Early Brain and Child Development
BUILDING BRAINS, FORGING FUTURES
A Program of the American Academy of Pediatrics

Early Brain & Child Development: Building Bridges - Forging Futures

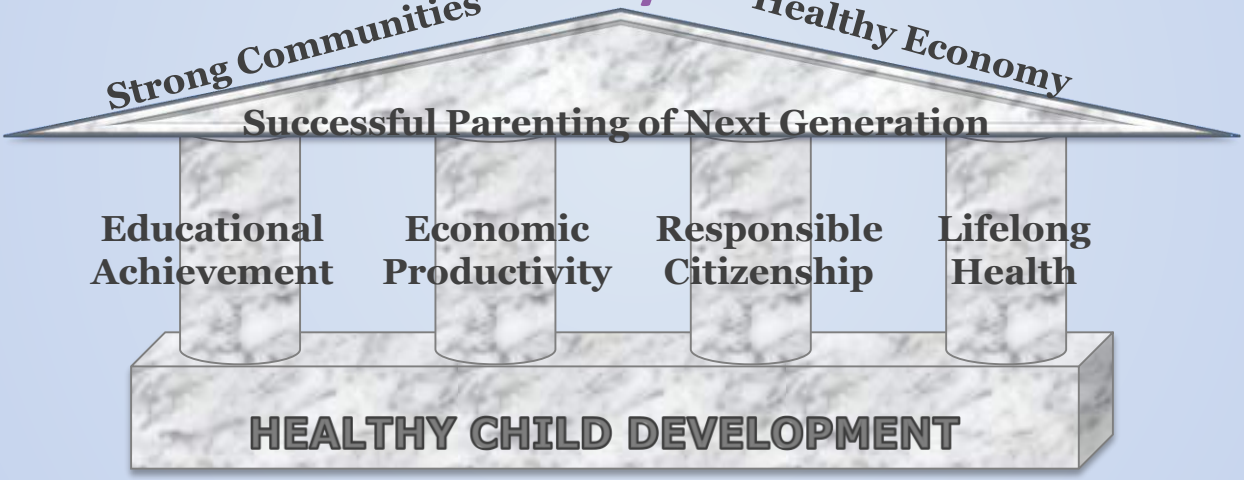
Home Visitors Conference 2013
Partners in Progress – Strengthening Oklahoma Families

Marny Dunlap, MD & Edd Rhoades, MD

October 15, 2013

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

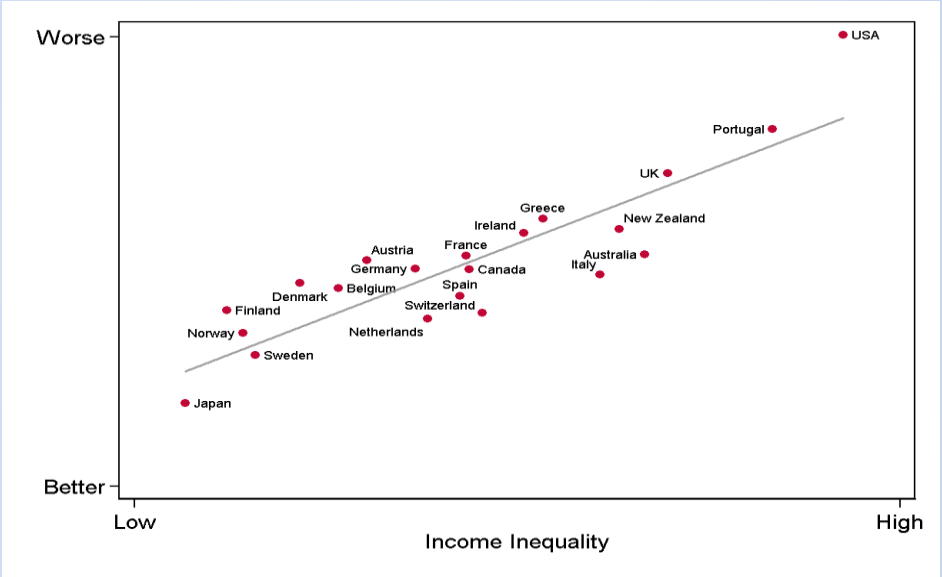
The Foundation of a Successful Society is Built in Early Childhood



Health and Social Problems Worse in More Unequal Countries

Index of:

- Life expectancy
- Math & Literacy
- Infant mortality
- Homicides
- Imprisonment
- Teenage births
- Trust
- Obesity
- Mental illness – incl. drug & alcohol addiction
- Social mobility

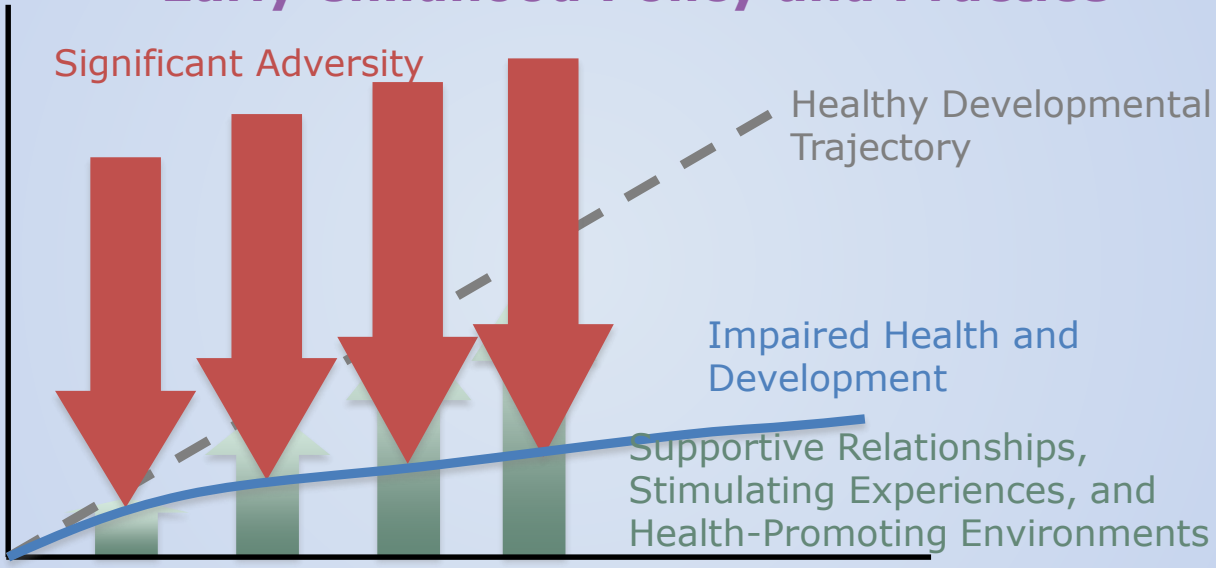


Wilkinson & Pickett, The Spirit Level

The Equality Trust

www.equalitytrust.org.uk

Current Conceptual Framework Guiding Early Childhood Policy and Practice



Brain Architecture Supports Lifelong Learning, Behavior, and Health

- Brains are built over time, starting in the earliest years of life. Simple skills come first; more complex skills build on top of them.

- Cognitive, emotional, and social capabilities are inextricably intertwined throughout the life course.
- A strong foundation in the early years improves the odds for positive outcomes and a weak foundation increases the odds of later difficulties.

700 New Neural Connections Every Second

Image source: Conel, JL. The postnatal development of the human cerebral cortex. Cambridge, Mass: Harvard University Press, 1959

Video: Experiences Build Brain Architecture

Center on the Developing Child at Harvard University

http://developingchild.harvard.edu/resources/multimedia/videos/three_core_concepts/brain_architecture

Foundation for Executive Function Skills is Built in Early Childhood

- ***Self-Control*** – ability to filter thoughts and impulses to resist temptations and distractions
- ***Working Memory*** – ability to hold and manipulate information in our heads over short periods of time
- ***Mental Flexibility*** – adjusting to changing demands, priorities, or perspectives

Critical Factors in Developing a Strong Foundation for Executive Function Skills

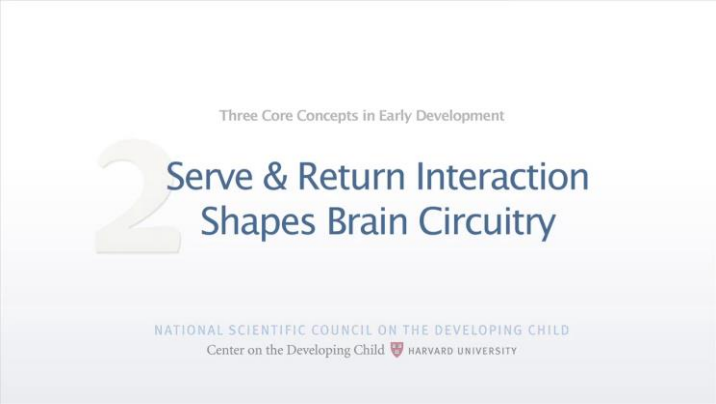
- ***Children's Relationships*** – consistent reliable adults who support and protect them, and model and engage them in building executive function skills
- ***Activities*** - the opportunity to engage in activities that reduce stress, foster social connection, incorporate vigorous physical activity, and increase the complexity of skills at the right speed for each child
- ***A safe and stable environment***

Serve & Return Builds Brains and Skills

- Ongoing, reliable interaction with trusted adults is essential for the development of healthy brain circuits
- Systems that support the quality of relationships in early care settings, communities, and homes help build brain architecture

Serve & Return Interaction Shapes Brain Circuitry

Center on the Developing Child at Harvard University



http://developingchild.harvard.edu/resources/multimedia/videos/three_core_concepts/serve_and_return/

Early Childhood Stress Influences Developmental Outcomes

Positive Stress Response

- Brief increases in heart rate, mild elevations in stress hormone levels; important to development in the context of stable and supportive relationships

Tolerable Stress Response

- Serious and temporary, but impact buffered by supportive relationships and safe environments

Toxic Stress Response

- Prolonged activation of stress response systems in the absence of protective relationships; disrupts brain architecture, increases the risk of stress-related physical and mental illness

Defining Adversity or Stress

Positive Stress

- Brief, infrequent, mild to moderate intensity
- Most normative childhood stress
  - Inability of the 15 month old to express their desires
  - The 2 year old who stumbles while running
  - Beginning daycare or school
- **Moderate, short-lived** physiological response
  - Increased heart rate, higher blood pressure
  - Mild elevation of stress hormone, cortisol, levels
- Social-emotional buffers allow a return to ***baseline***

  (responding to non-verbal clues, consolation, reassurance, assistance in planning)
- Builds motivation and resiliency
- Positive Stress is **NOT** the **ABSENCE** of stress

Defining Adversity or Stress

Tolerable Stress

- Physiological responses large enough to disrupt brain architecture
- Activated by:
  - Death of loved one, divorce, natural disasters
- Relieved by supportive relationships:
  - that facilitate coping
  - restore heart rate and stress hormone levels
  - reduce child's sense of being overwhelmed

Defining Adversity or Stress

Toxic Stress

- Long lasting, **frequent**, or strong intensity
- More extreme precipitants of childhood stress (**ACEs**)
  - Recurrent physical, sexual, emotional abuse
  - Recurrent physical, emotional neglect
  - Household dysfunction
  - Severe maternal depression
  - Family violence
  - Substance abuse
- Strong & prolonged activation of stress response systems in the **absence** of buffering protection of adult support
- **Insufficient social-emotional buffering**
  (Deficient levels of emotion coaching, re-processing, reassurance and support)

Defining Adversity or Stress

Toxic Stress (cont.)

- Potentially permanent changes and long-term effects
  - **Epigenetics** (there are life long / intergenerational changes in how the genetic program is turned **ON** or **OFF**)
  - **Brain architecture** (the mediators of stress impact upon the mechanisms of brain development / **connectivity**)
- Increased susceptibility to cardiovascular disease, hypertension, obesity, diabetes and mental health problems
- Implications: “Toxic stress is the key intergenerational transmitter of social and health disparities.” - Andrew Garner, MD, COPACFH

Video: Toxic Stress Derails Healthy Development

Center on the Developing Child at Harvard University

http://developingchild.harvard.edu/resources/multimedia/videos/three_core_concepts/toxic_stress/

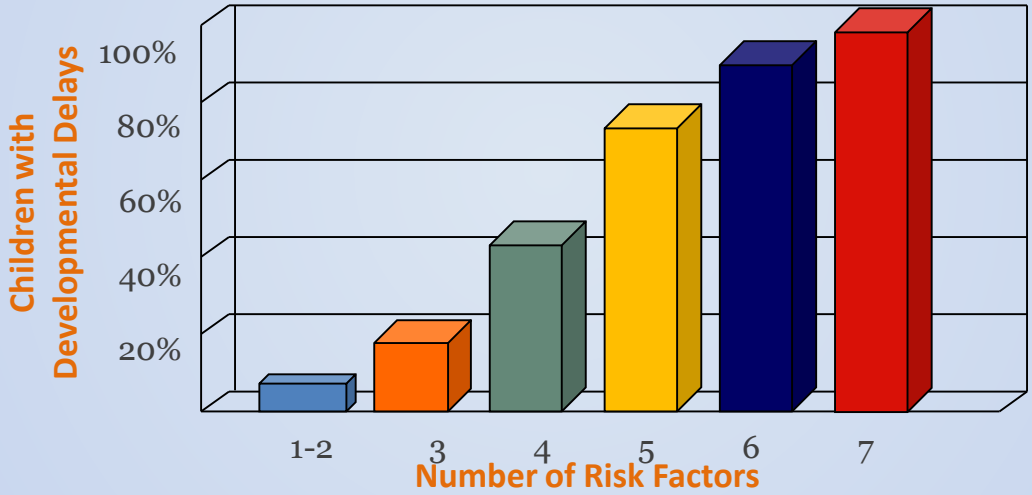
Prevalence of Adverse Childhood Experiences (ACE)

	Girls (n=9,367)	Boys (n=7,970)	Total (17,337)
• Abuse			
– Emotional	13.1%	7.6%	10.6%
– Physical	27.0%	29.9%	28.3%
– Sexual	24.7%	16.0%	20.7%
• Household Dysfunction			
– Mother Treated Violently	13.7%	11.5%	12.7%
– Household Substance Abuse	29.5%	23.8%	26.9%
– Household Mental Illness	23.3%	14.8%	19.4%
– Parental Separation or Divorce	24.5%	21.8%	23.3%
– Incarcerated Household Member	5.2%	4.1%	4.7%
• Neglect *			
– Emotional	16.7%	12.4%	14.8%
– Physical	9.2%	10.7%	9.9%

*Wave 2 data only (n=8,667)

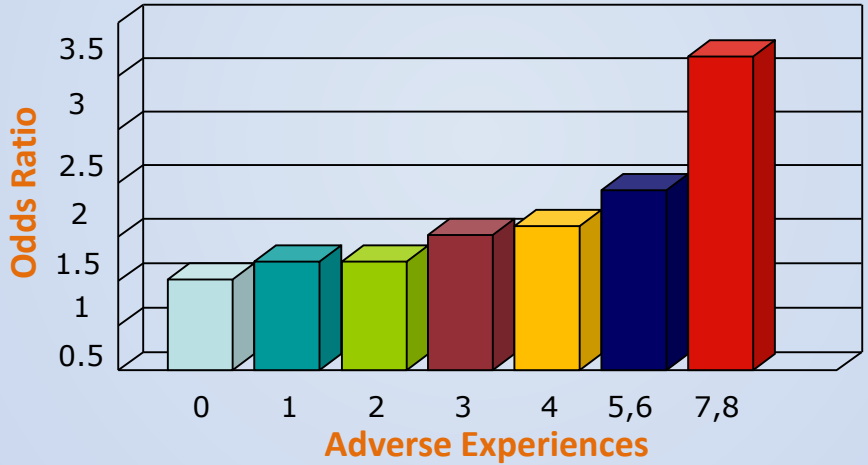
Source: Kaiser ACE Study, 1 995-1997. Data from : www.cdc.gov/nccdphp/ace/demographics

90-100% Chance of Developmental Delays When Children Experience 6-7 Risk Factors



Data Source: Barth, et al. (2008)
Graphic adapted from 2011, Center on the Developing Child at Harvard University

3:1 Odds of Adult Heart Disease After 7-8 Adverse Childhood Experiences



Source: Dong, et al. (2004) via Center on the Developing Child at Harvard University

Intergenerational Transmission of Risk

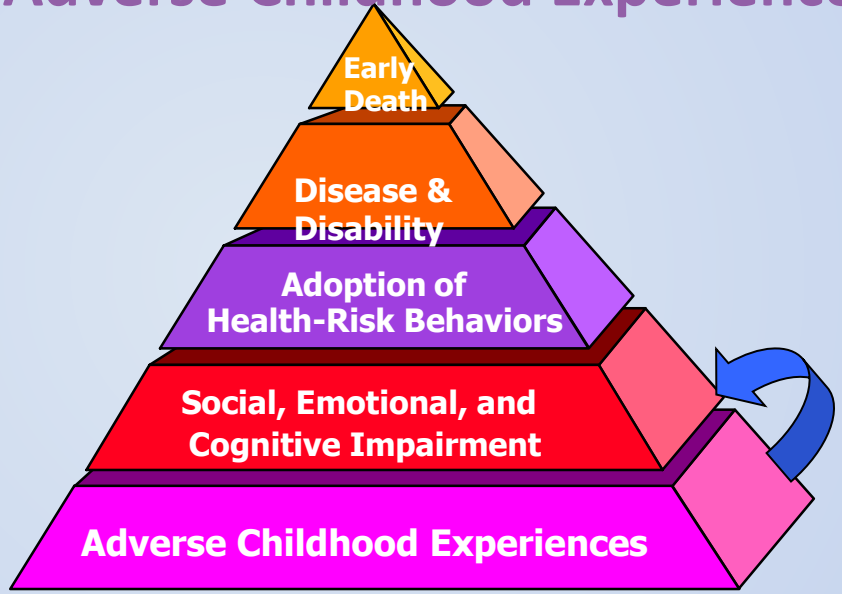
Evidence from ACE Study indicates…
(V. Felitti et al, 2005)

Adverse childhood experiences are the **MOST BASIC CAUSE** of health risk behaviors, morbidity, disability, mortality, and healthcare costs.

Understanding Impact of Adverse Childhood Experiences

Death

Conception



Relationships Buffer Toxic Stress

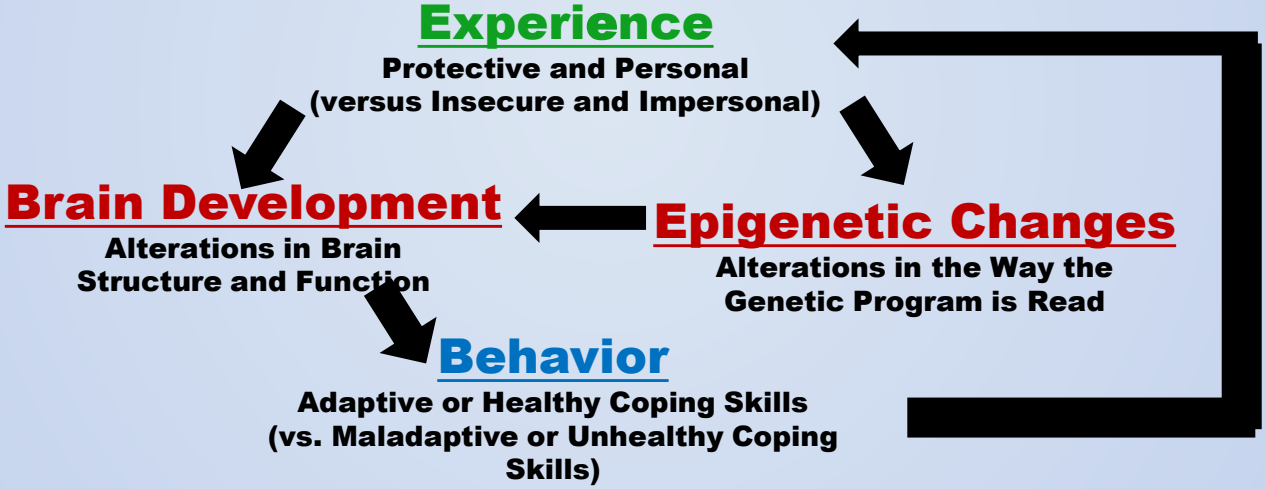
- Learning how to cope with moderate, short-lived stress can build a healthy stress response system
- Toxic stress (when the body's stress response system is activated excessively) can weaken brain architecture
- Without caring adults to buffer children, toxic stress can have long-term consequences for learning, behavior, and both physical and mental health

What are We Building?

Developmental Neuroscience

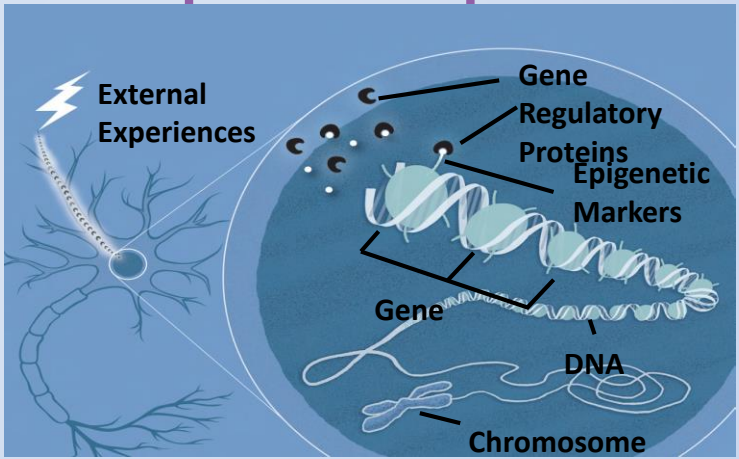
- **Brain Architecture** is experience dependent (both individual connections or “synapses” and complex circuits of connections are dependent upon activity)
- **Ecology** (environment/experience) influences how brain architecture is formed and remodeled (plasticity)
- Diminishing **cellular plasticity** limits remediation
- **Early childhood adversity** -> vicious cycle of stress
- **Potentially permanent alterations** in brain architecture and functioning

Development results from an on-going, re-iterative, and cumulative dance between nurture and nature



Epigenetics: Experiences Alter Gene Expression and Shape Development

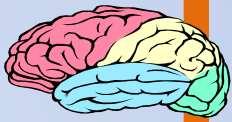
"Genes may load the gun, but the environment pulls the trigger"



Epigenetics

- Which genes are turned on/off, when, and where
- Ecology (environment/experience) influences how the genetic blueprint is read and utilized
- Ecological effects at the molecular level
- Stress-induced changes in epigenetic switches (and gene expression)

Differential Brain Maturation

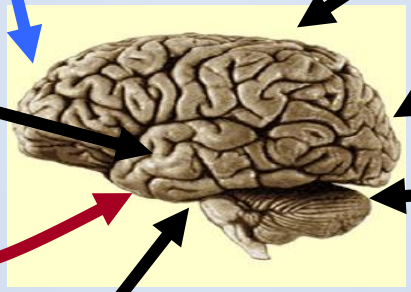


- The Brake – PFC (with some hippocampal help)

Frontal lobes:
Abstract thought, reasoning, judgment, planning, impulse and affect regulation, consequences

Parietal Lobe:
Integration of sensory data and movement

Temporal lobe (outside):
Processing sound and language



Occipital Lobe:
Visual processing

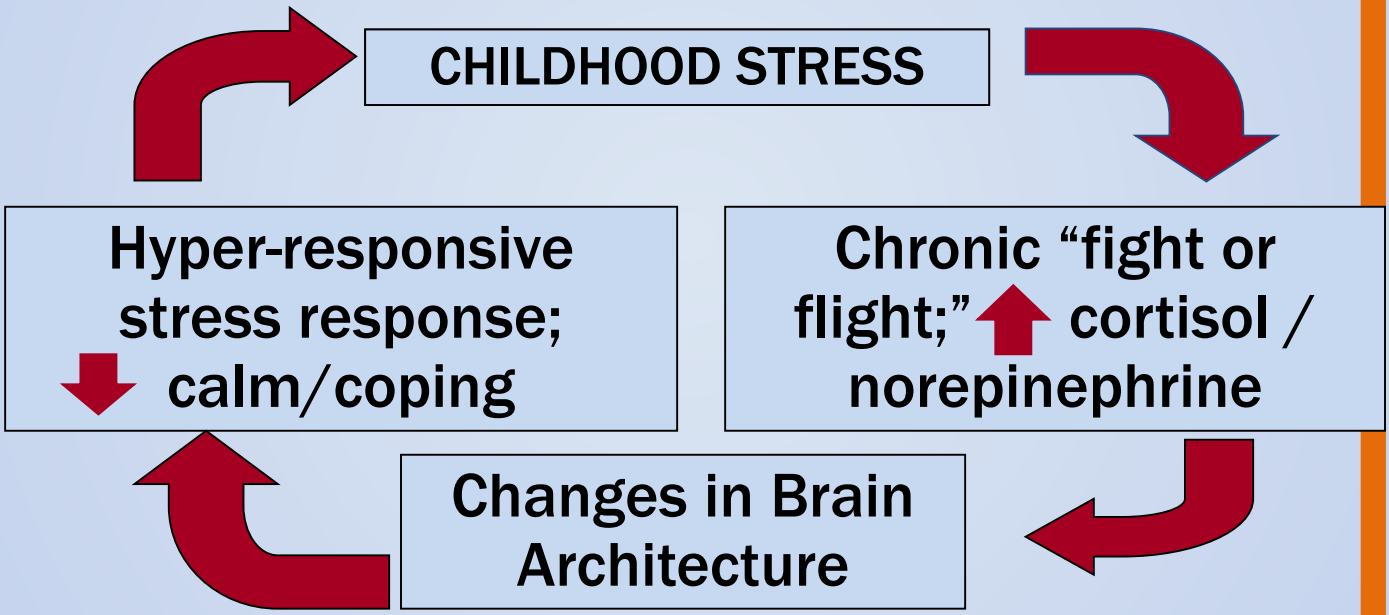
Limbic System (inside):
Emotions and impulsivity

Cerebellum:
Smooth movements
Coordination

+ The Gas Pedal + Amygdala

Brain Stem & Cranial Nerves:
Vital functions
Swallowing

Impact of Early Stress



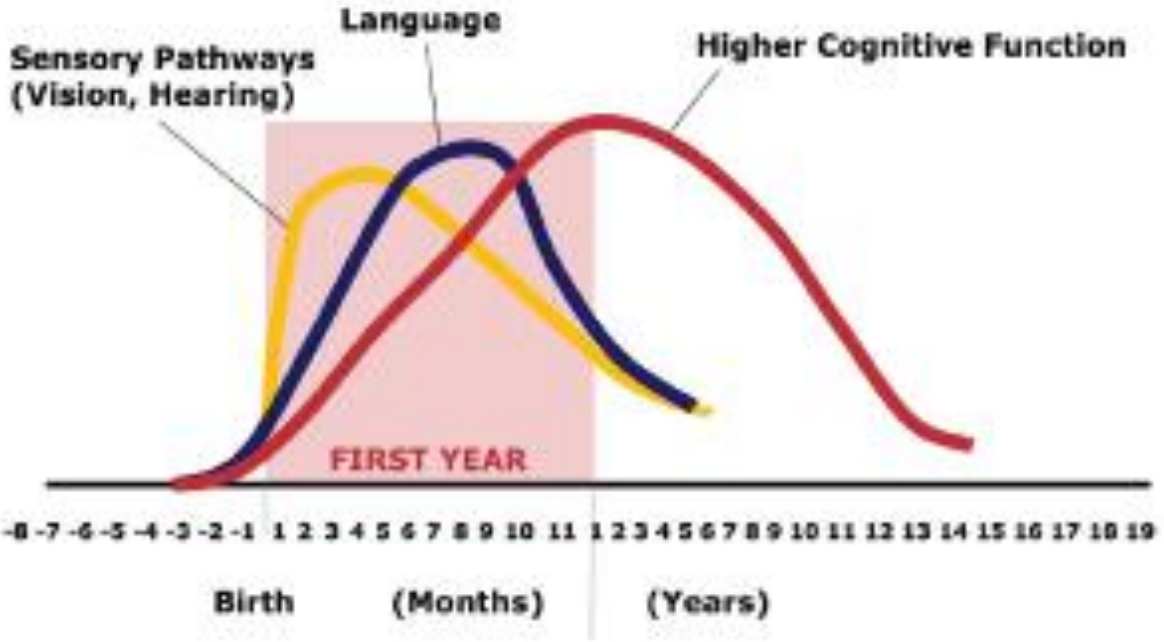
Early Childhood Trauma and the Brain

- Trauma can be associated with reduced size of the **cortex**.
- Trauma decreases the size of the **corpus callosum**.
- Trauma may increase the **amygdala** volume and decrease **hippocampal** volume.
- These changes may **affect IQ, the ability to regulate emotions**, and can lead to increased fearfulness and a reduced sense of safety and protection.

Center on the Developing Child
HARVARD UNIVERSITY

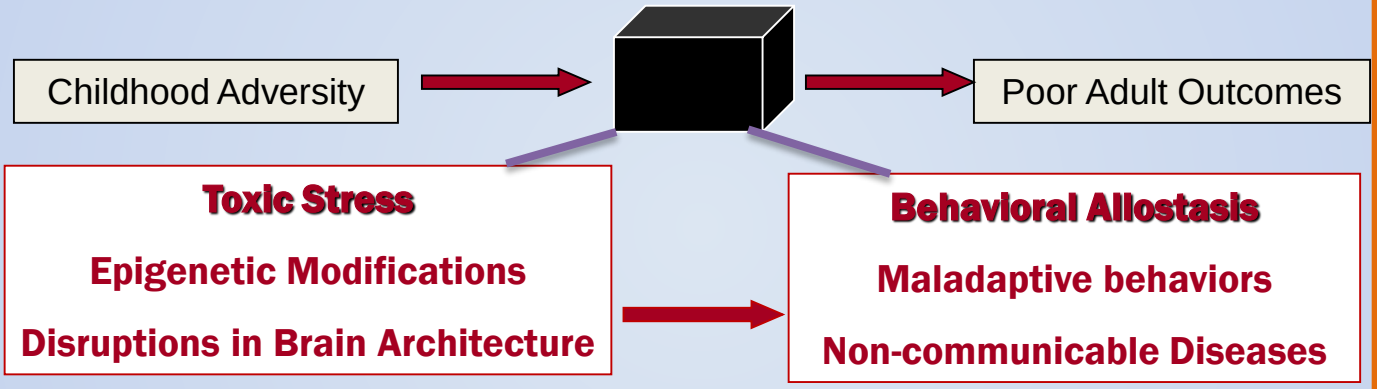
Human Brain Development

Neural Connections for Different Functions Develop Sequentially



Source: C.A. Nelson (2000)

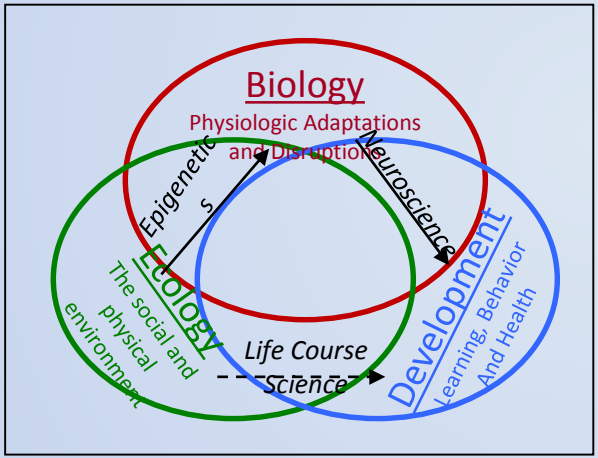
Linking Childhood Experiences and Adult Outcomes



Improve caregiver/community capacity to prevent or minimize toxic stress (e.g. – efforts to promote the safe, stable and nurturing relationships that turn off the physiologic stress response)

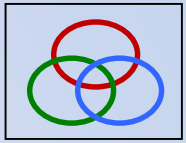
Improve caregiver/community capacity to promote healthy, adaptive coping skills (e.g. - efforts to encourage rudimentary but foundational SE, language, and cognitive skills

Eco-Bio-Developmental Model of Human Health and Disease



Source: Andrew Garner, MD, PhD, FAAP

Ecology becomes **biology,** and together they drive **development** across the lifespan



Advantages of an EBD Framework

- Underscores the need to improve the early childhood **ecology** in order to:
  - Mitigate the **biological** underpinnings for educational, health and economic **disparities**
  - Improve **developmental**/life-course trajectories
- Highlights the pivotal role of **toxic stress**
  - Not just "**step on the gas**" or enrichment
  - But "**take off the brake**" by treating, mitigating or immunizing against toxic stress

The BIG Questions are…

If TOXIC STRESS is the missing link between ACE exposure and poor adult outcomes, it raises the following BIG questions:

Are there ways to:

- **treat,**
- **mitigate,** and/or
- **immunize against** the effects of toxic stress?

If so, is there a mismatch between:

- what we **KNOW** … and …
- what we actually **DO**? (may not have time!)

Addressing Toxic Stress

Treatment of the consequences

- TF-CBT and PCIT are evidence-based
- Reactive – some "damage" already done!
- Very COSTLY
- Efficacy linked to age and chronicity
  - Declining brain plasticity?
- Insufficient number of / access to providers
  - Limited reimbursements; carve-outs
- Mental Health Parity?
- Persistent STIGMA
  - "Character Flaws" vs "Biological Maladaptations"

Addressing Toxic Stress

Secondary / Targeted Preventions

- Focused, targeted interventions for those deemed to be "at high risk"
- Visiting Nurse Programs (Nurse Family Partner.)
- Parenting Programs (Triple-P, Nurturing Parent.)
- More likely to be effective; minimize "damage"
- Requires screening (no screen is perfect)
- Still issues with stigma, numbers of/access to providers

Addressing Toxic Stress

Primary / Universal Prevention

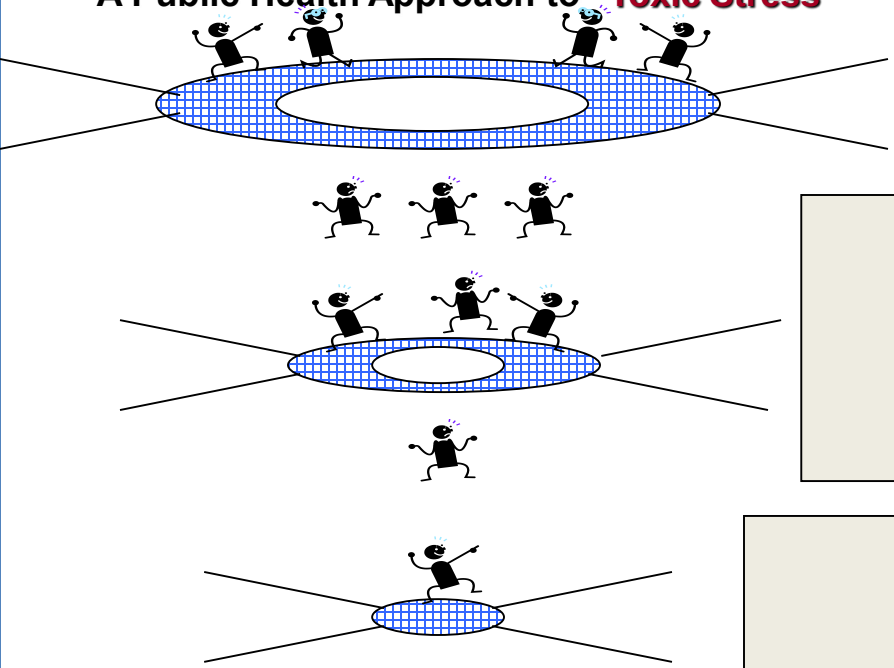
- Proactive, universal interventions to make stress **positive**, instead of tolerable or toxic
- Acknowledges that preventing all childhood adversity is **impossible** and even **undesirable**
- **Actively building resiliency** ("immunizing" through positive parenting, 7C's, promoting optimism, formalized social-emotional learning)
- **SE Buffers** allow the physiologic stress response to return to baseline

  Parenting/Caregiver skills for younger children

  SELear skills for older children (www.casel.org)

Social-Emotional Safety Nets

A Public Health Approach to "Toxic Stress"

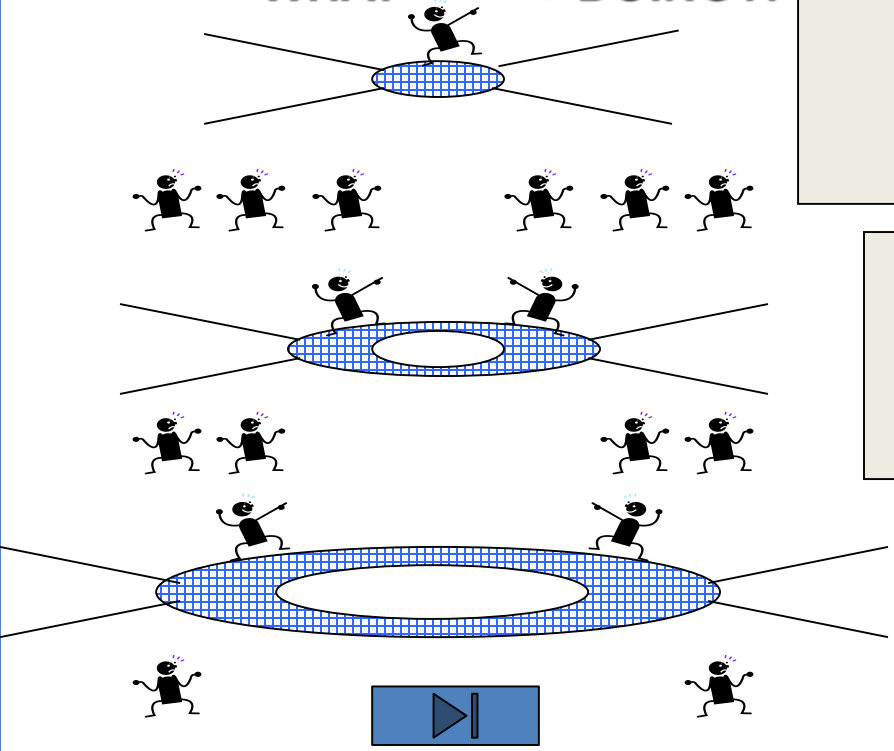


Universal Primary Preventions
Anticipatory guidance
Consistent messaging (CTC)
No identification
No stigma
Ceiling effects =
Limited evidence base

Targeted Interventions
(for those "at risk")
Nursing home visits (NFP)
Parenting programs (PPP)
Early Intervention
Less ceiling=More evidence
Requires screening
Issues with stigma

Evidence-Based Treatments
(for the symptomatic)
PCIT; TF-CBT; Pharmaco-Tx
Treatment works!
Screening / stigma / access

WHAT are we DOING?!



Universal Primary Preventions
Bright Futures
Connected Kids / NCH
Circle of Security /ZTT
Relationships as a "vital" sign
Decrease Stress/Build Skills

Targeted **Interventions**
Screening for risks
(assess the ecology)
Refer to/advocate for EBI
Collaborating/Developing EBI
ID Risks/Provide EBI

Evidence-Based Treatments
Screening for diagnoses
Common factors approach
Refer for/advocate for EBT
Collaborating/Developing EBT
ID Symptoms/Provide EBT

Public Health Implications

ACE data provide a working model for understanding and addressing the **childhood antecedents** of **adult disease.**

Is there a gap between what **we do**

and what **we know**?

What we **DO**:

95% of the trillions of dollars that we spend on health is on **treatment** and **NOT prevention**

Public Health Implications

What we KNOW:

That 70% of early deaths are preventable, with...

Public Health Implications

The majority (40% overall) due to behavioral patterns that lead to chronic disease.

Behavioral Allostasis due to toxic stress?

McGinnis, Williams-Russo and Knickman, 2002

A Public Health Dilemma:

Do we continue to treat **disease,**

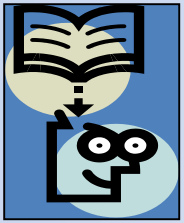
the **unhealthy lifestyles** that lead to disease,

or the **TOXIC STRESS** that leads to the adoption of unhealthy lifestyles??

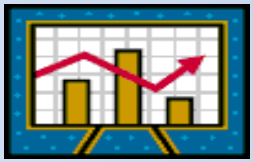
WHAT NEXT?

- Let's build bridges!
- Let's build systems!
- Common vision
- Next steps

Epigenetics | Physiology of Stress | Neuroscience



The Science of Early Brain and Child Development

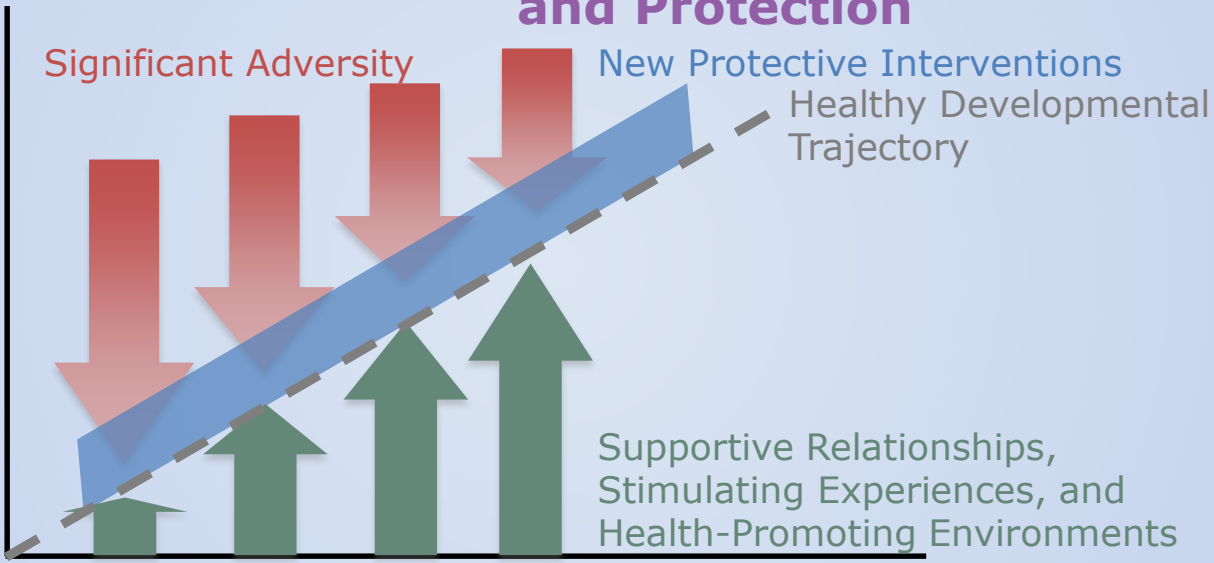


Education | Health | Economics

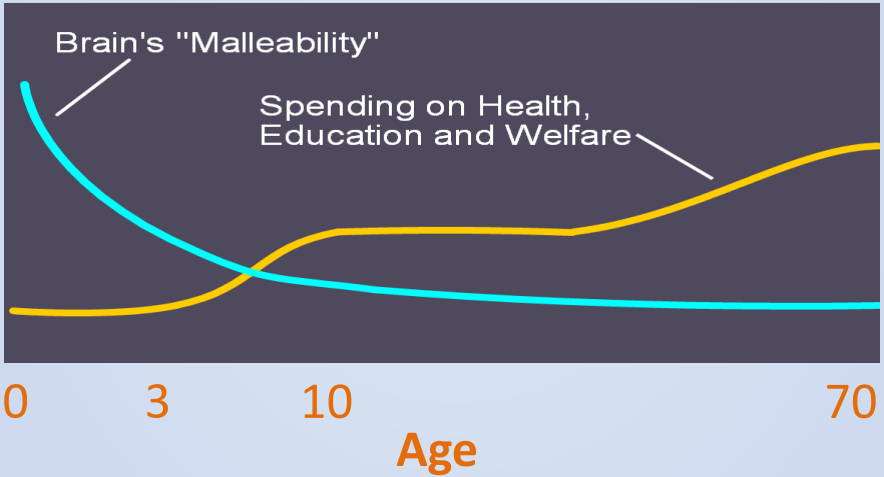
One Science – Many Implications

The critical challenge now is to translate game-changing advances in developmental science into effective policies and practices for families w/ children to improve education, health and lifelong productivity

Building an Enhanced Theory of Change that Balances Enrichment and Protection

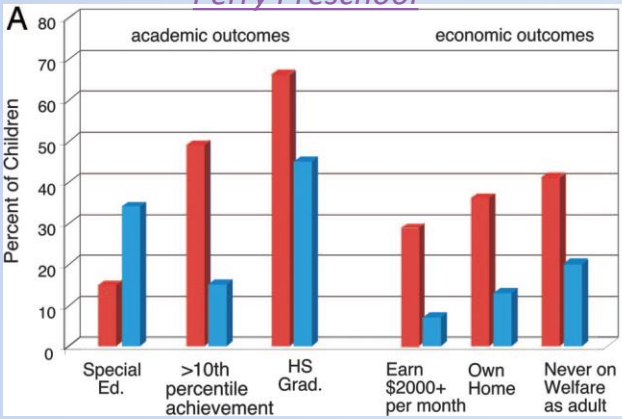


The Mismatch Between Opportunity and Investment

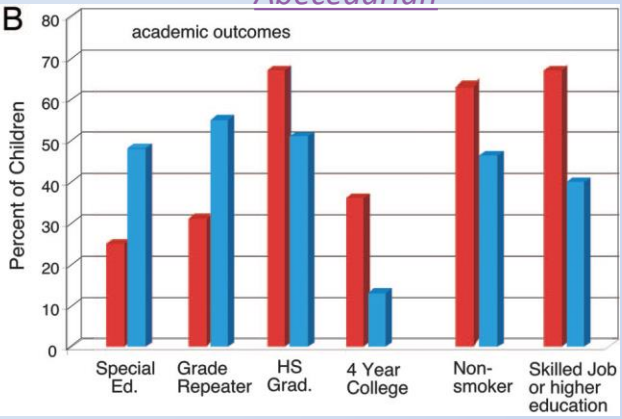


Documented Positive Impacts From Quality Preschool Programs

Perry Preschool



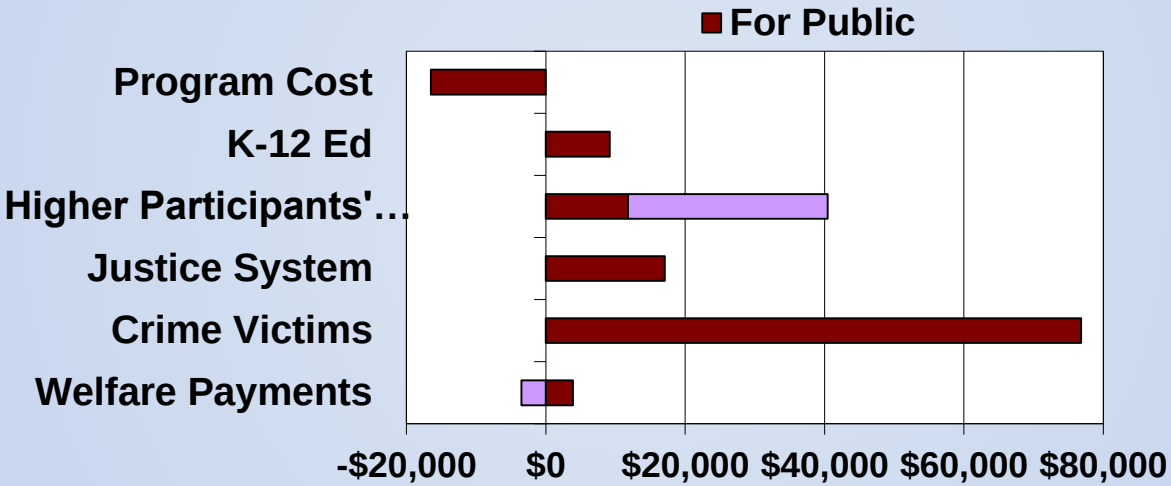
Abecedarian



■ = Program Group ■ = No Program Group

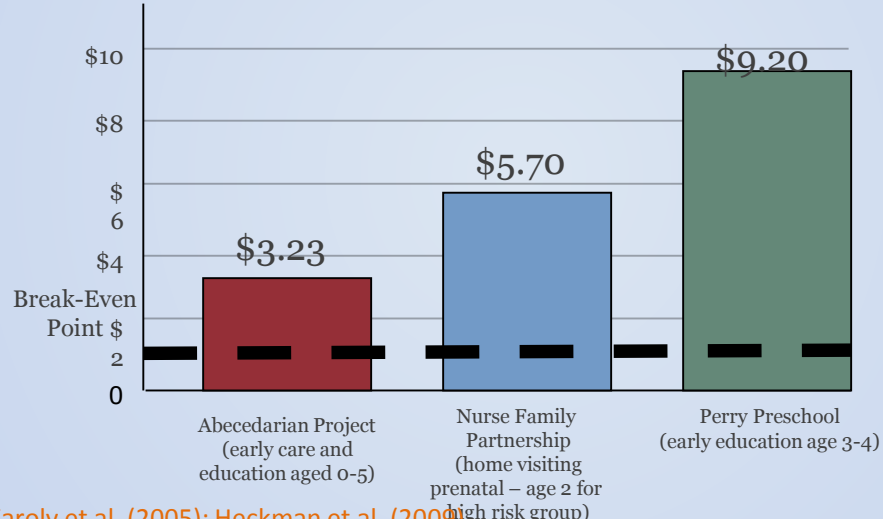
Source: Eric Knudsen, James Heckman, Judy Cameron and Jack Shonkoff
Proceedings of National Academy of Sciences (PNAS), July 5, 2006

Perry Preschool
Costs and Benefits Over 27 Years



Source: Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40 by L. J. Schweinhart et al. (2005)

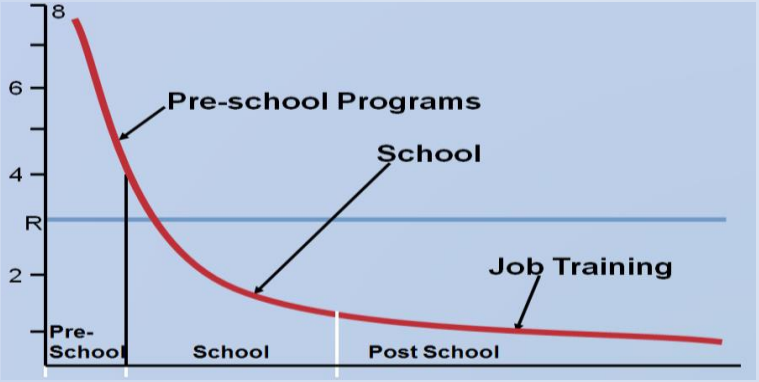
Cost/Benefit for Three Early Childhood Programs



Total Return per $1 Invested

Data Sources: Karoly et al. (2005); Heckman et al. (2009)
Graph Source: © 2011, Center on the Developing Child at Harvard University

Rates of Return to Human Development Investment Across All Ages



Carneiro, Heckman, Human Capital Policy, 2003

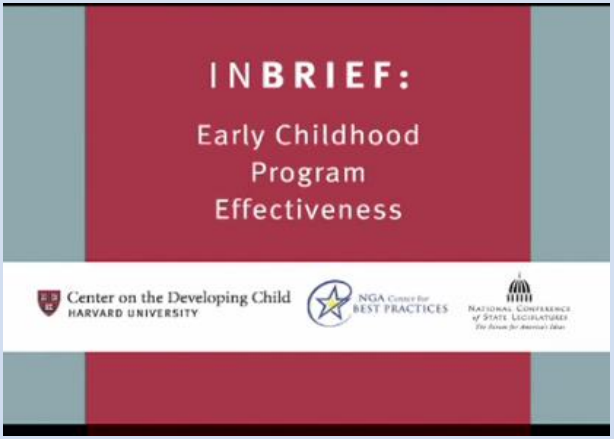
Eric Knudsen, James Heckman, Judy Cameron and Jack Shonkoff
Proceedings of National Academy of Sciences (PNAS), July 5, 2006

"The most effective strategy for strengthening the future workforce, both economically and neurobiologically, and improving its quality of life is to invest in the environment of disadvantaged children during the early childhood years."

15% Return on Investment

Video: Early Childhood Program Effectiveness

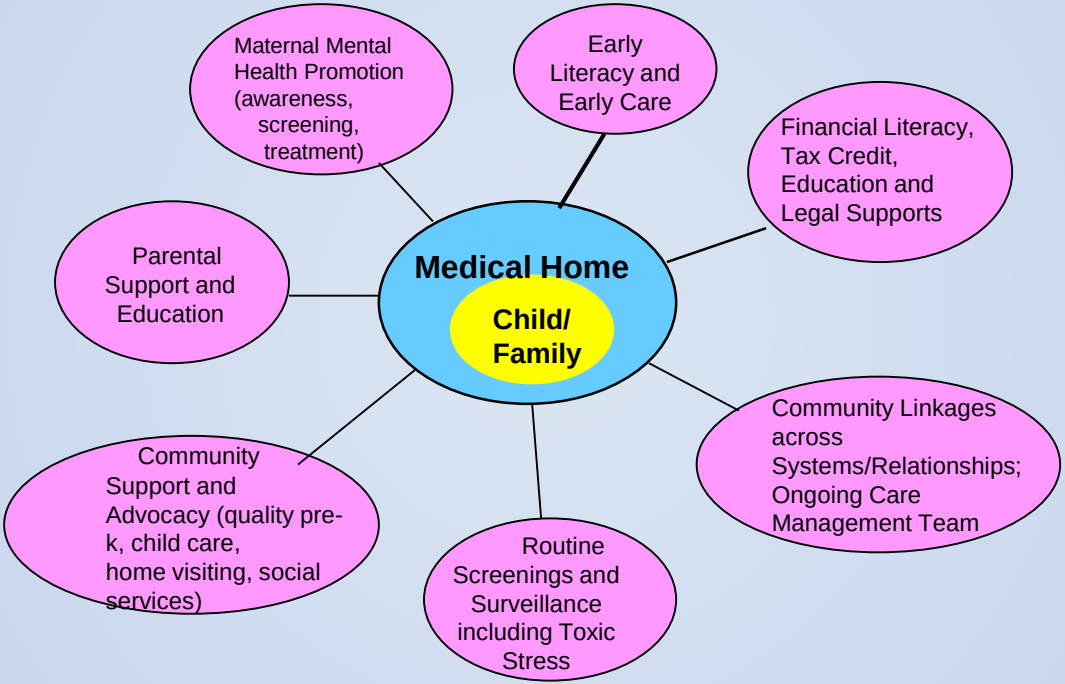
Center on the Developing Child at Harvard University



http://www.youtube.com/watch?v=_BgtFYEC1Yk&feature=player_detailpage

Approaches that Actively Build Resiliency

- Positive parenting education
- Circle of Security
- 7 Cs
- 5 Rs
- Incorporate formalized social-emotional learning into early learning experiences


Maternal Mental Health Promotion (awareness, screening, treatment)
Early Literacy and Early Care
Financial Literacy, Tax Credit, Education and Legal Supports
Parental Support and Education
Medical Home
Child/ Family
Community Linkages across Systems/Relationships; Ongoing Care Management Team
Community Support and Advocacy (quality pre-k, child care, home visiting, social services)
Routine Screenings and Surveillance including Toxic Stress

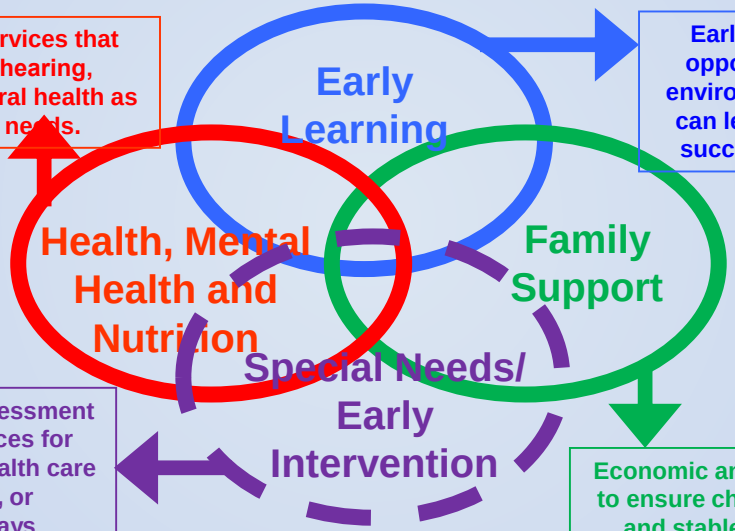
Young Children and Their Families Need New Champions

"The time has come for fresh leadership in both the public and private sectors to address significant inequalities in opportunity, beginning in the earliest years of life, as both a moral responsibility and a critical investment in our nation's social and economic future."

Jack P. Shonkoff, M.D, Center on the Developing Child. Presentation 1/18/07.

State Early Childhood Development System

Comprehensive health services that meet children's vision, hearing, nutrition, behavioral, and oral health as well as medical health needs.

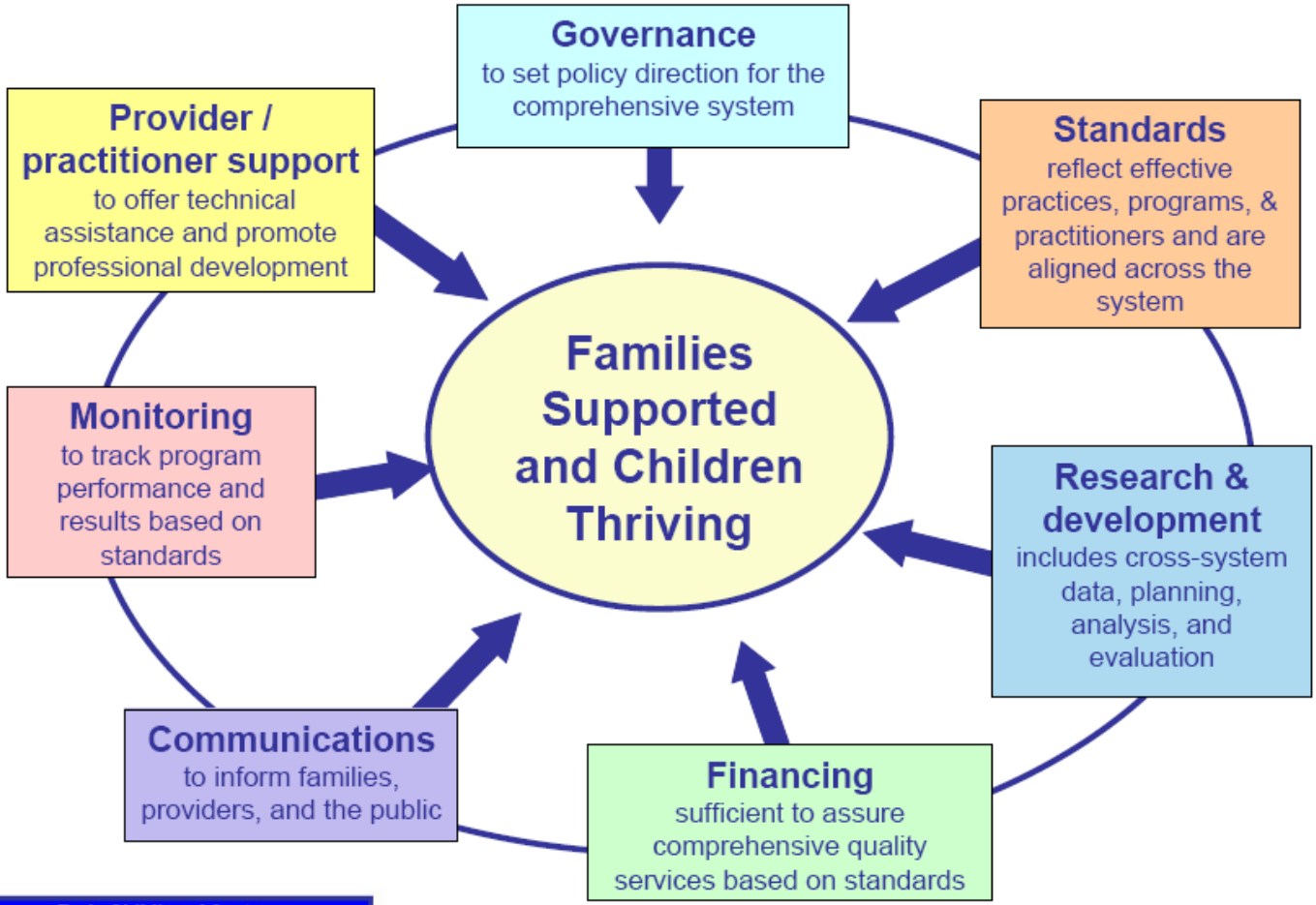


Early care and education opportunities in nurturing environments where children can learn what they need to succeed in school and life.

Early identification, assessment and appropriate services for children with special health care needs, disabilities, or developmental delays

Economic and parenting supports to ensure children have nurturing and stable relationships with caring adults.

Core Elements of an Early Childhood Development System



Supportive Communities & Effective Policy Strategies

- Effective collaborative relationships
- Business leader champions
- Community volunteering and family engagement
- Public private investments
- Public private partnerships
- Public will
- Policies that benefit children and families

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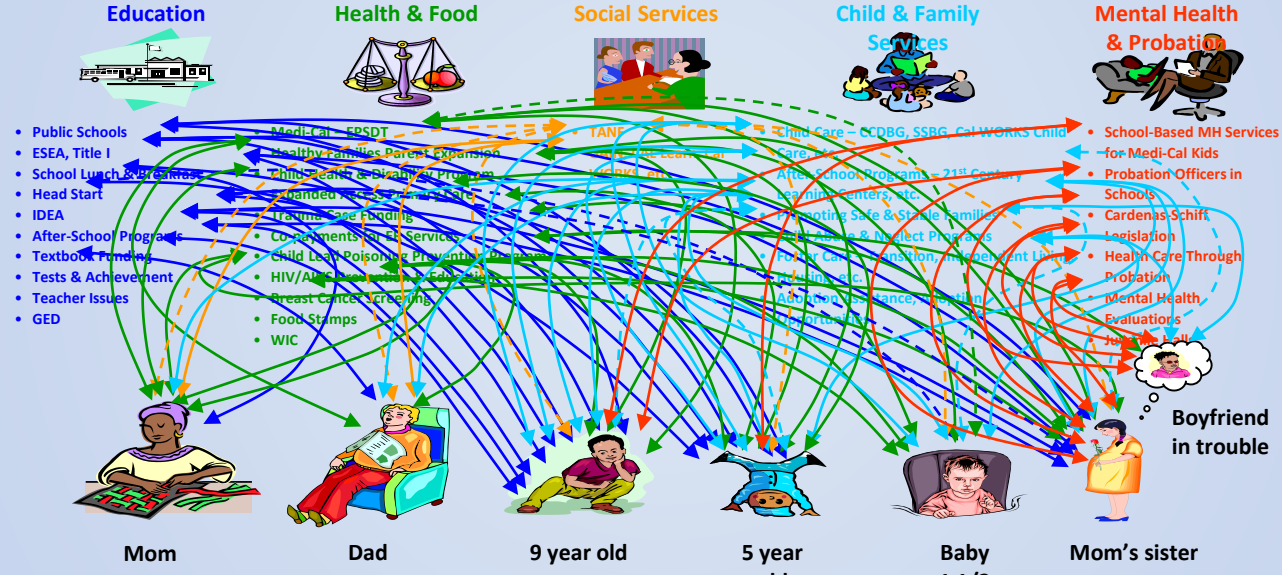
Early Childhood Development System Transformation Framework

Components	What System Do We Have Now? ECD 1.0	What System Are we Trying to Build ECD 2.0	What System Do we Need to Design for the Future ECD 3.0
Logic Model	5 to zero, looking back	Zero to 5, transactional	Optimizing development
Organization of ECD Producing Sectors	Isolated sectors	Cross-sector paths	Integrated systems
Organization & Delivery of Individual Services	Fragmented	One stop	Integrated network
Education & Workforce Development	Ad-hoc	ECE workforce & economic Development	
Market Structure	Disorganized, fragmented	embedded	
Funding	Silos,	Consolidation, augmentation	New investment mechanisms
Planning		City, state, &	National plan
Regulation & Governance	Fragmented across sectors	Joint planning/ ECCS	Integrated system
Performance Monitoring		Early Development Instrument & Ages and Stages Questionnaire	Map trajectories

Can we go from this……



Adapted from: Margaret Dunkle The George Washington University & The LA County Children's Planning Council 2002

To Building and Sharing the Pyramid!

CURRENT EARLY BRAIN AND CHILD DEVELOPMENT EFFORTS IN OKLAHOMA

EDUCATION

- **OSDE**
  - Universal pre-K
  - SoonerStart Early Intervention (EI)
  - Parents as Teachers (PAT)
- **Head Start**
  - Early Head Start

CURRENT EARLY BRAIN AND CHILD DEVELOPMENT EFFORTS IN OKLAHOMA

HEALTH

- **OSDH**
  - Child Guidance
  - Incredible Years
  - PCIT
  - MIECHV (Home Visitation)
  - ECCS
  - Start Right
  - SoonerStart EI
  - Children First (NFP)
- **OHCA**
  - SoonerCare
  - Medical Home
- **OUHSC**
  - SoonerSuccess
  - SafeCare
- **Healthy Start**
  - Oklahoma City Healthy Start
  - Tulsa Healthy Start

CURRENT EARLY BRAIN AND CHILD DEVELOPMENT EFFORTS IN OKLAHOMA

HUMAN SERVICES

- **OKDHS**
  - Child Care
  - STARS/QRIS
  - Comprehensive Home Based Services (CHBS)
  - SafeCare
- **Child Care Resource & Referral Association, Inc.**
- **OCCY**
  - Office of Planning and Coordination
  - Oklahoma Statewide Promising Practices Team

CURRENT EARLY BRAIN AND CHILD DEVELOPMENT EFFORTS IN OKLAHOMA

MENTAL HEALTH

- **ODMHSAS**
  - Strengthening Families Program
  - Celebrating Families
  - Trauma Focused – Cognitive Behavioral Therapy

- **Project Launch**

CURRENT EARLY BRAIN AND CHILD DEVELOPMENT EFFORTS IN OKLAHOMA

OTHER STATE AND COMMUNITY INITIATIVES

- **Oklahoma Partnership for School Readiness**
  - SmartStart Oklahoma
  - Early Childhood Advisory Council (ECAC)
- **Educare of Tulsa**
- **Educare of Oklahoma City**
- **Oklahoma Family Network**
- **Tulsa Transforming Early Childhood Community Systems (TECCS)**
- **Parent Aide Services (PAS)**
- **Early Childhood Association of OK**

How To Get There

- Create cross-sector paths for families
- Plan and implement programs and services across systems and sectors
- Collect and share data across systems
- Create one-stop, user-friendly networks (there is no wrong door)
- Support early childhood education workforce & economic development
- Consolidate, augment and share funds across systems
- Involve families in system design

How To Get There (cont'd)

- Measure progress and results
- Engage and educate the public
- Think outside the box
- Reward innovation
- Support and reward relationship-based work throughout the system
- Engage business leaders and unlikely champions
- RELATIONSHIPS, RELATIONSHIPS, RELATIONSHIPS
- BE THE CHANGE!!!!

What's Needed to Move from Patchwork to Innovative Community-based Systems?

- Leaderships and state policymakers **thinking differently** about how to use federal, state, and local, public and private resources
- Agencies and professionals **will work together** for transformation
- Systems and **policy changes** will be essential
- Service providers will become **learning communities**
- **Parent support** becomes central to any EC system

Source: Our Nation's Future, 2013

Components Unique to the Community-based Early Childhood Pathway

- Agreement on the **guiding child outcomes**
- Providing all parents and care givers **access to information**
- Informal and formal **touch points** for support
- Universally accepted **screening and assured follow-up**
- Methods for identifying the **most vulnerable populations**
- Certain **universal supports and services**

Source: Our Nation's Future, 2013

Core Functions to Support Systematic, Integrated and Comprehensive Approaches

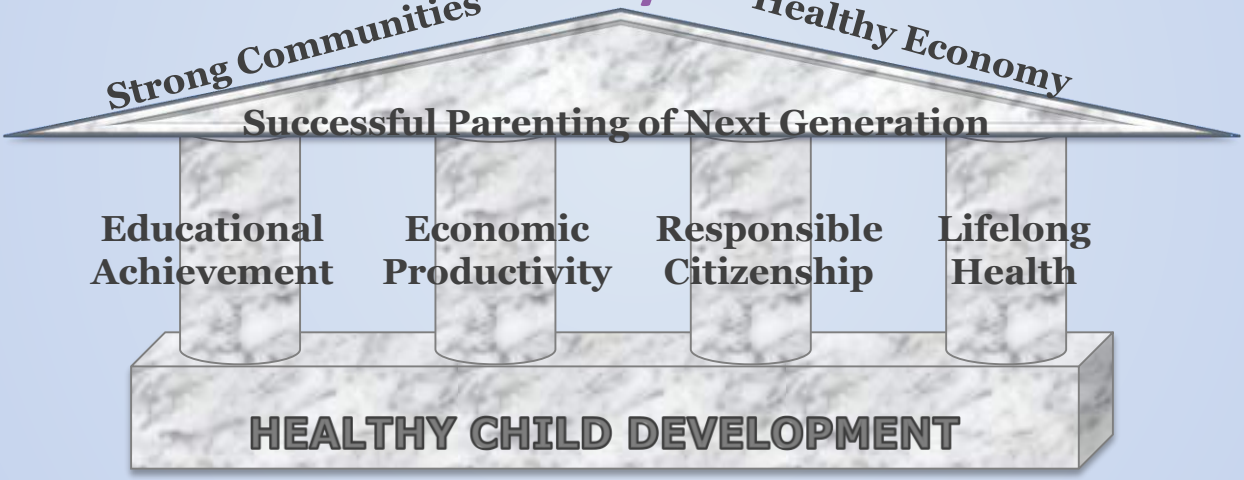
- An accountability system to track and assess outcomes
- An agreed upon organizing entity
- A quality control and measurement system
- Professional development and capacity building

Source: Our Nation's Future, 2013

Its All About

- **Building health, First 1000 Days**
- **"Building brains, forging futures!"**
- The **earliest relationships** and their sturdiness
- **Breaking the generational transmission** of abuse, ACE transmission and toxic stress mitigation
- **Partnerships** and shared values of communities of all agencies that becomes a **collective impact** approach
- A **culture of quality**, measurement and accountability
- **Population** approaches and management upstream
- Driving **innovation** in all we do
- Proven, wise and sustainable **investments** for young children's future

The Foundation of a Successful Society is Built in Early Childhood



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