD)
- 2.93 times as likely to smoke
- 3.23 times as likely to binge drink





Changing the fundamental question
from “**What’s wrong with you?**”
to “**What happened to you?**”



Parenting Stress and Ace's

- Maternal report of exposure to ACEs during childhood is significantly associated with parental stress, even after controlling for poverty and being at-risk (i.e., clinical sample).
- As John Bowlby (1951) never hesitated to suggest: “a society that values its children must cherish their parents”



Strategic Insight

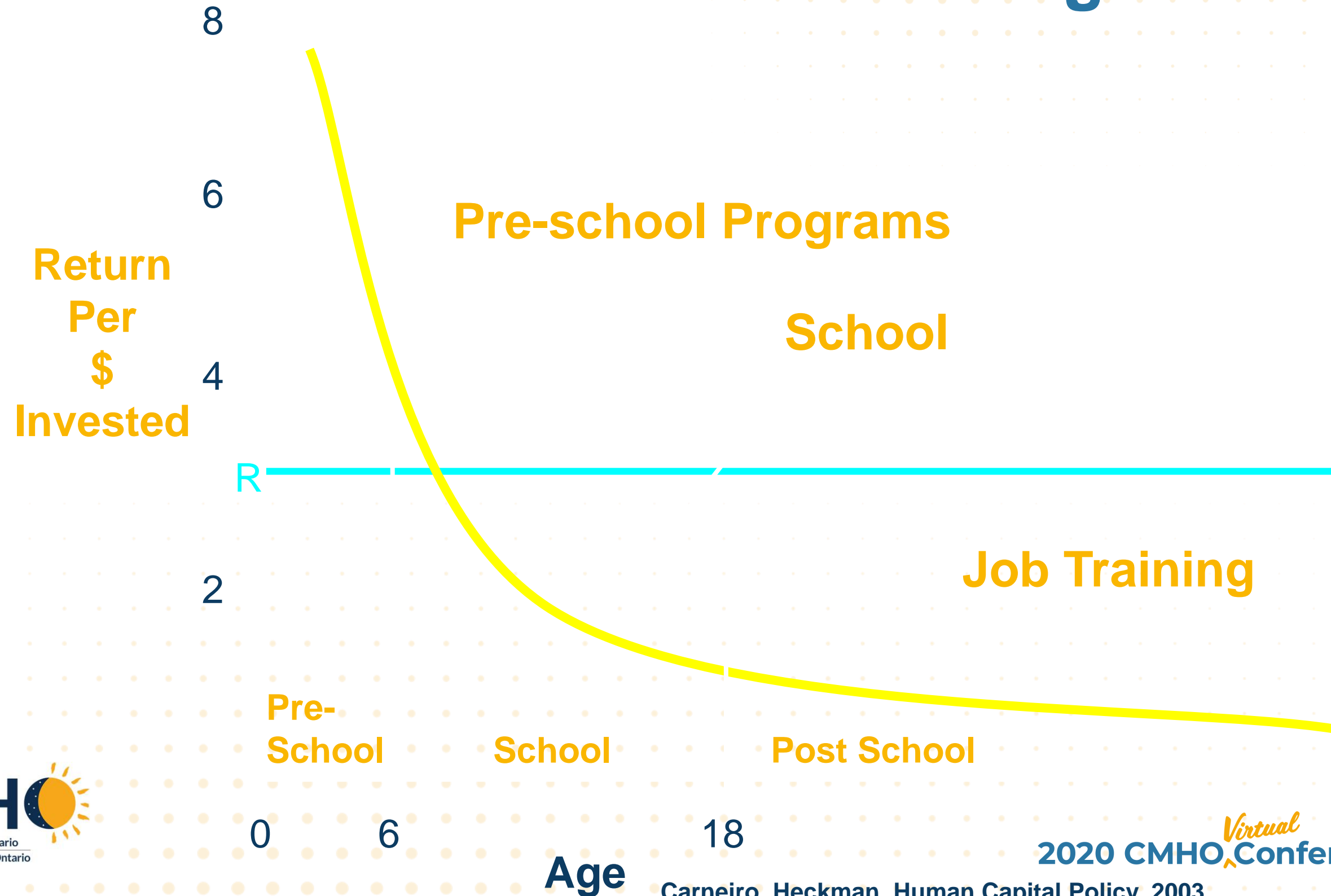
The burden of mental health problems and early criminality will be driven by the level of vulnerability in social-emotional development in the early years.

Thus, our strategy should focus on reducing vulnerability early in life.

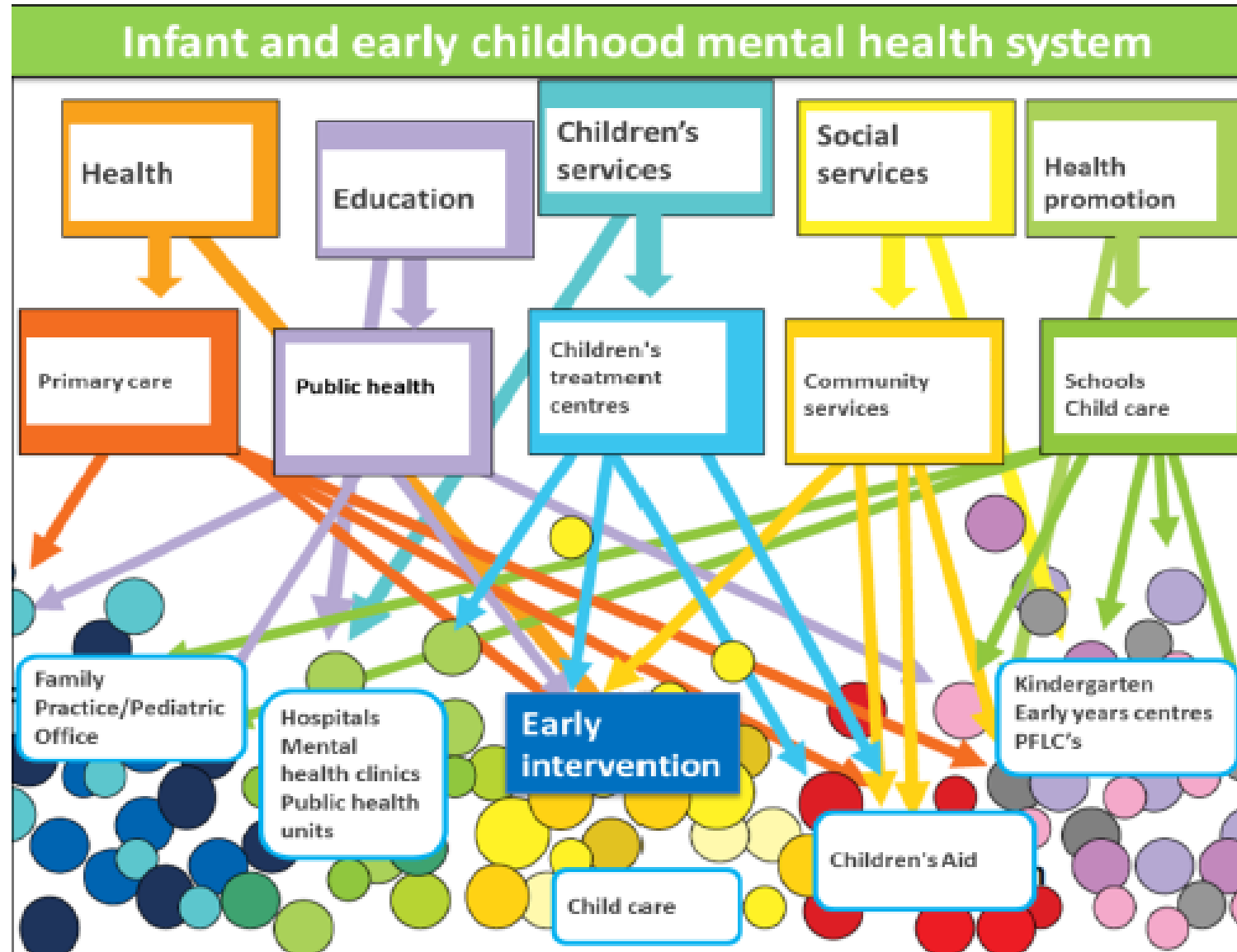


Rates of Return to Human Development Investment Across all Ages

03-074



Current System

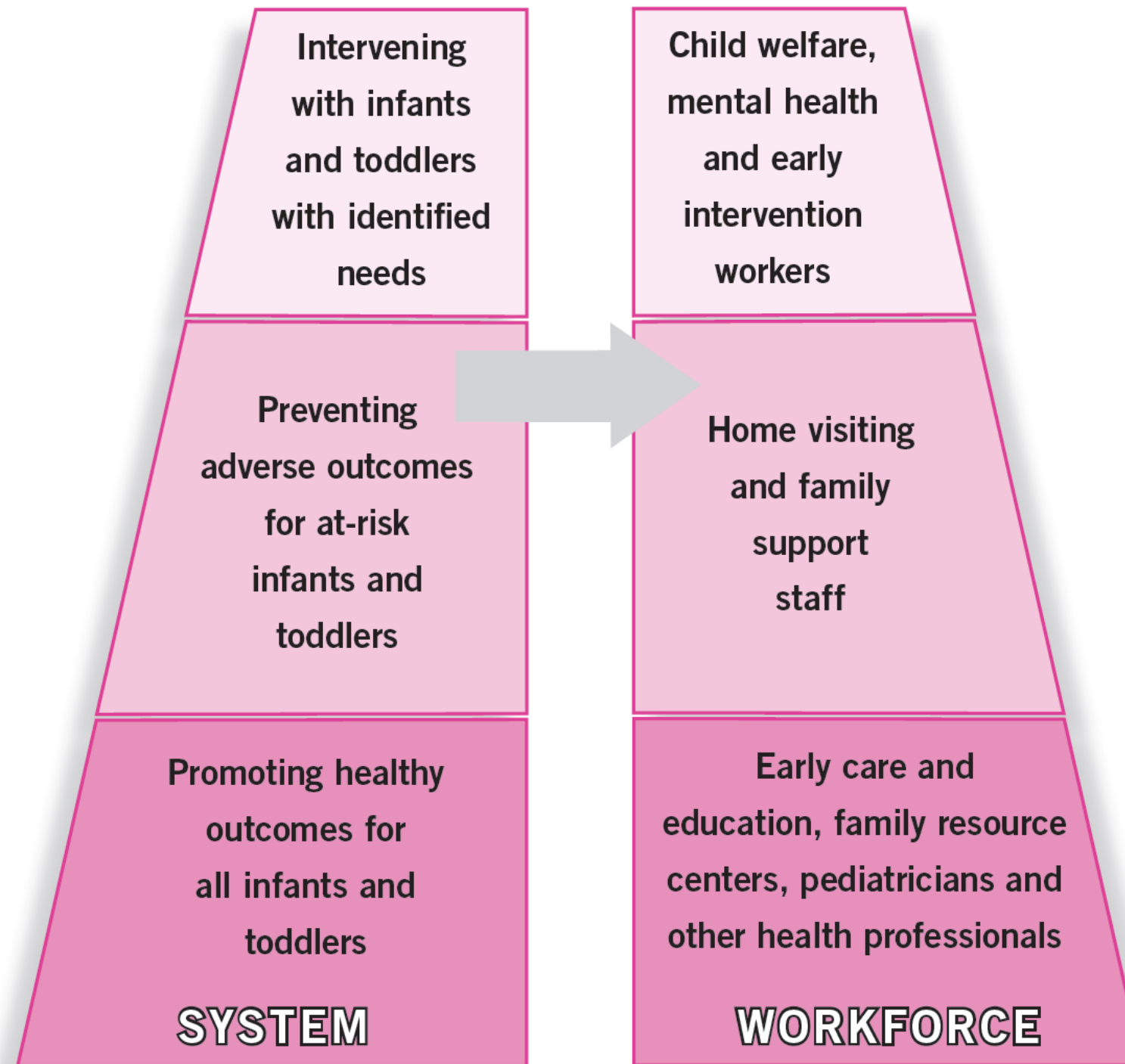


Ontario Centre of Excellence
for Child and Youth
Mental Health
Bringing People and Knowledge Together to Strengthen Care.

November 2014

Investing in the mental health of children under 6





What the WHO Commission recommended

Commit to and implement a comprehensive approach to early life, building on existing child survival programs and extending interventions in early life to include social/emotional & language/cognitive development.



Virtual
2020 CMHO Conference
**Innovating and Advancing Child
and Youth Mental Health**
November 23 to December 4

Sponsored by



Ontario Centre of Excellence
for Child & Youth Mental Health

Centre d'excellence de l'Ontario en santé
mentale des enfants et des adolescents

