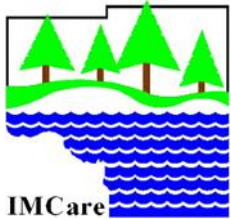
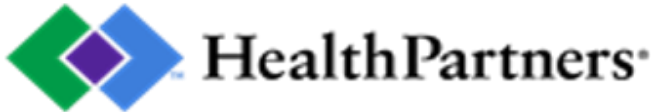


A Great Start for Minnesota's Children: Growth, Development and Safety Oh My!

Krishnan Subrahmanian MD, MPhil, FAAP
Pediatrician, Hennepin Healthcare
Chief Medical Officer, Hennepin Health
November 2024



MN Health Plans Collaborative



Today's Presenter

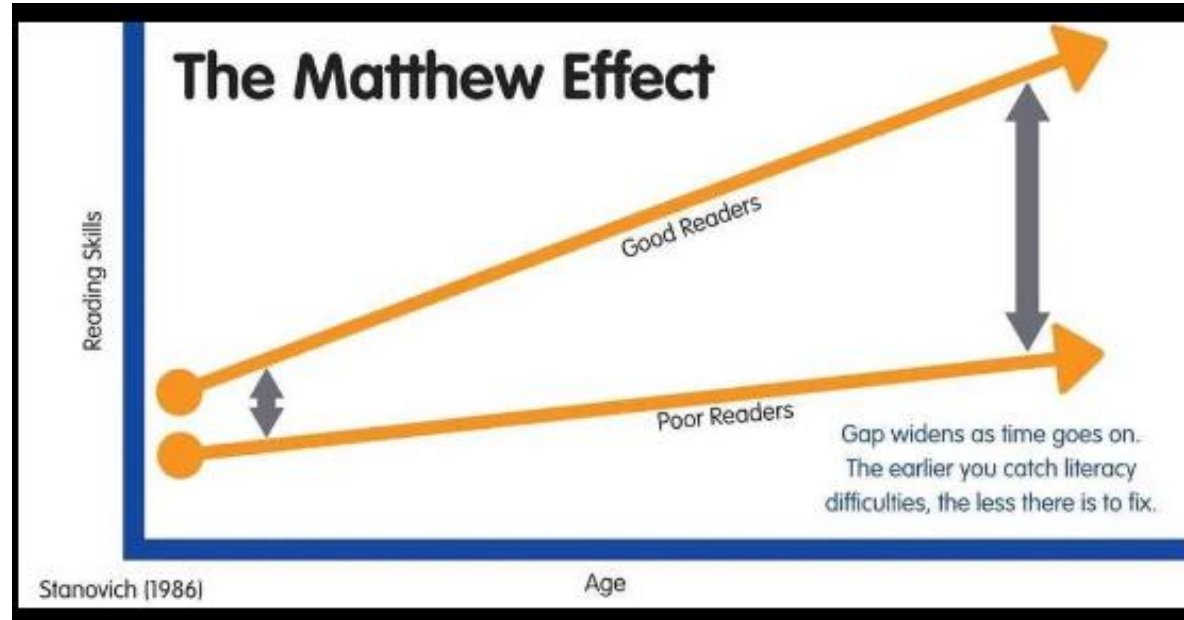
Dr. Krishnan Subrahmanian (MD, Mphil, FAAP)

Dr. Krishnan Subrahmanian serves as a primary care pediatrician and hospitalist at Hennepin Healthcare and as an Assistant Professor of Pediatrics at The University of Minnesota. Additionally, he serves as the Chief Medical Officer of Hennepin Health, the state's only county owned, state certified health maintenance organization. A former high school teacher, Dr. Krish trained in Pediatrics and Global Health serving with the Baylor International Pediatric AIDS Initiative in Botswana and South Dakota. He is the co-author of the text *Global Child Health* and previously served as the Co-chair of the Admissions Committee at the University of Minnesota School of Medicine. Most importantly he trains daily in pediatrics as the father of three little ones.

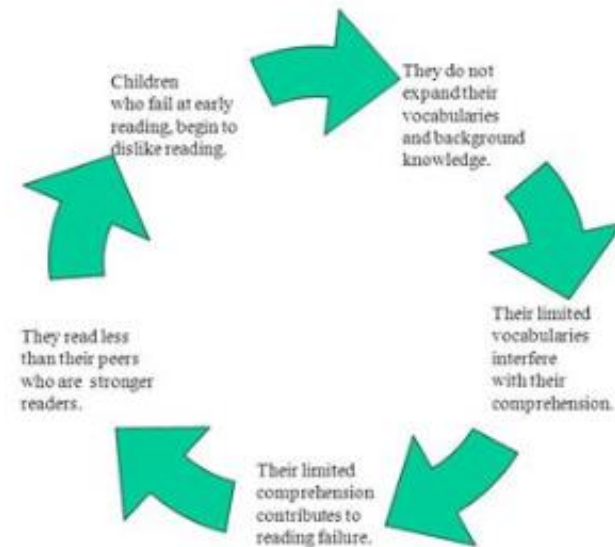
Agenda

- The search for early intervention and why?
- The Brain is Built by Experience
- How do Pediatricians monitor this growth?
- Adverse Childhood Experiences (ACE) and Stress
 - How this impacts brain development
- Resilience
- Additional Screening possibilities

Teach a Child to Read



The Matthew Effect (Stanovich, 1986)



Start With Kindergarten?

Cooper et.al 2018

TABLE 2
Adjusted Means (SE) of Fifth-Grade Outcomes for the Kindergarten Reading/Social Skills Subgroups
(Controlling for Gender, Minority Status, Income, and Fifth-Grade Social Competence)

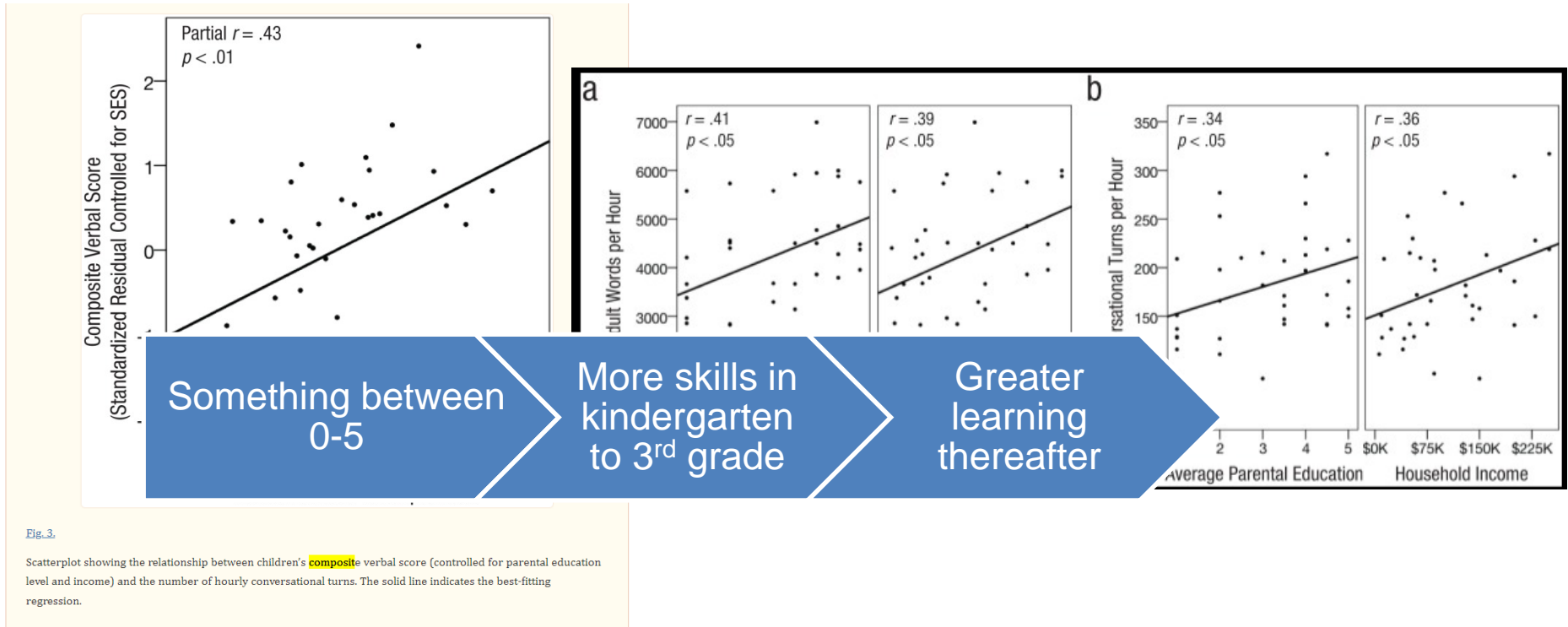
Subgroup	Kindergarten social skills			Pairwise differences ^a
	Low	Average	High	
Fifth-grade reading (T score) ^b				
Kindergarten reading—low	41.61 (1.35)	44.74 (0.83)	42.80 (2.26)	b*
Kindergarten reading—average	51.13 (0.65)	51.02 (0.36)	53.08 (0.76)	a*, c**
Kindergarten reading—high	62.98 (3.05)	58.97 (0.70)	58.77 (1.07)	ns
Fifth-grade math (T score) ^c				
Kindergarten reading—low	44.08 (0.95)	44.60 (0.67)	42.61 (3.53)	ns
Kindergarten reading—average	50.88 (0.61)	50.96 (0.28)	52.49 (0.54)	a*, c [†]
Kindergarten reading—high	62.40 (2.17)	58.34 (0.60)	57.71 (0.96)	ns

^aPairwise differences within kindergarten reading level indicated the following: a = mean level of fifth-grade outcome significantly different between subgroups with low and high kindergarten social skills; b = mean level of fifth-grade

Kindergarten Reading was predictive of 5th grade reading and math scores (regardless of social skills)

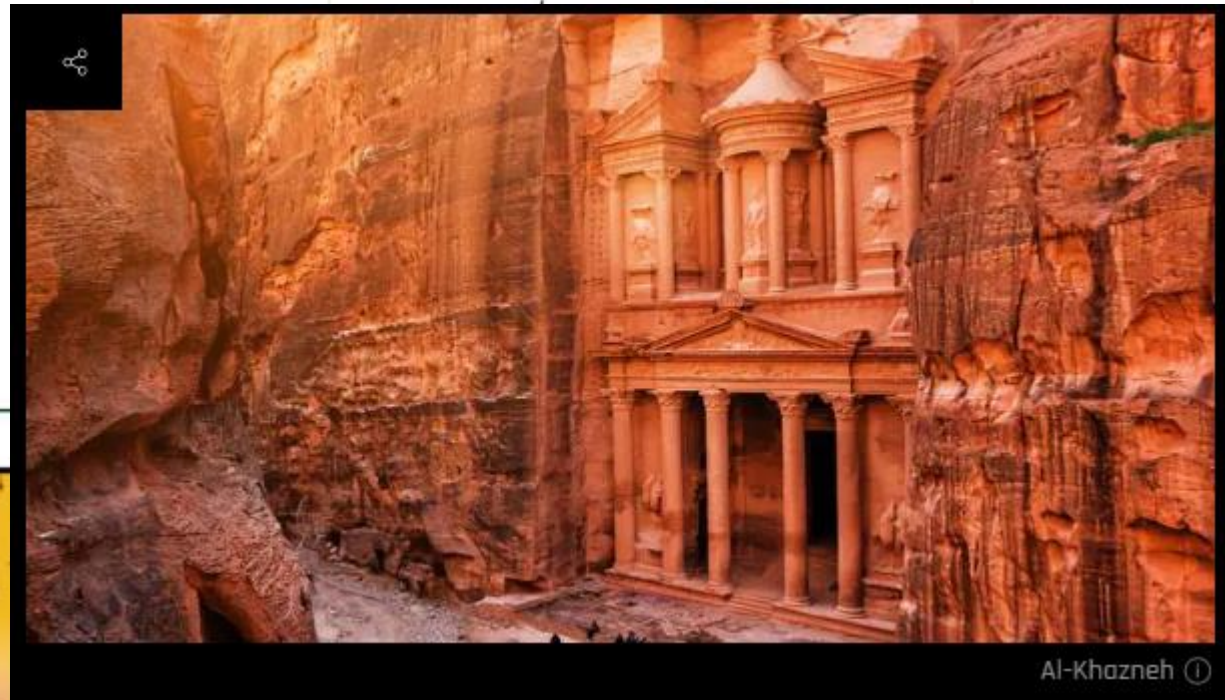
No, Start Earlier!

Beyond the 30 Million Word Gap (Romeo et. Al 2018)



BRAINS ARE BUILT THROUGH EXPERIENCE

We Build Lots Of Neuronal Connections And Then Experience Edits To Make Beauty!



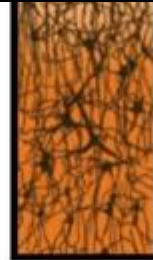
Newborn



1 Month



9 Months



2 Years



Adult

ectory of brain synapses



At birth



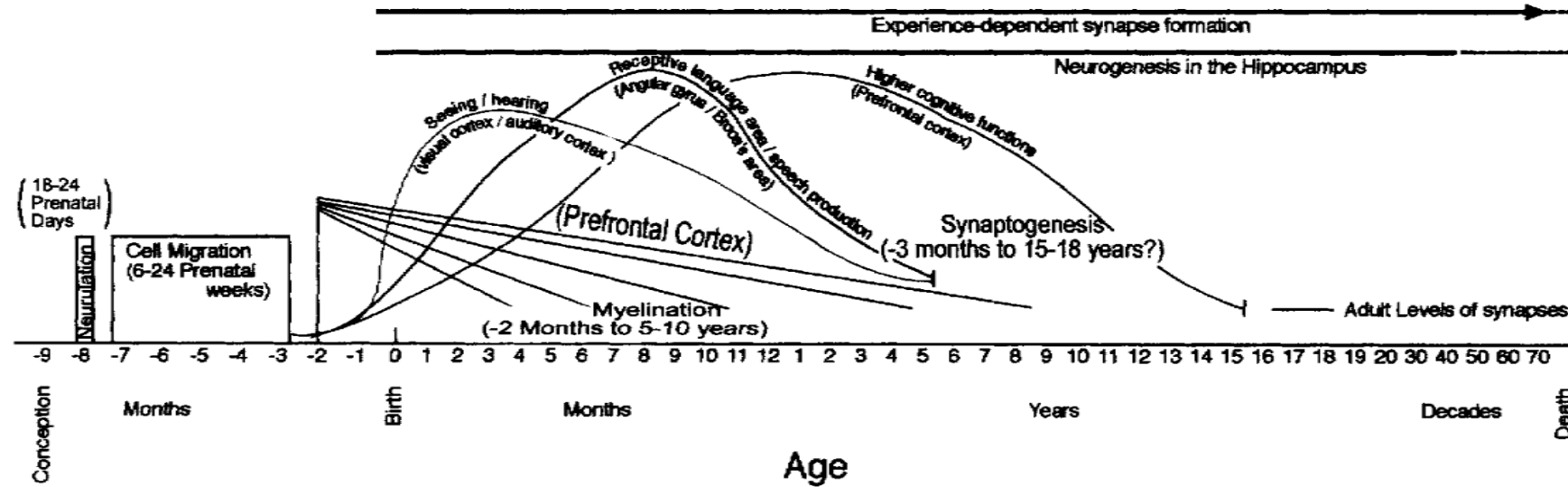
6 years old



14 years old

Photo: Andrew Sikorski

There Is A Critical Time And Order To Connections



Note. This graph illustrates the importance of prenatal events, such as the formation of the neural tube (neurulation) and cell migration; critical aspects of synapse formation and myelination beyond age three; and the formation of synapses based on experience, as well as neurogenesis in a key region of the hippocampus (the dentate gyrus), throughout much of life.

Figure 1 The Developmental Course of Human Brain Development

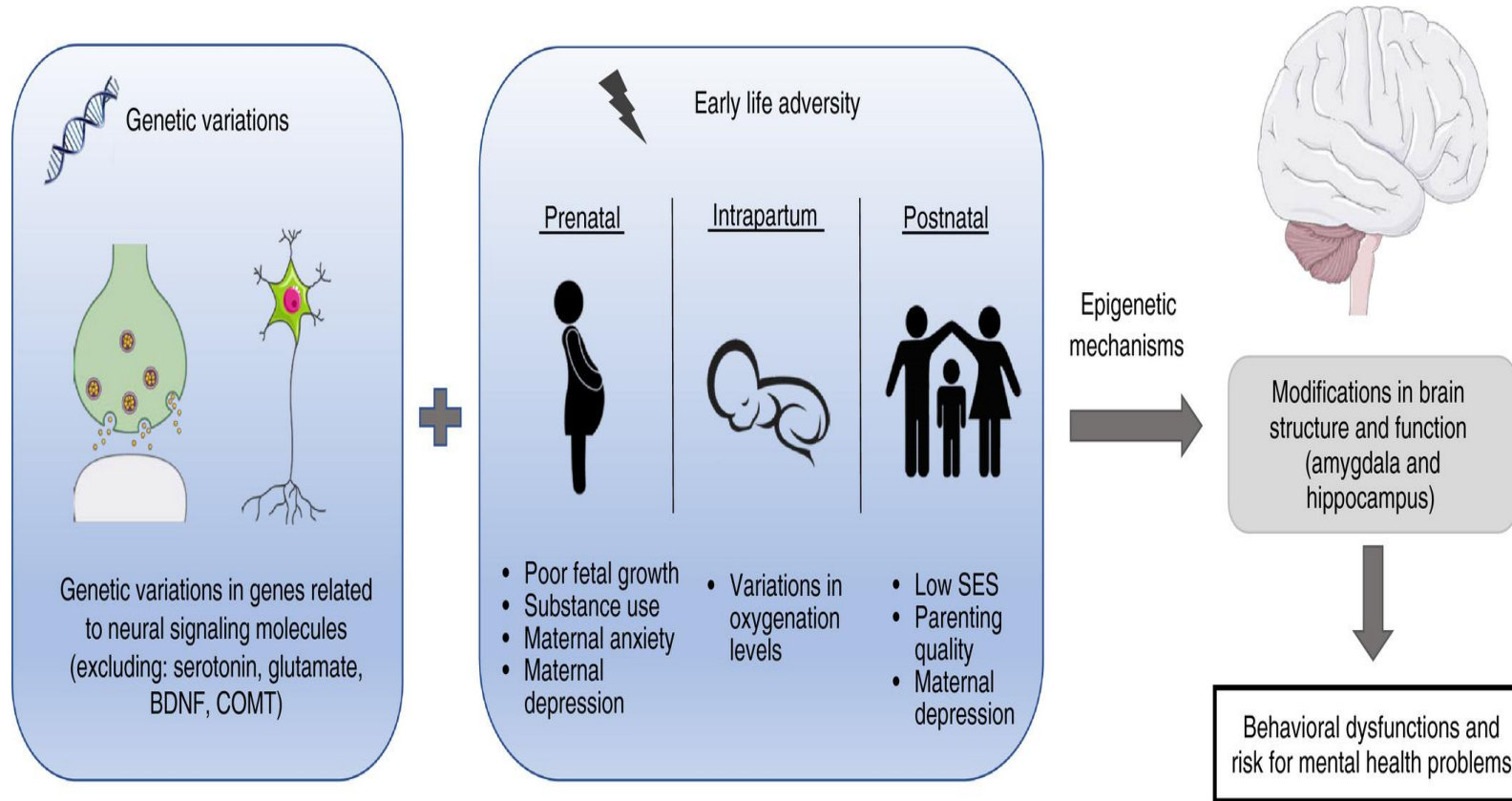
Published in American Psychologist 2001

Developmental science and the media. Early brain development.

R. Thompson, C. Nelson



How To Establish A Great Start?



Genetic and Physical Health (including nutrition) + Developmental Experiences (Including safety/People/ Interaction) = A Great Start

Examine A Brain Built By Positive Experience

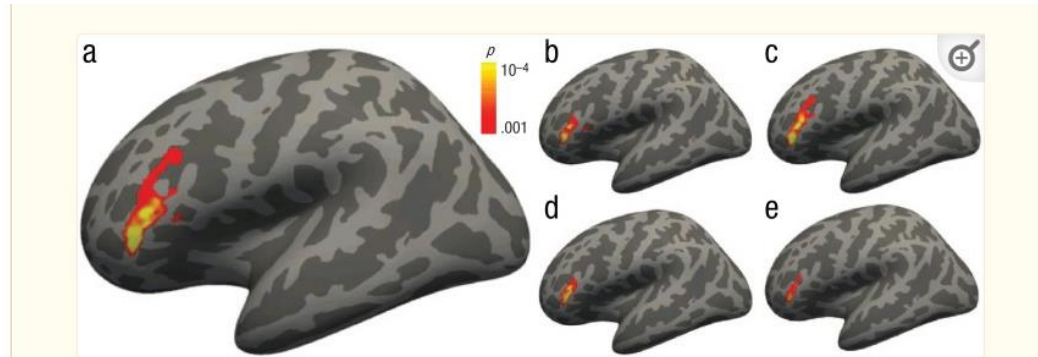
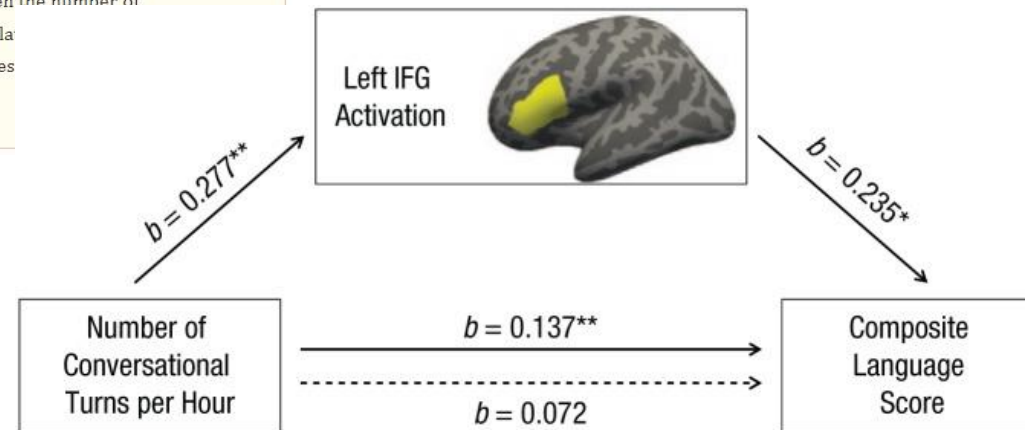


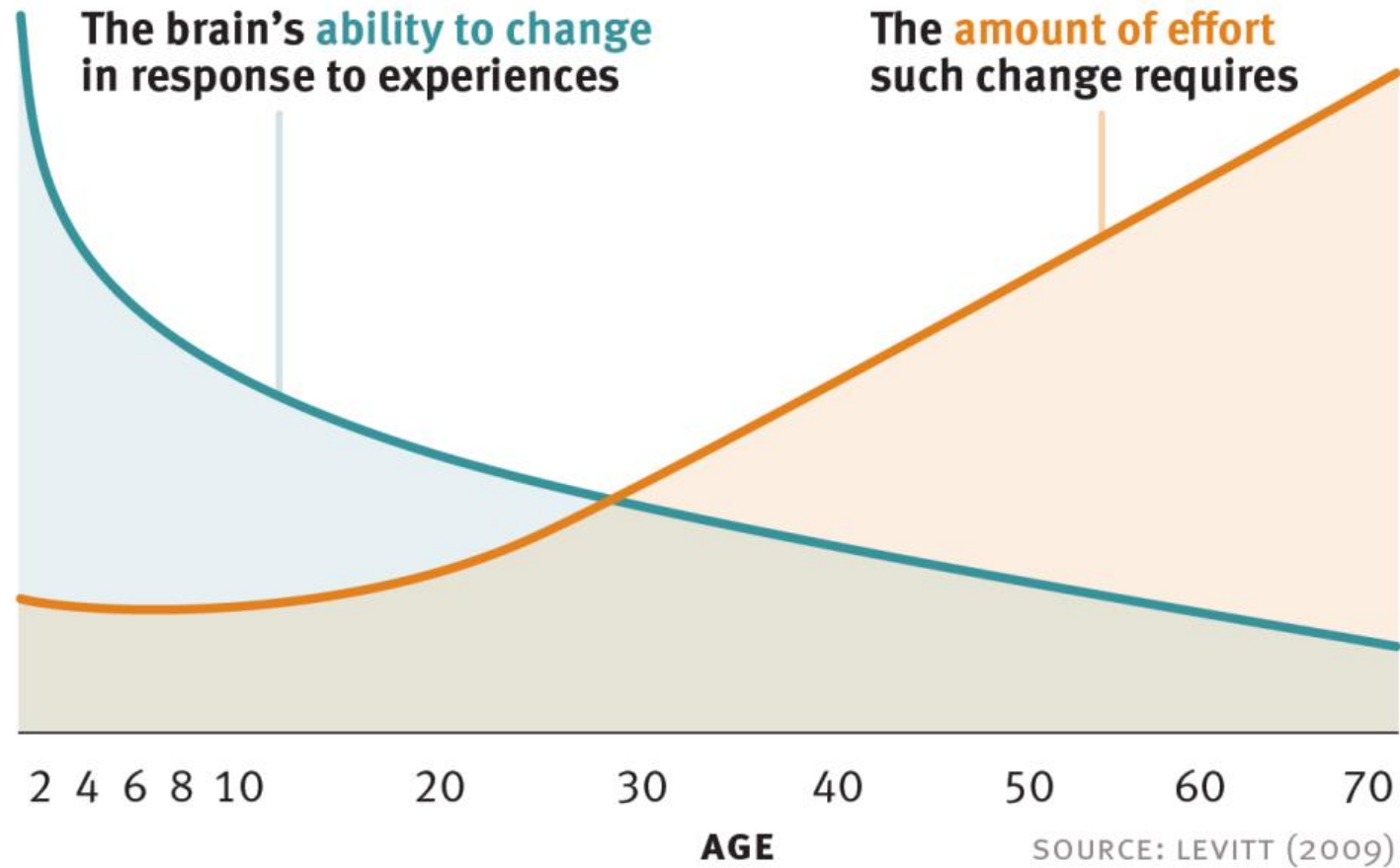
Fig. 5.

Correlations between activation during language processing and the number of hourly conversational turns children experienced. The brain image in (a) shows the zero-order correlation between the number of conversational turns and activation in the forward > backward speech contrast. Correlations when controlling for (b) parental education and income, (c) verbal and nonverbal assessments, (d) numbers of adult words and child utterances, and (e) all of these covariates.

Experience actually activated and built a part of the brain!

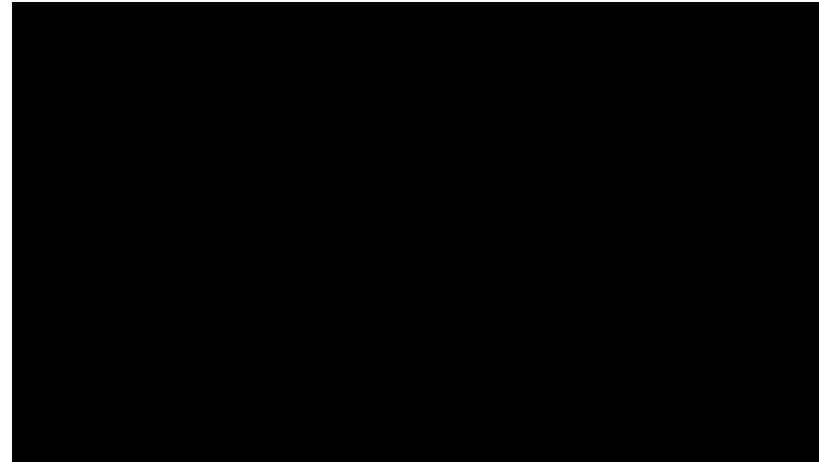


Building Off These Experiences Gets Harder



Serve And Return

- Young children naturally reach out for interaction through babbling, facial expressions, and gestures,
- Adults respond with the same kind of vocalizing and gesturing back at them.
- This back-and-forth process is fundamental to the wiring of the brain, especially in the earliest years.
- Foundational pathways are constructed to then allow all other learning that is to come
- Relationships for further learning are built as well



Take Aways



The substrate of the brain is built early



The brain requires experiences to build and shape



Attentive, loving adults can make this happen

HOW DO PEDIATRICIANS MONITOR THIS GROWTH?

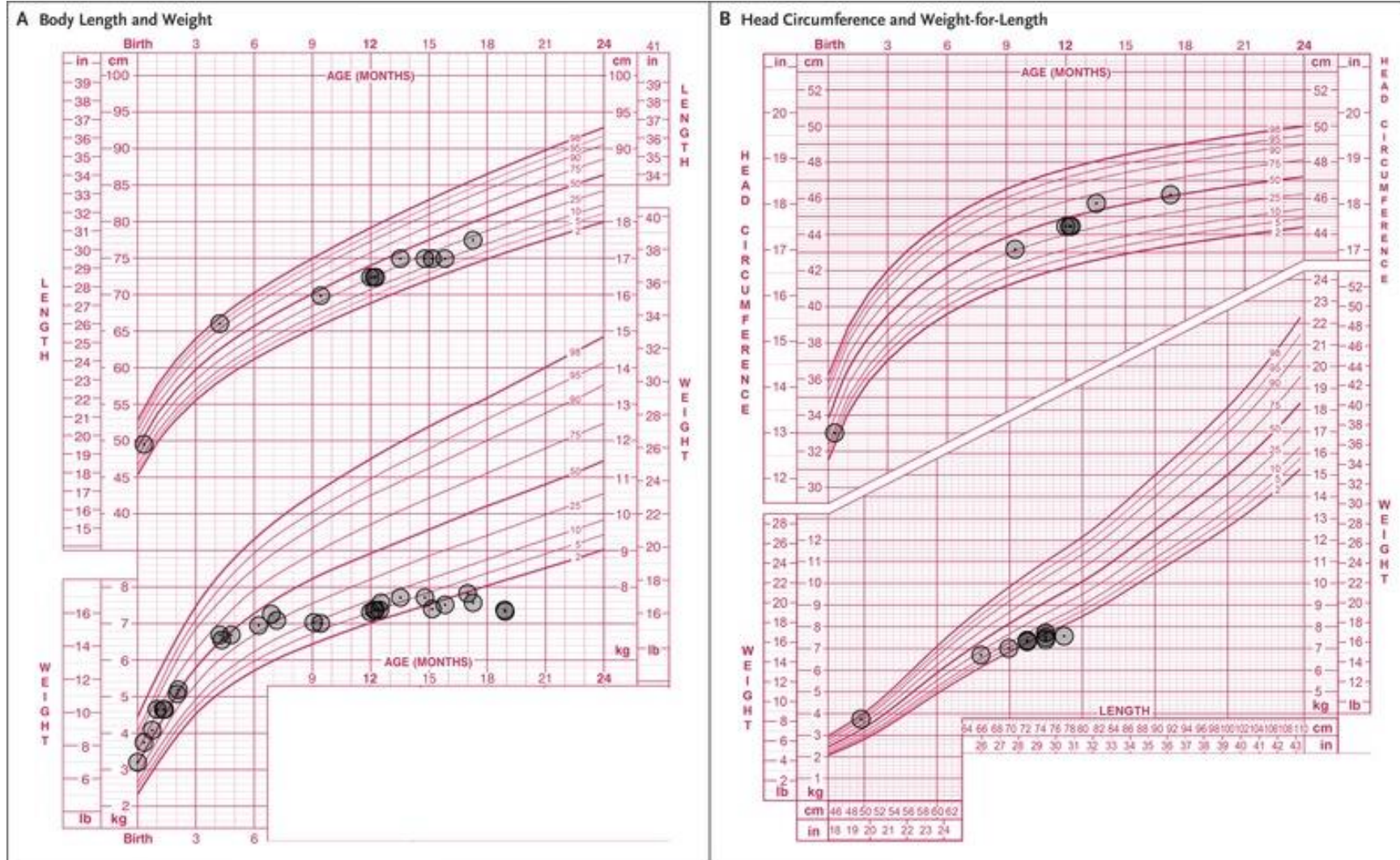
We Take Steps To Ensure Physical Health



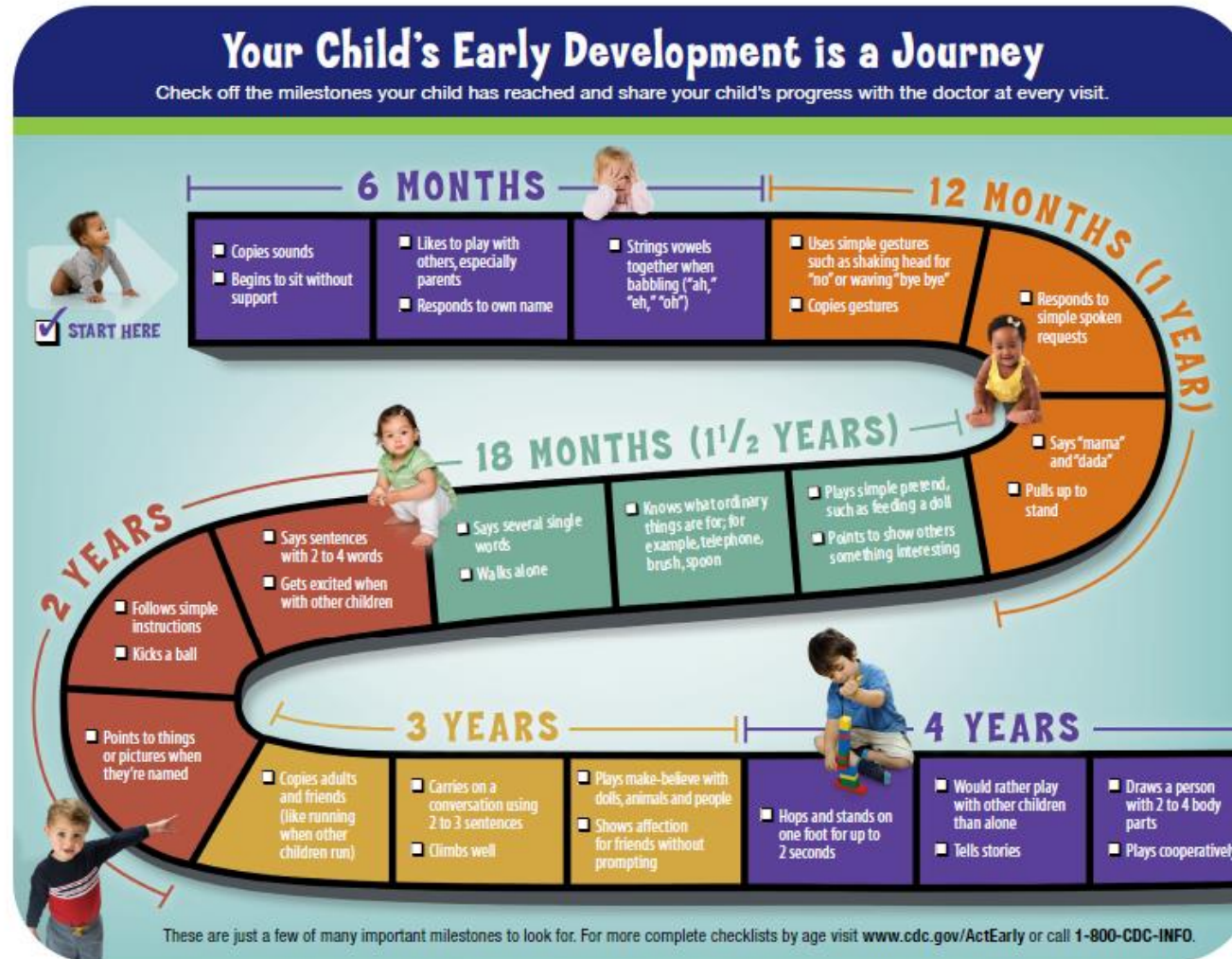
Pompe disease
Primary T-cell lymphopenias
Propionic acidemia
Severe combined immunodeficiency
Short-chain acyl-CoA dehydrogenase deficiency
Sickle cell disease
Sickle-C disease
Spinal muscular atrophy (SMA)
S-beta thalassemia
Trifunctional protein deficiency
Tyrosinemia (3 types)
Very long-chain acyl-CoA dehydrogenase deficiency
X-linked adrenoleukodystrophy
2-Methyl-3-hydroxybutyric acidemia
2-Methylbutyryl-CoA dehydrogenase deficiency
3-Hydroxy-3-methylglutaryl-CoA lyase deficiency
3-Methylcrotonyl-CoA carboxylase deficiency

- Newborn Blood Screening
- Hearing Screening
- Pulse Oximetry Screening
- Bilirubin Screening

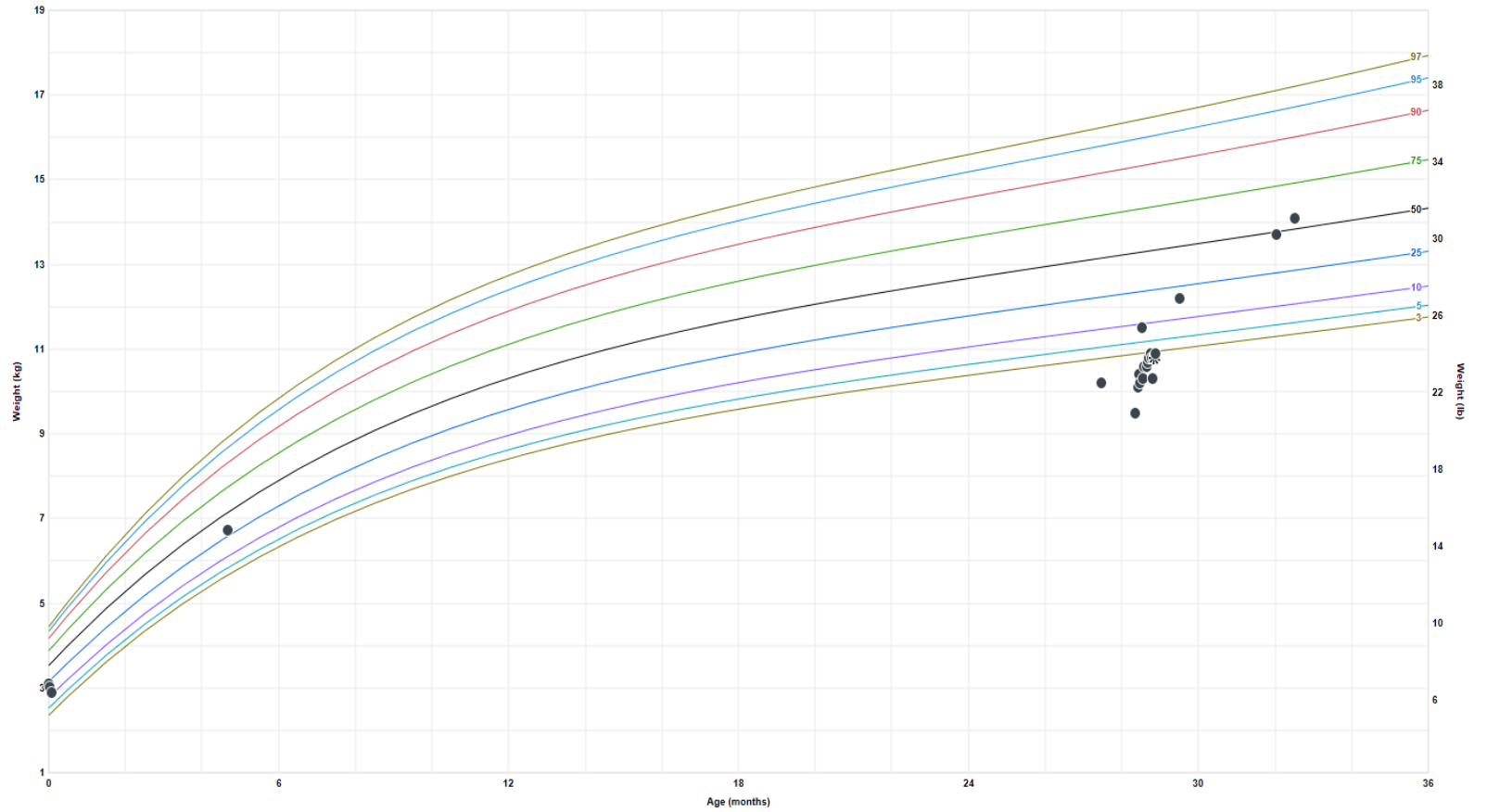
Growth Metrics



We Take Steps To Ensure Developmental And Social Health



Take Steps to Intervene and Promote Development Growth



Source: Centers for Disease Control and Prevention (CDC), 2000

Take Aways



Genetic and Physical Health (including nutrition) + Developmental Experiences (Including safety/people/interaction) = **A Great Start**



Missing any piece of this equation presents a challenge and part of a pediatrician's job to identify and support

ADVERSE CHILDHOOD EXPERIENCES (ACEs)

ACE Study From 1995 to 1997

AJPM American Journal of Preventive Medicine

A Journal of the American College of Preventive Medicine and Association for Prevention Teaching and Research

Articles & Issues ▾ Free CME Collections ▾ For Authors and Reviewers ▾ Journal Info ▾ Society Info

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[May 1998](#) Volume 14, Issue 4, Pages 245–258

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Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults

The Adverse Childhood Experiences (ACE) Study

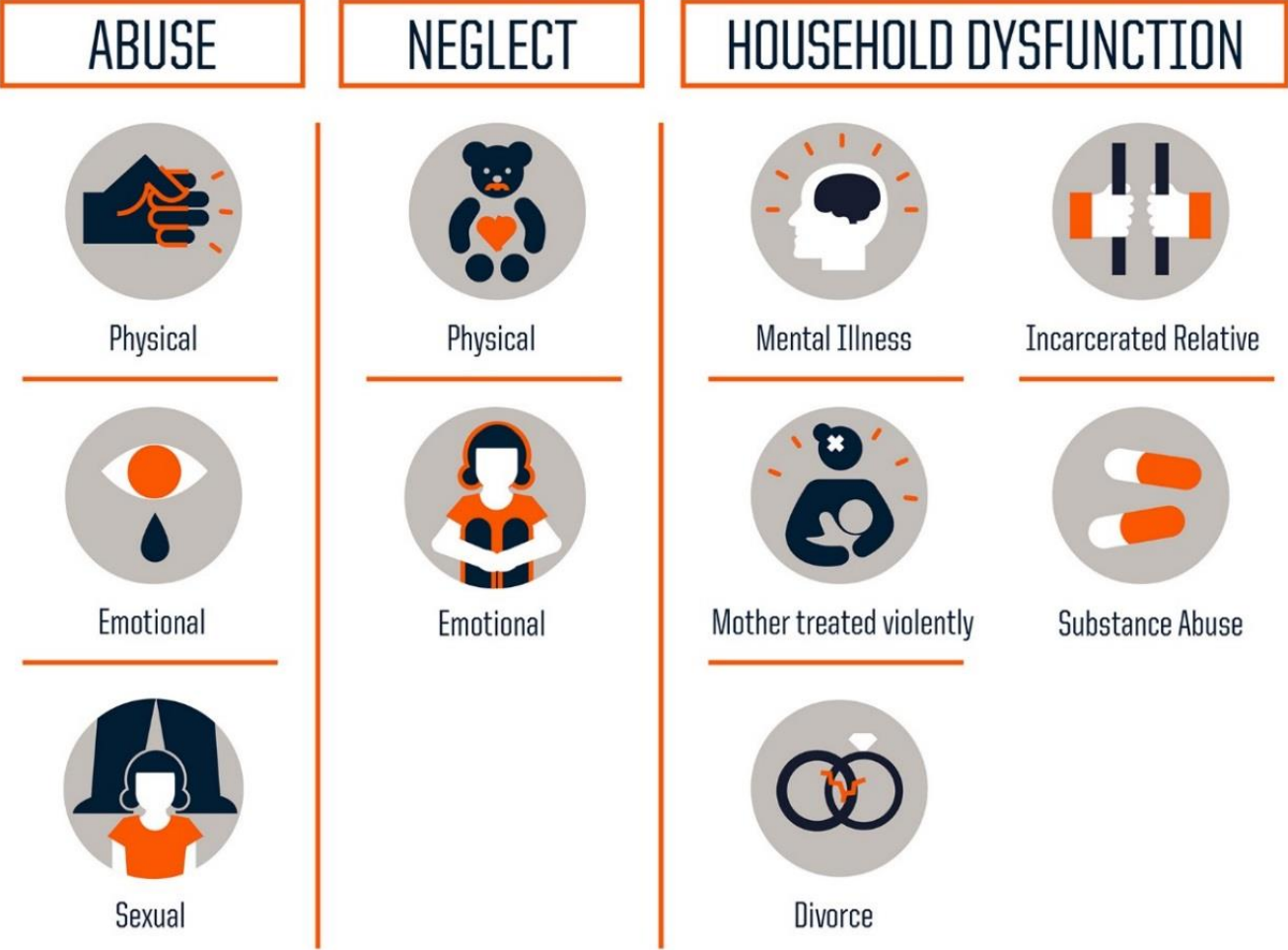
[Vincent J Felitti MD, FACP](#), [Robert F Anda MD, MS](#), [Dale Nordenberg MD](#), [David F Williamson MS, PhD](#), [Alison M Spitz MS, MPH](#), [Valerie Edwards BA](#), [Mary P Koss PhD](#), [James S Marks MD, MPH](#)

 PlumX Metrics

DOI: [https://doi.org/10.1016/S0749-3797\(98\)00017-8](https://doi.org/10.1016/S0749-3797(98)00017-8)

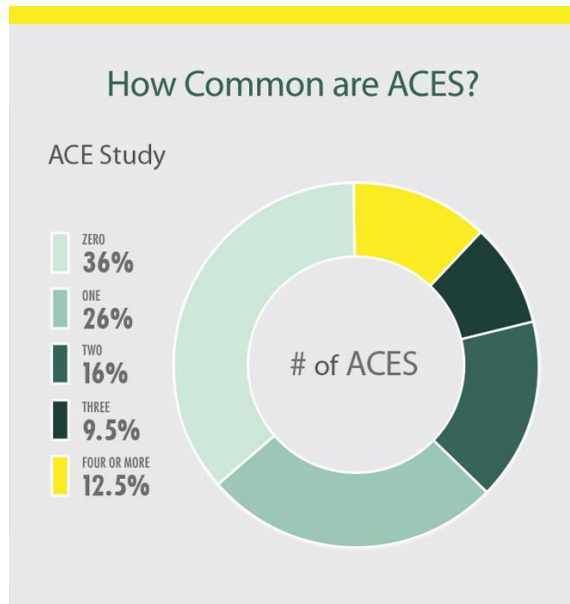
Demographic Information	Percent (N = 17,337)
Gender	
Female	54.0%
Male	46.0%
Race/Ethnicity	
White	74.8%
Hispanic/Latino	11.2%
Asian/Pacific Islander	7.2%
African-American	4.5%
Other	2.3%
Age (years)	
19-29	5.3%
30-39	9.8%
40-49	18.6%
50-59	19.9%
60 and over	46.4%
Education	
Not High School Graduate	7.2%
High School Graduate	17.6%
Some College	35.9%
College Graduate or Higher	39.3%

What Are The ACEs?



ACEs are...

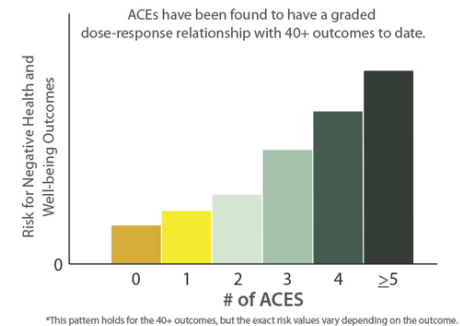
1 Very Common



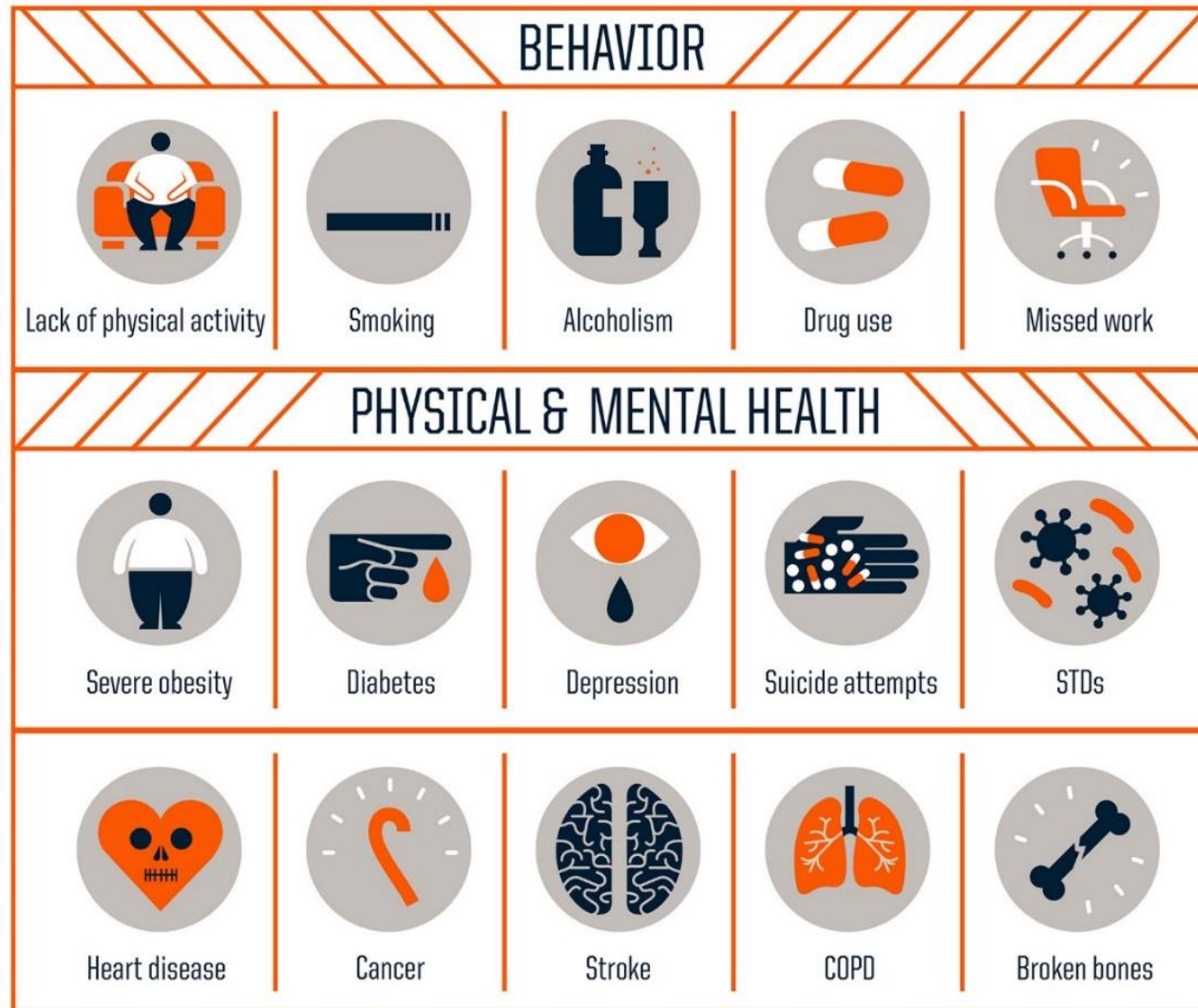
2 Dose Responsive

ACEs can have lasting effects on....

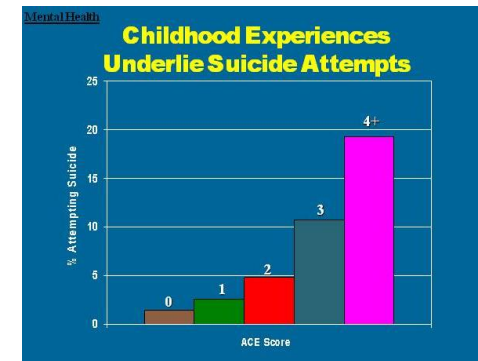
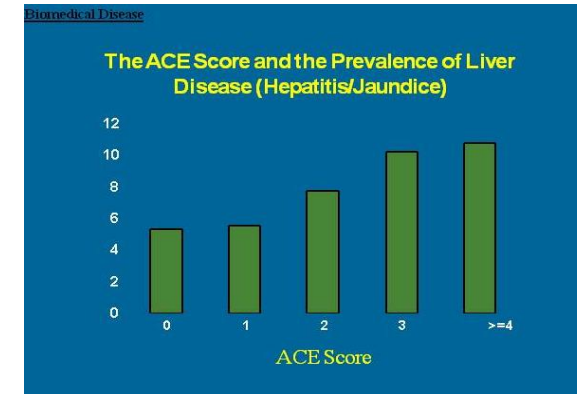
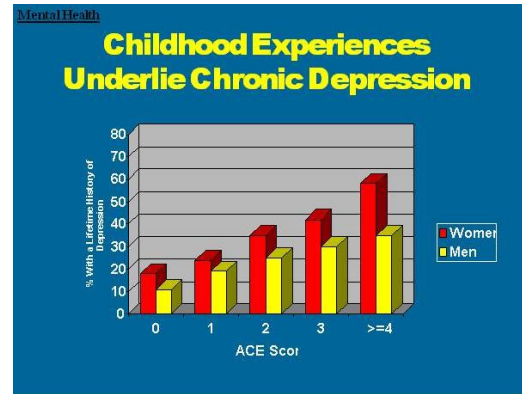
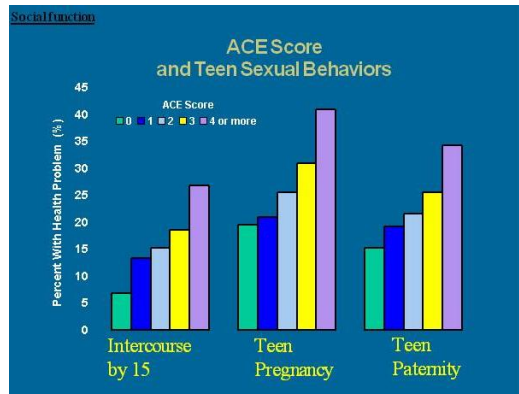
-  Health (obesity, diabetes, depression, suicide attempts, STDs, heart disease, cancer, stroke, COPD, broken bones)
-  Behaviors (smoking, alcoholism, drug use)
-  Life Potential (graduation rates, academic achievement, lost time from work)



Measured Outcomes

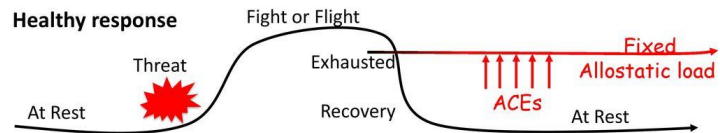


Stepwise Relationship To All Sorts Of Challenges



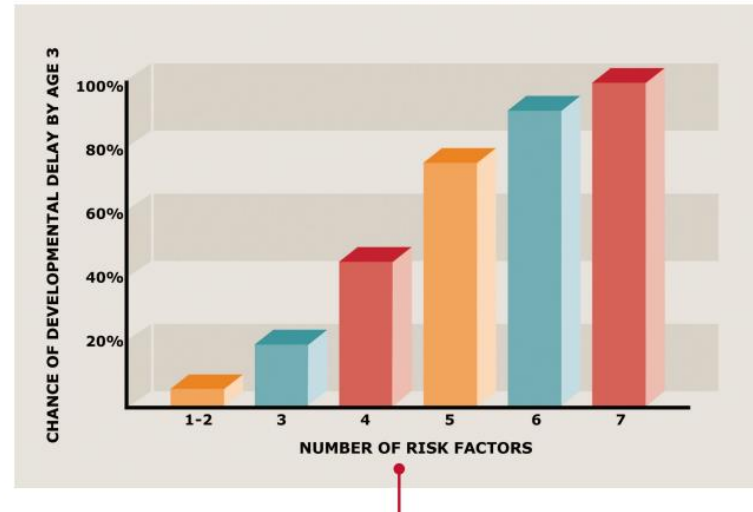
The Impact of ACEs on Brain Development

The Impact of ACEs on Brain Development

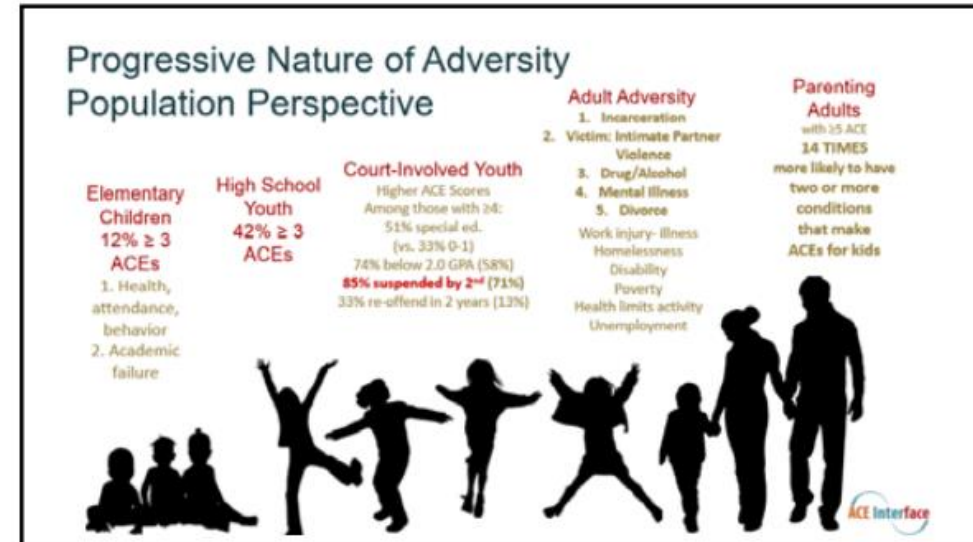
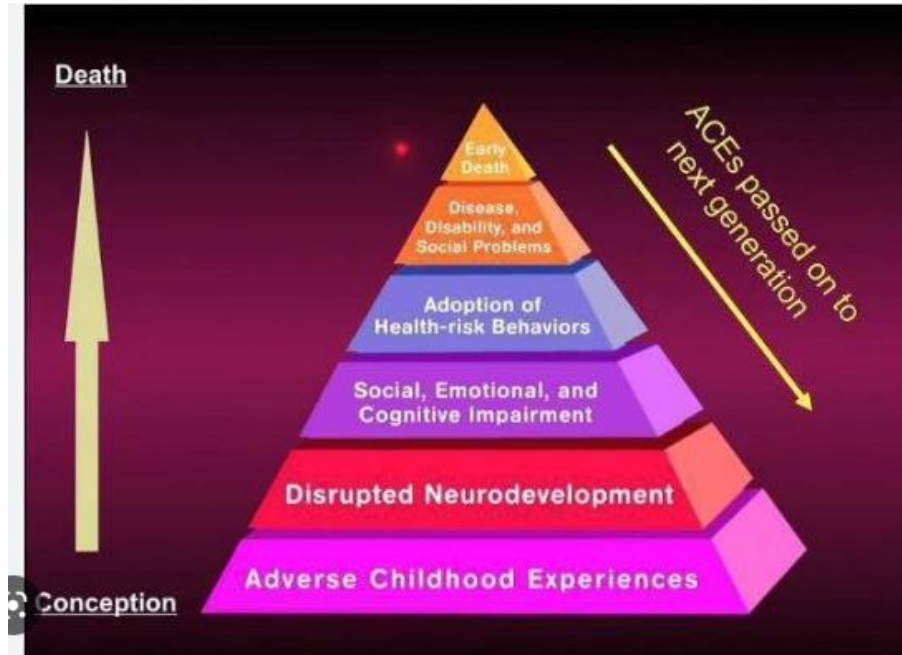


Chronic Stress from ACEs over-develop 'life-preserving' part of the brain.

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



How Do Aces Affect The Lifespan



Stress is **NOT** trauma

Positive Stress

- Normal part of healthy development
- Brief inc HR, BP
- Mild inc stress hormones

- *Ex: school test, sports game*

Tolerable Stress

- Stressful event is buffered by caring adult relationships

- *Ex: death of a loved one, divorce, or natural disaster AND a nurturing and protective caregiver*

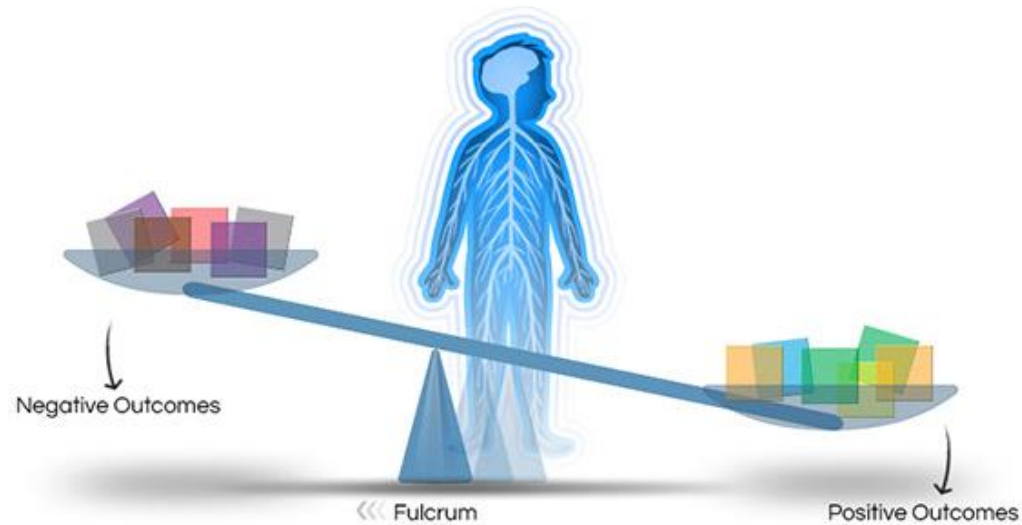
Toxic Stress

- Frequent or prolonged adversity
- Disrupts brain dev and inc risk of chronic disease
- *Ex: abuse, neglect, caregiver with mental illness or substance use, experiencing discrimination, witnessing violence*

Intense, prolonged exposure without a protective caregiver

Protective, nurturing adult caregiver to buffer the impact

Resiliency Can Be Built in Several Ways



- At least one stable relationship with a caregiver, adult
- Building a sense of self efficacy and control
- Skills of self regulatory capacity
- Culture, faith, hope
- Learning to cope with manageable positive stresses














PATHWAYS TO RESILIENCE

Resilience is the ability to bounce back from setbacks in our lives. It is the way we can prevent stress from causing serious physical, mental and emotional issues. Practicing positive and often simple activities can actually **retrain our brain to be more resilient!**






FOR CHILDREN

-  Positive Role Models
-  Supportive Adults
-  Parental Involvement
-  Caring Community
-  Increased Parent-Infant Contact
-  Increased Knowledge of Child Development

FOR EVERYONE

-  Supportive Relationships
-  Healthy Food
-  Exercise
-  Smile
-  Talk About Feelings
-  Music
-  Art
-  Walk in the Woods
-  Gratitude
-  Positive Thoughts
-  Laugh
-  Hope
-  Volunteer

FOR ADULTS

-  Acknowledge Trauma
-  Seek Support
-  Identify Emotional Triggers
-  Mental Health and Substance Abuse Treatment
-  Create Safe and Stable Nurturing Relationships

Additional Screening

AAP Policy Statement

Screen for risk factors within social determinants of health during patient encounters. Practices can use a brief written screener or verbally ask family members questions about basic needs, such as food, housing, and heat. Screening for basic needs can help uncover not only obvious but also less apparent economic difficulties experienced by families. As patient-centered medical homes continue to develop, care coordinators will fulfill the role of community liaison for families in poverty, connecting them with needed resources.

Child and Teen Check Up

C&TC Requirements

Procedure

Health history includes, but is not limited to:

- Complete medical and family history
- Child in foster care or out-of-home placement
- Medications (prescription and non-prescription) and supplements
- Identification of mental health needs or risks and history of trauma
- Information on sexual development and maturation
- Risk of exposure to lead, tuberculosis, and sexually transmitted infections (STI)
- Nutritional intake
- Chemical use, abuse, and risks
- Social determinants of health
- Child, adolescent, family protective factors

Social Determinants of Health

The Social Determinants of health, just as biological factors, play a critical role in health outcomes. The new [Bright Futures Guidelines \(www.brightfutures.aap.org\)](http://www.brightfutures.aap.org) identify a range of SDH to consider, such as:

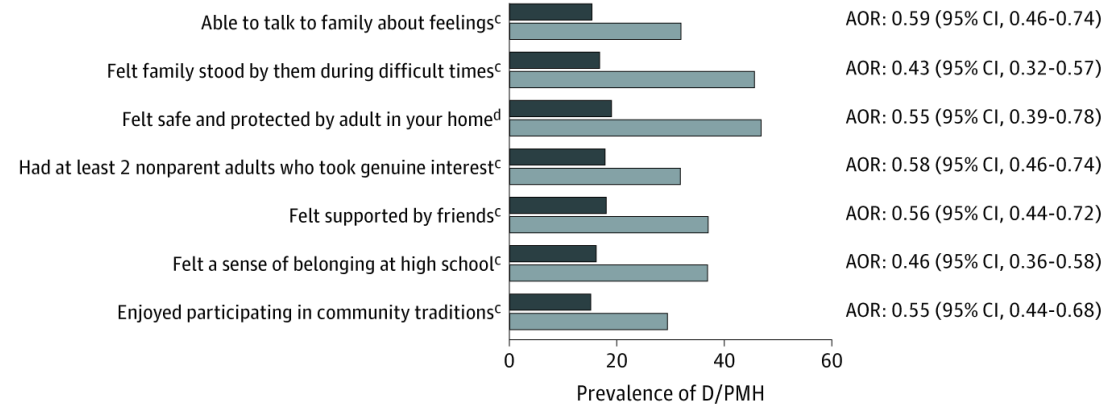
- Family and youth strengths and protective factors such as strong social supports, sources of concrete support in times of need, sense of community or spirituality, personal resilience
- Socioeconomic factors such as neighborhood safety, housing stability, food security, adequate employment, and access to transportation or other basic needs
- Factors affecting family functioning, such as domestic or neighborhood violence; family substance use disorder or mental health issues, parental incarceration, youth involvement in the juvenile justice system, or other Adverse Childhood Experiences (ACEs) that may affect parent or child well-being

An example of a screening questionnaire for SDH can be found here: [Standardized Screening for Health-Related Social Needs in Clinic Settings: The Accountable Health Communities Screening Tool \(www.nam.edu\)](http://www.nam.edu)

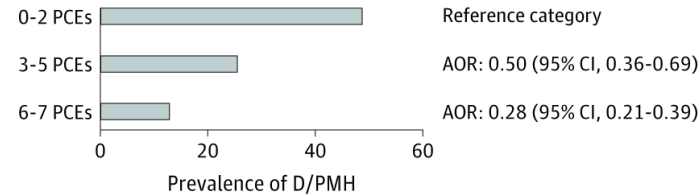
Positive Childhood Experiences

Very often or often^c/most or all of the time^d
 Never, rarely, or sometimes^c/never, a little, or some of the time^d

A PCEs, single items^{a,b}



B Cumulative score^{a,b}



*Bethell et al.

Positive Relationships &
 Experiences
 =
 Improved Mental Health

We Care

WE CARE SURVEY

Our goal at the Harriet Lane Clinic is to provide the best possible care for your child and family. We would like to make sure that you know all the resources that are available to you for your problems. Many of these resources are free of charge. Please answer each question with an "X" and hand it in to your child's doctor at the beginning of the visit. Thank You!

1. Do you have a high school degree?

YES

NO If NO, would you like help to get a GED? YES NO MAYBE

2. Do you have a job?

YES

NO If NO, would you like help with finding employment? YES NO MAYBE

3. Do you smoke cigarettes?

YES

NO If YES, would you like help to quit? YES NO MAYBE

4. Do you or does anyone else in your home use drugs?

YES

NO If YES, would you like help with it? YES NO MAYBE

5. Do you or does anyone else in your home have a problem with alcohol?

YES

NO If YES, would you like help with it? YES NO MAYBE

6. Are you feeling sad or hopeless a lot of the time?

YES

NO If YES, would you like help with it? YES NO MAYBE

◀ ▶ 2 of 3

7. Does your partner hit or verbally abuse you? YES

YES

NO If YES, would you like help?

8. Do you need daycare for your child? YES

YES

NO If YES, would you like help finding it?

9. Do you think you are at risk of becoming homeless? YES

YES

NO If YES, would you like help with this?

10. Do you need help in getting food by the end of the month? YES

YES

NO If YES, would you like help with this?

In case your child's doctor cannot address all these issues at this visit, please rank that you wish to talk about in order of importance.

1. Most important

2.

3. Least important

◀ ▶ 3 of 3



Parent Questionnaire - R

Dear Parent or Caregiver: Being a parent is not always easy. We want to help families have a safe environment for kids. So, we're asking everyone these questions about problems that affect many families. If there's a problem, we'll try to help.

Please answer the questions about your child being seen today for a checkup. If there's more than one child, please answer "yes" if it applies to any one of them. This is voluntary. You don't have to answer any question you prefer not to. This information will be kept private, unless we're worried about your child's safety.

Today's Date: / /

Child's Name: _____

Child's Date of Birth: / /

Relationship to Child: _____

PLEASE CHECK

- Yes No Would you like us to give you the phone number for Poison Control?
- Yes No Do you need to get a smoke alarm for your home?
- Yes No Does anyone smoke at home?
- Yes No In the past 12 months, did you worry that your food would run out before you could buy more?
- Yes No In the past 12 months, did the food you bought just not last and you didn't have money to get more?
- Yes No Do you often feel your child is difficult to take care of?
- Yes No Do you sometimes find you need to slap or hit your child?
- Yes No Do you wish you had more help with your child?
- Yes No Do you often feel under extreme stress?
- Yes No Over the past 2 weeks, have you often felt down, depressed, or hopeless?
- Yes No Over the past 2 weeks, have you felt little interest or pleasure in doing things?

Thinking about the past 3 months

- Yes No Have you and a partner fought a lot?
- Yes No Has a partner threatened, shoved, hit or kicked you or hurt you physically in any way?
- Yes No Have you had 4 or more drinks in one day?

SEEK

www.seekwellbeing.org

Health Leads

RECOMMENDED SCREENING TOOL

Health Leads' screening toolkit is licensed under a Creative Commons CC BY-SA 4.0 license, which means you can freely share and adapt the tool however you like. All we ask is you include attribution to Health Leads and, if you modify the tool, that you distribute the modifications under the same licensing structure. [Full details on the Creative Commons license are available here.](#)

Example introductory text: This form is available in other languages. If you do not speak English, call (800) 555-6666 (TTY: (800) 777-8888) to connect to an interpreter who will assist you at no cost.

Name: _____ Phone number: _____

Preferred Language: _____ Best time to call: _____

		Yes / No
	In the last 12 months*, did you ever eat less than you felt you should because there wasn't enough money for food?	<input type="checkbox"/> Y <input type="checkbox"/> N
	In the last 12 months, has the electric, gas, oil, or water company threatened to shut off your services in your home?	<input type="checkbox"/> Y <input type="checkbox"/> N
	Are you worried that in the next 2 months, you may not have stable housing?	<input type="checkbox"/> Y <input type="checkbox"/> N
	Do problems getting child care make it difficult for you to work or study? (leave blank if you do not have children)	<input type="checkbox"/> Y <input type="checkbox"/> N
	In the last 12 months, have you needed to see a doctor, but could not because of cost?	<input type="checkbox"/> Y <input type="checkbox"/> N
	In the last 12 months, have you ever had to go without health care because you didn't have a way to get there?	<input type="checkbox"/> Y <input type="checkbox"/> N
	Do you ever need help reading hospital materials?	<input type="checkbox"/> Y <input type="checkbox"/> N
	Do you often feel that you lack companionship?	<input type="checkbox"/> Y <input type="checkbox"/> N
	Are any of your needs urgent? For example, I don't have food tonight, I don't have a place to sleep tonight	<input type="checkbox"/> Y <input type="checkbox"/> N
	If you checked YES to any boxes above, would you like to receive assistance with any of these needs?	<input type="checkbox"/> Y <input type="checkbox"/> N

*Time frames can be altered as needed

What about Asset-Based Discussions?

- *Identify and build on family strengths and protective factors. Although families in poverty face many challenges, each family has strengths, capabilities, and protective factors. Pediatricians can strive to identify and build on protective factors within families, such as cohesion, humor, support networks, skills, and spiritual and cultural beliefs.^{96,97} By approaching families from a strengths-based perspective, pediatricians can help build trust and identify the assets on which a family can draw to effectively address problems and care for their children.*

Positive Childhood Experiences and HOPE and ABCD

1. Felt able to talk to their family about feelings
2. Felt their family stood by them during difficult times
3. Enjoyed participating in community traditions
4. Felt a sense of belonging in high school (not including those who did not attend school or were home schooled)
5. Felt supported by friends
6. Had at least 2 nonparent adults who took genuine interest in them
7. Felt safe and protected by an adult in their home.

Take Aways



Challenging situations early in life are common and they add up



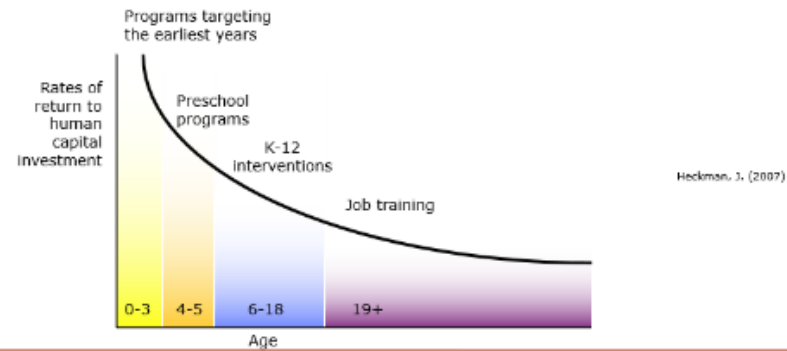
They affect early childhood development and long-term health. They change patterns of behavior and physiology



They are not destiny and relationships, and learning can help build resiliency

An impressive ROI

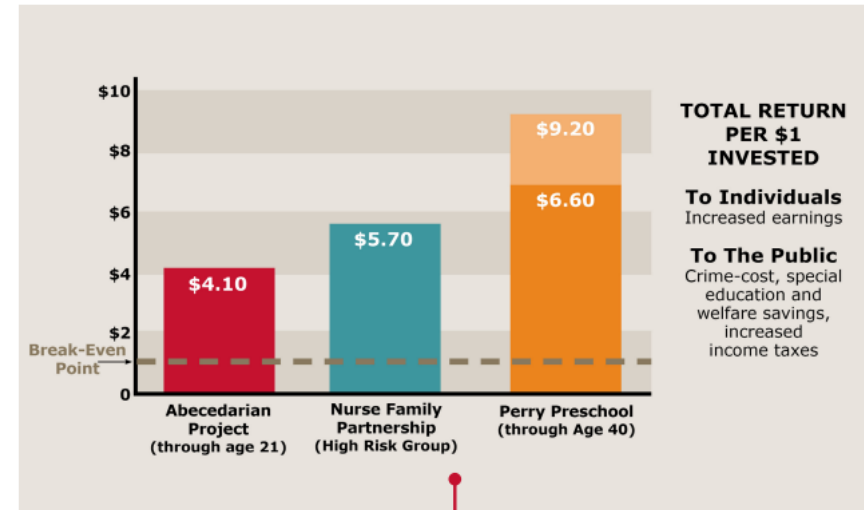
Preventive Intervention is More Efficient and Produces Higher Returns than Later Remediation



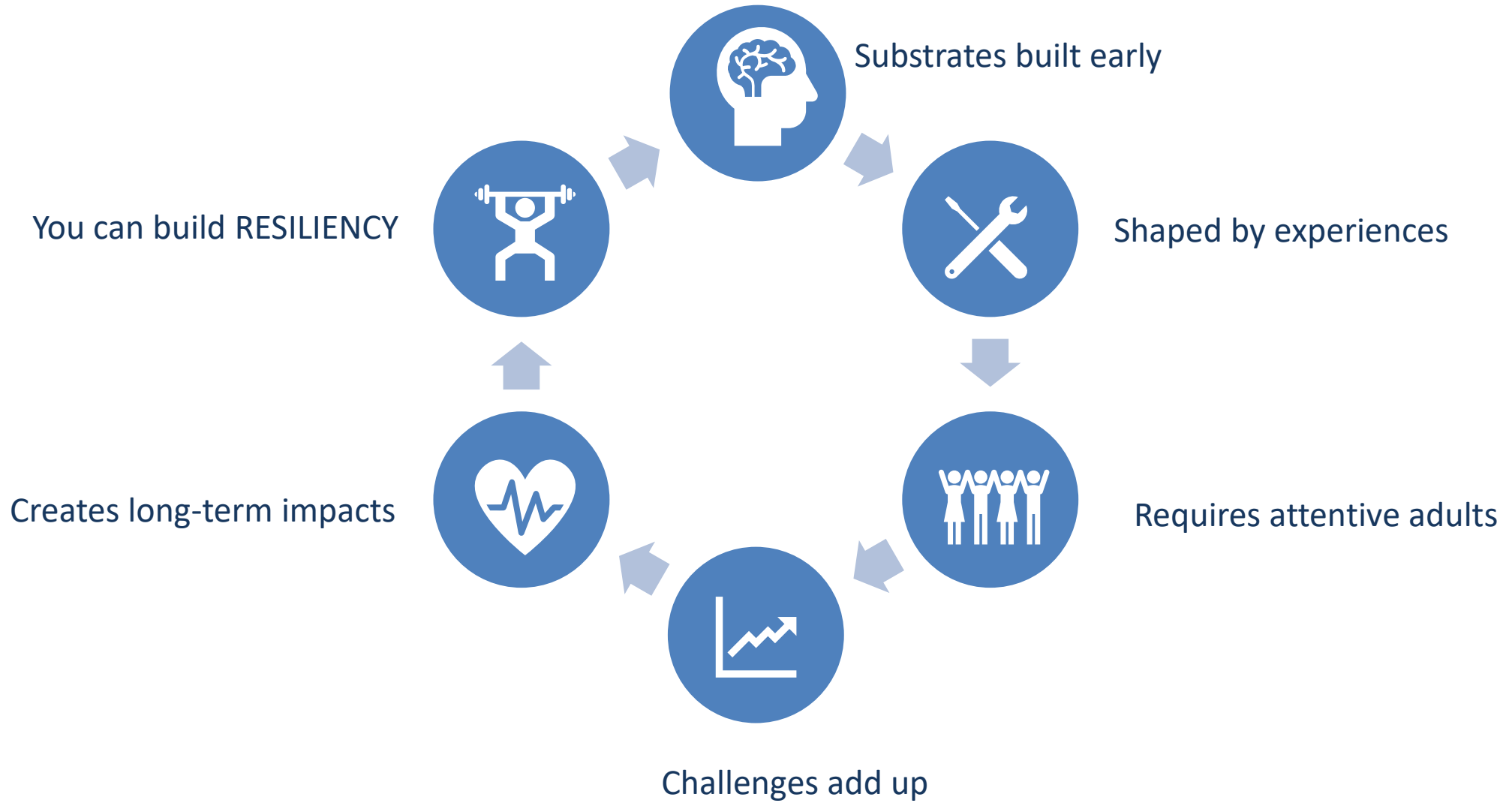
College of Education and Human Development

UNIVERSITY OF MINNESOTA
INSTITUTE OF CHILD DEVELOPMENT

\$4-\$9 IN RETURNS FOR EVERY DOLLAR INVESTED IN EARLY CHILDHOOD PROGRAMS



Summary




What Can We Do?

Physical Health + Developmental Experiences = A Great Start

- Are we supporting and encouraging new families in these areas?
 - Nutrition
 - Resources to be safe and healthy
 - Parenting skills and support
 - Social Connections and Community, Childcare
- Are we supporting and encouraging children in these areas?
 - Nutrition screening
 - Responsive Care and consistency of care
 - Language Development and Talking to children
 - Social connections
- Are we actively combating adverse experiences and building resilience?

QUIZ



 YouTube



Hennepin Health

your community health plan

THANK YOU

Questions and Open Discussion

Thank You!

Evaluation – [link at sign-off](#)



Certificate of Participation –upon completion of Evaluation



Recording - [Performance Improvement Project \(PIP\): Healthy Start for Minnesota Children - Stratis Health](#)