The Life Course Model: Embodying Inequity

Prevention Hub

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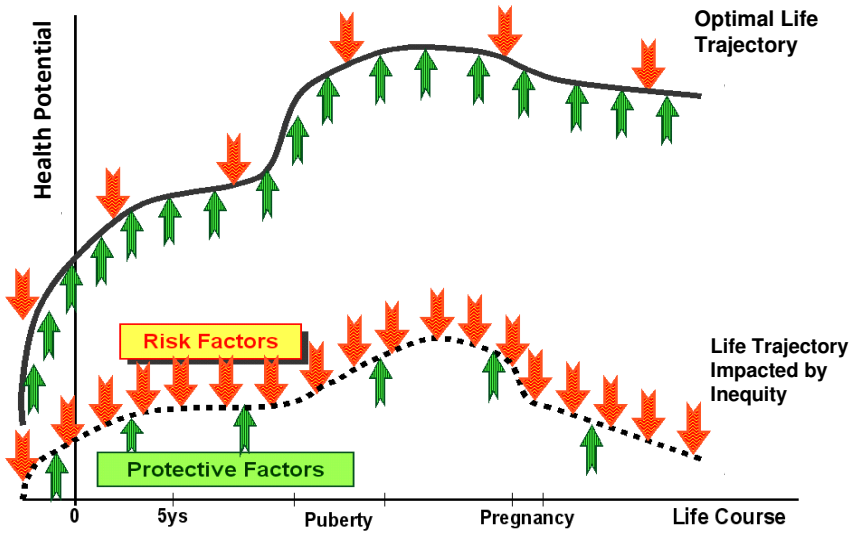
Life Course Framework

- Combines a focus on health equity and social determinants with an updated understanding of how biology and environment interact.
- Life course theory offers an understanding of how health develops over a lifetime and across generations.

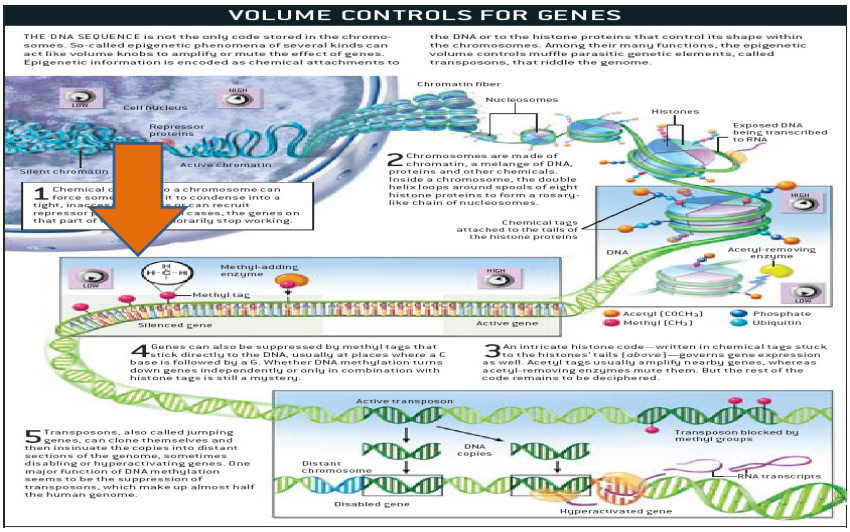
Life Course Concepts

- Early Programming
- Critical or Sensitive Periods
- Cumulative Impact/Weathering

Life Course Perspective



Epigenetics



Gibbs WW. The Unseen Genome: Beyond DNA. Scientific American 2003

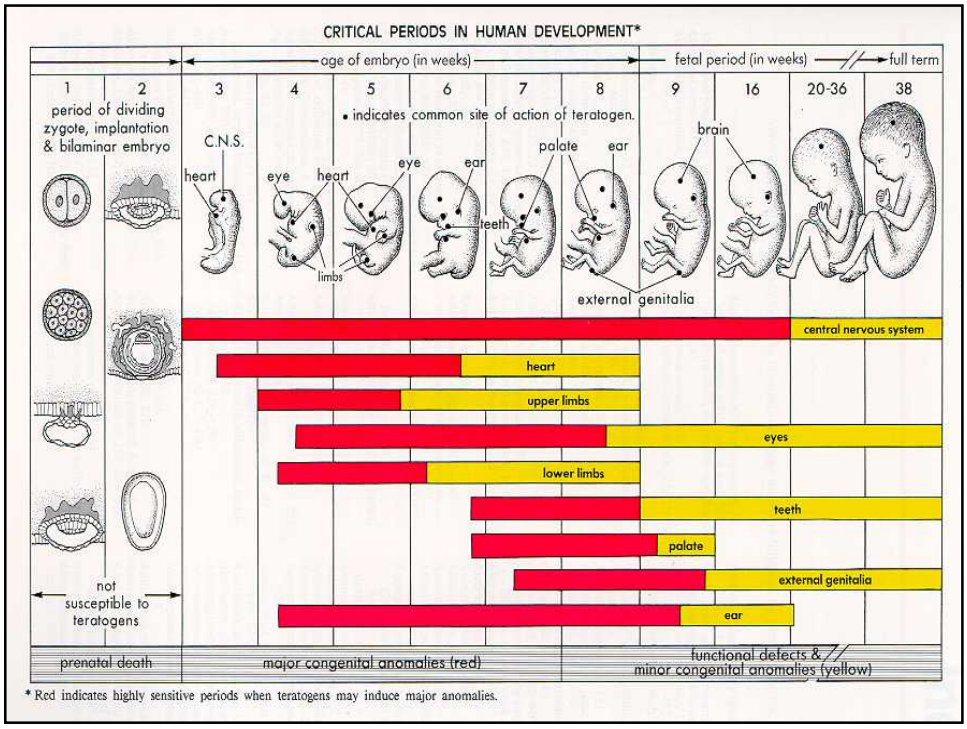
EPIGENETICS

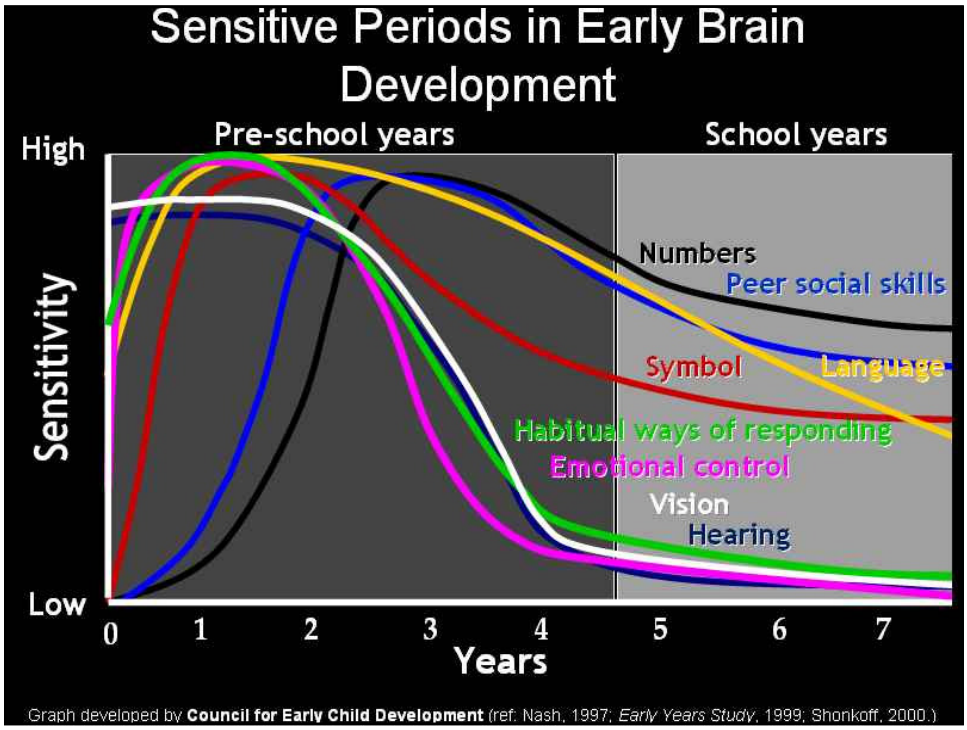
Same Genome, Different Epigenome

R.A. Waterland, R.A. Jirtle, "Transposable elements: targets for early nutritional effects on epigenetic gene regulation," *Mol Cell Biol*, 23:5293-300, 2003. Reprinted in the New Scientist 2004

Critical/Sensitive Periods

A critical period is a time during an organism's life span when it is more sensitive to environmental influences or stimulation than at other times during its life.

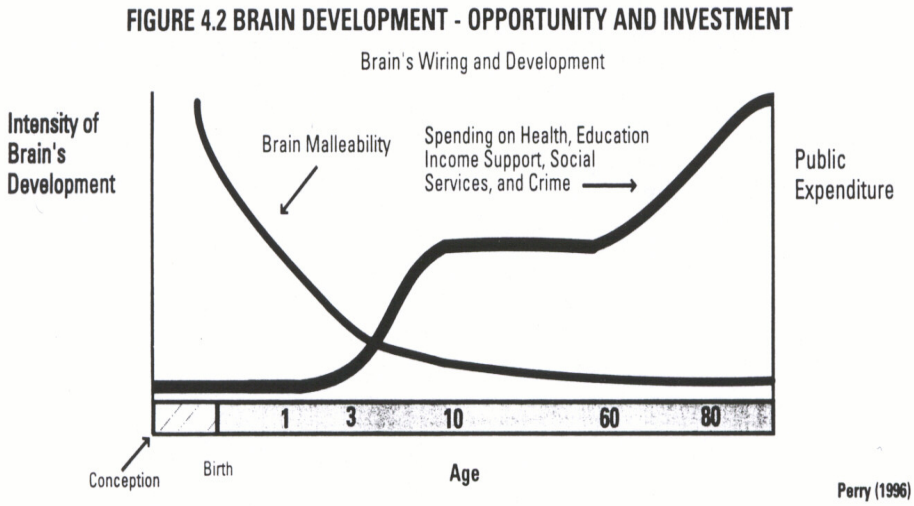

CRITICAL PERIODS IN HUMAN DEVELOPMENT*
age of embryo (in weeks)
fetal period (in weeks)
full term
1
2
3
4
5
6
7
8
9
16
20-36
38
period of dividing zygote, implantation & bilaminar embryo
• indicates common site of action of teratogen.
C.N.S.
heart
eye
heart
eye
ear
teeth
limbs
palate
ear
brain
external genitalia
central nervous system
heart
upper limbs
eyes
lower limbs
teeth
palate
external genitalia
ear
not susceptible to teratogens
prenatal death
major congenital anomalies (red)
functional defects & minor congenital anomalies (yellow)
* Red indicates highly sensitive periods when teratogens may induce major anomalies.


Sensitive Periods in Early Brain Development
Pre-school years
School years
High
Low
Sensitivity
Numbers
Peer social skills
Symbol
Language
Habitual ways of responding
Emotional control
Vision
Hearing
0
1
2
3
4
5
6
7
Years
Graph developed by Council for Early Child Development (ref: Nash, 1997; Early Years Study, 1999; Shonkoff, 2000.)

Critical Periods in Adolescence

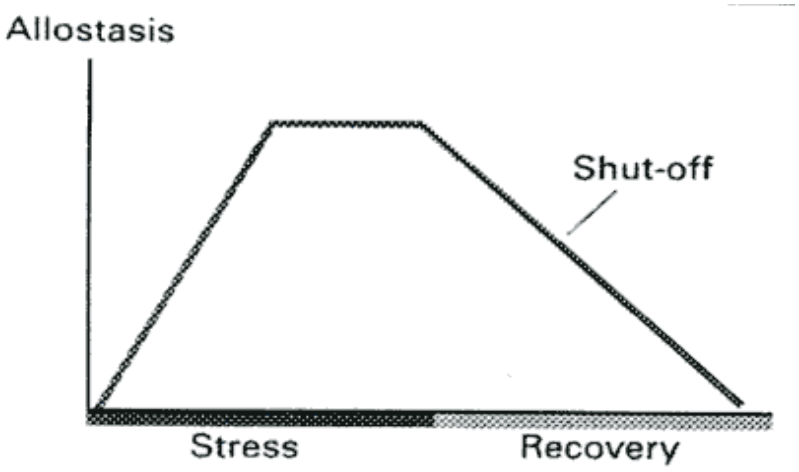
- **Physical Transformation**
  - Parts of brain associated with complex thinking, judging, organizing, and planning still under construction.
  - Physical Growth
- **Psychological and Social Transformation**
  - Spiritual development
  - Development of identity
  - Development of capacity for social and intimate relationships

Too Much, Too Late?

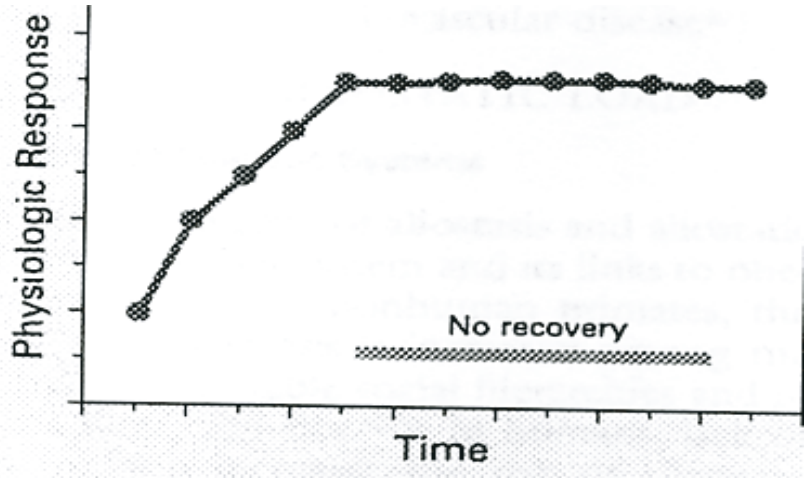


Cumulative Pathways

Allostasis



Allostatic Load



Consequences of Chronic Stress

Stressed	Stressed Out
Increased cardiac output	Hypertension and cardiovascular diseases
Increased available glucose	Glucose intolerance & insulin resistance
Enhanced immune functions	Infection & inflammation
Improved brain response and function	Short term memory loss and cognitive impairments

Effects of Stress

- **Physiological Stress**
- **Unhealthy Coping Mechanisms**

  Alcohol Overeating

  Smoking Drug Use

  Risky Sexual Behavior

What is the ACE study?

- Conducted at Kaiser from 1995-1997.
- More than 17,000 participants had a standardized physical exam and completed a confidential survey.
- Survey assessed childhood maltreatment and family dysfunction as well as current health status and behaviors.

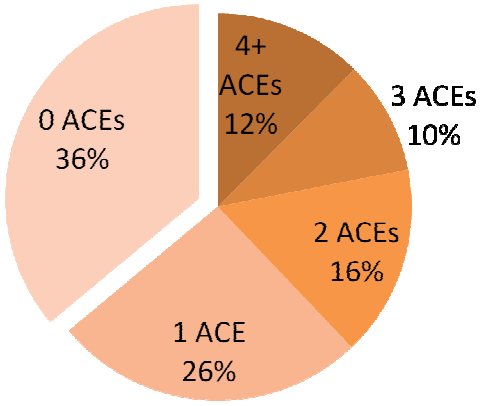
ACEs are Adverse Childhood Experiences

Abuse	Neglect	Household Dysfunction	
Physical	Physical	Mental Illness	Incarcerated Relative
Emotional	Emotional	Mother Treated Violently	Substance Abuse
Sexual		Divorce	

Prevalence of ACEs

Sexual Abuse 28%	**Emotional Neglect 15%**
Household Substance Abuse 27%	**Mother Treated Violently 13%**
Parental Divorce 23%	**Emotional Abuse 11%**
Physical Abuse 21%	**Physical Neglect 10%**
Household Mental Illness 19%	**Family Member in Jail 5%**

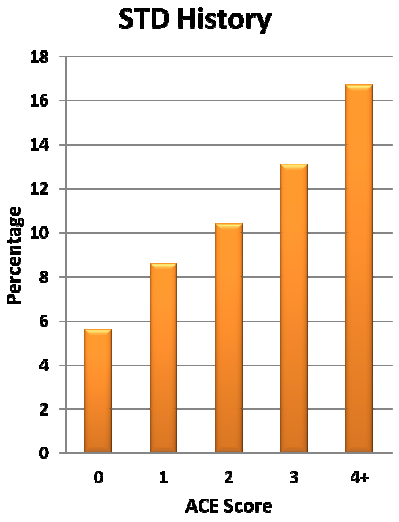
Number of ACEs in Study Population

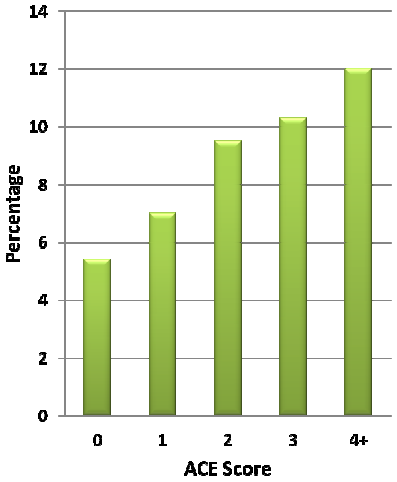


Major Findings

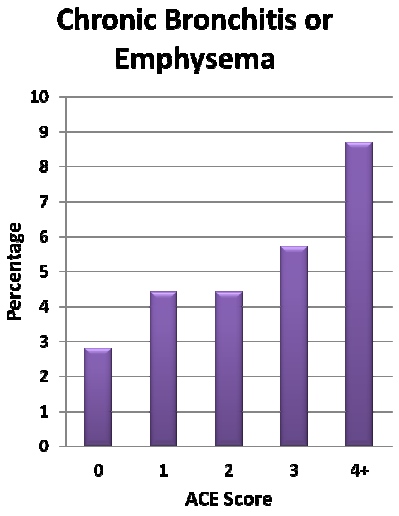
- Alcoholism and alcohol abuse
- Chronic obstructive pulmonary disease
- Depression
- Fetal death
- Poor health-related quality of life
- Illicit drug use
- Ischemic heart disease
- Liver disease
- Multiple sexual partners
- Intimate partner violence
- STDs
- Smoking
- Suicide attempts
- Unintended pregnancies
- Early initiation of smoking
- Early initiation of sexual activity
- Adolescent pregnancy

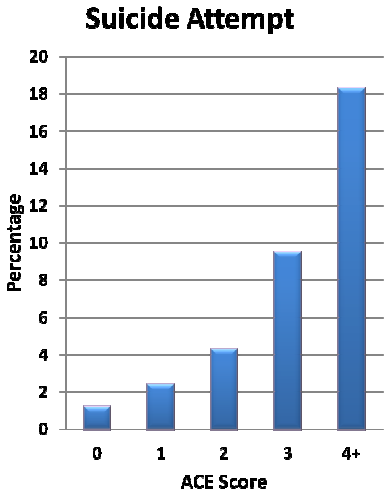
ACEs and Health Outcomes





ACEs and Health Outcomes





Life Course Resources

- CityMatCH Life Course Toolbox
- HRSA Life Course Approach Resource Guide
- WHO: Life Course Approach To Health
- AMCHP Life Course Metrics Project