



What Happens Early Affects the Rest of Our Lives

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Director

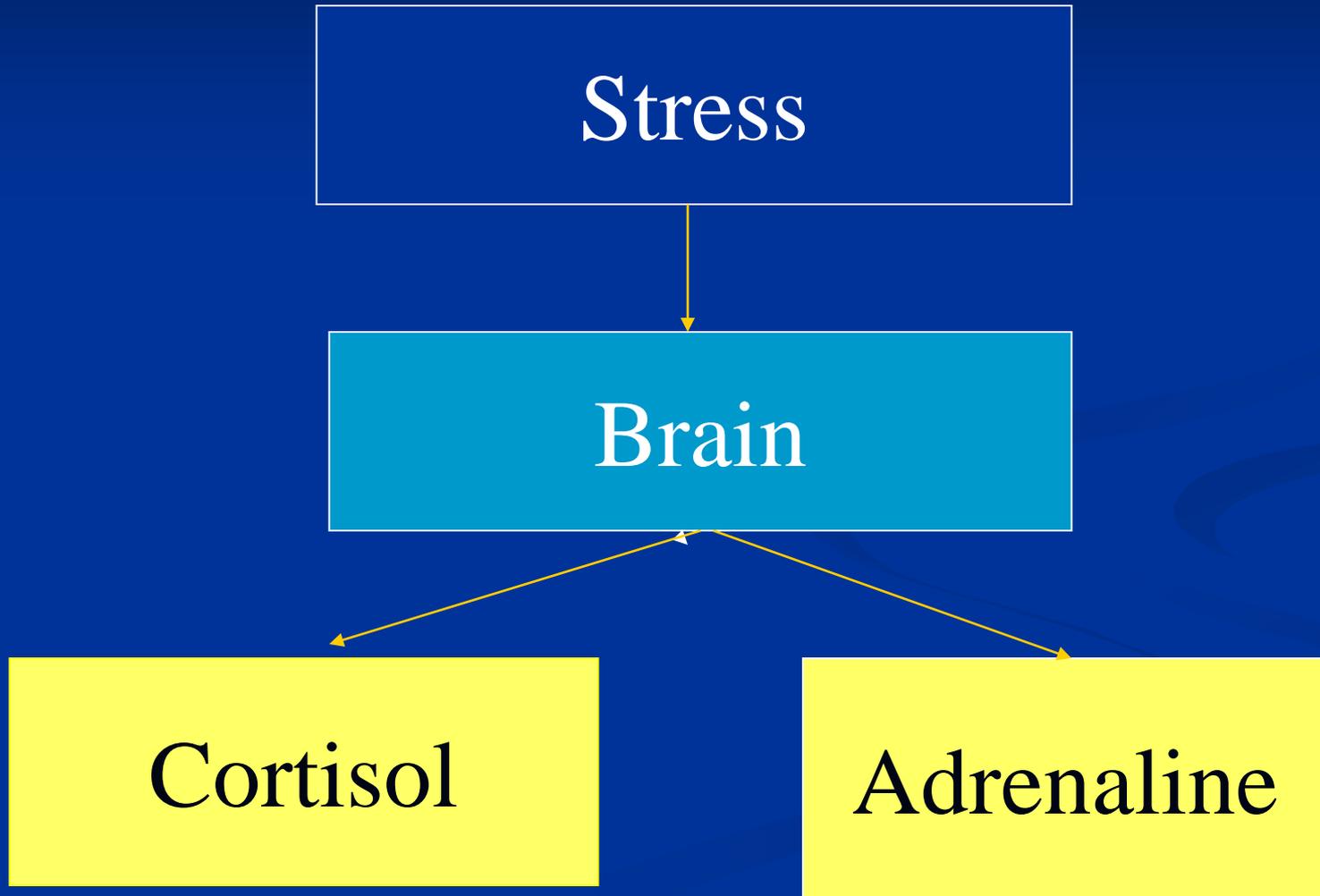
Division of Diabetes Treatment and Prevention
Indian Health Service



Think of something that didn't go your way today

- What thoughts went through your mind?
- What emotion(s) did you experience?
- What did it feel like?
- Where did you feel it in your body?

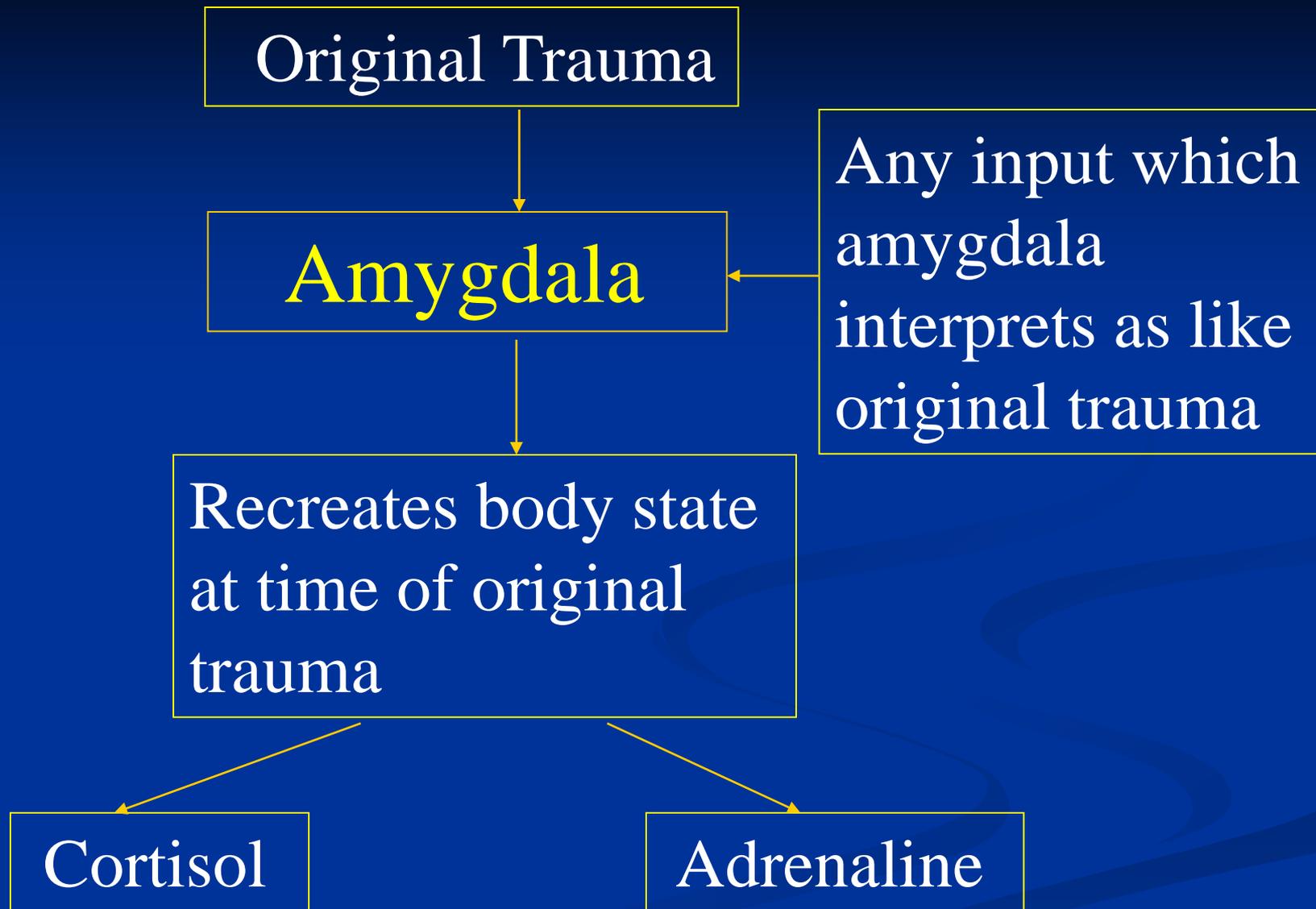
Basic Stress Pathway





Sorting out Stress and Trauma

- **Stress:** anything that requires a response, can be “good” or “bad”
- **Trauma:** anything that *overwhelms* our ability to respond, especially if we perceive that our life or our connection to things that support us physically or emotionally is threatened
 - Can cause lasting changes in the brain and body that increase risk for many problems



Original emotion re-experienced: fear, rage, sadness

Adapted from LeDoux, *The Emotional Brain*, 1996



Nadine Burke Harris

“When we understand that the source of so many of our society’s problems is exposure to childhood adversity, the solutions are as simple as reducing the dose of adversity for kids and enhancing the ability of caregivers to be buffers.”

The Deepest Well: Healing the Long-term Effects of Childhood Adversity
2018

Our Current Path—

An all-too-common story: “Mary”

■ Pre-conception

- Mother’s grandparents went to boarding school, parents have had trouble with alcohol; most of them developed diabetes
- Family income below poverty line, buy food at reservation store

■ Pregnancy and Birth

- Single 15 year old, won’t say who the father is
- Intermittent prenatal care
- WIC foods have to be shared with family
- Stopped using drugs when found out she was pregnant, cut down but continued smoking and got drunk “just a few times”
- Mostly kept going to high school thru pregnancy
- Mary born slightly SGA at 35 weeks gestation, spent 2 wks in hospital

“Mary”

■ Early Life

- Grandmother already overwhelmed caring for other grandchildren, but agreed to watch Mary while mother tried to stay in school
 - Mary often sitting in front of TV most of day
- Then put into tribal child care
 - High staff turnover, minimal teacher-student ratio
- Family got by on commodities and WIC foods
- Mary gained weight rapidly in 1st yr, then stayed >95th % ile
- Mother’s boyfriend moved in
 - Intermittently employed, binged on alcohol and drugs, sometimes hit mother in front of Mary
- Mary held back to repeat 2nd grade as reading difficulties
- Mary left school after 10th grade

■ Now Mary becomes pregnant...



Trauma in Children

- When trauma occurs during *development* of brain and body systems, can have lifelong impact
- Similar Terms:
 - **Toxic stress:** when a child experiences *strong, frequent, and/or prolonged adversity*—such as physical or emotional abuse, chronic neglect, caregiver substance abuse or mental illness, exposure to violence, and/or the accumulated burdens of family economic hardship—*without adequate adult support*.

Harvard Center on the Developing Child
 - **Complex Trauma** is both children's *exposure* to multiple traumatic events, often of an invasive, interpersonal nature, and the wide-ranging, long-term *impact* of this exposure.

National Child Traumatic Stress Network
- **Adverse Childhood Experiences (ACE):** abuse, neglect, and/or household dysfunction experienced in childhood
 - Increase risk at any level: graded, dose-response relationship



Adverse Childhood Experiences (ACEs)

- Physical Abuse
 - Emotional Abuse
 - Sexual Abuse
 - Family Substance Abuse
 - Family Mental Illness
 - Incarcerated Family Member
 - Parental Separation/Divorce
 - Seeing Mother Physically Abused
 - Physical Neglect
 - Emotional Neglect
-
- ACE “score” = number of **categories** experienced before age 18 yrs



ACES can have lasting effects on....



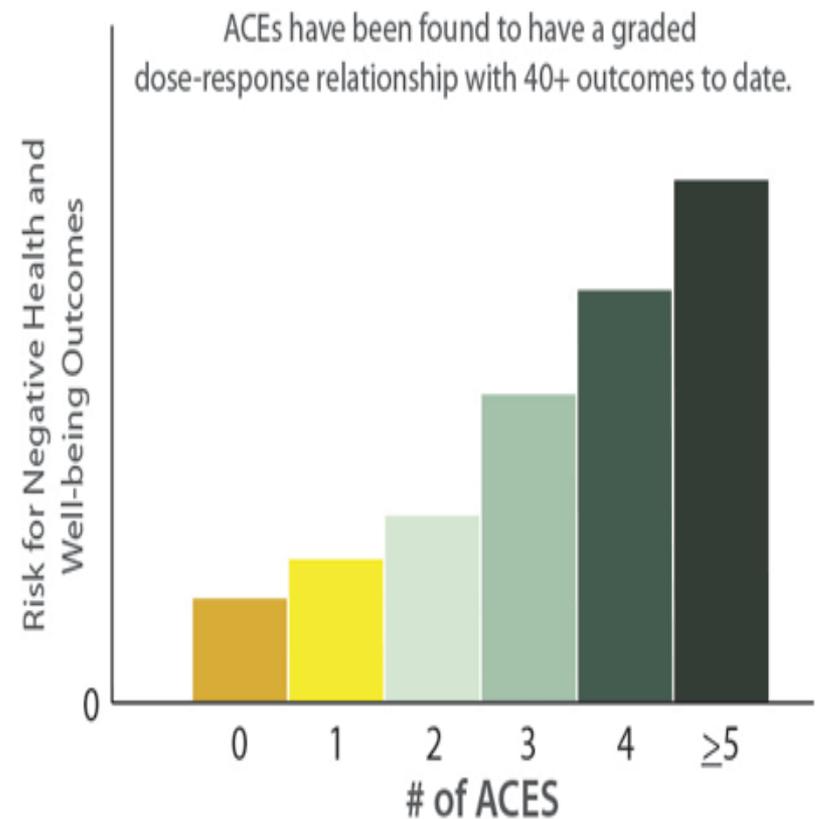
Health (obesity, diabetes, depression, suicide attempts, STDs, heart disease, cancer, stroke, COPD, broken bones)



Behaviors (smoking, alcoholism, drug use)



Life Potential (graduation rates, academic achievement, lost time from work)



*This pattern holds for the 40+ outcomes, but the exact risk values vary depending on the outcome.



As one person said of herself:

Being 300 pounds and smoking 3 packs/day aren't the problem—they're the symptoms



What is the average ACE score of:

- the community you serve?
- the clients you serve?
- their parents?

- What is *your* ACE score?
 - How have those experiences affected you later in life?



ACEs in Native People: Southwest

- Study of ACE exposures in 1,660 AI adults from 7 southwest Tribes
- ACE prevalence was very high in all 7 Tribes studied
 - 2/3 of participants reported at least one parent with alcohol problems
 - Most common types of maltreatment:
 - Physical neglect ♂: 45% ♀: 42%
 - Physical abuse ♂: 40% ♀: 42%
 - Sexual abuse ♂: 24% ♀: 31%
 - Emotional abuse ♂: 23% ♀: 36%
 - Emotional neglect ♂: 20% ♀: 23%
- **1/3 had experienced ≥ 4 types of ACEs** *Am J Prev Med 2003;25:238-244*
- In the CDC/Kaiser ACE study, ACE scores ≥ 4 increased risk:
 - 4-12x for alcoholism, drug abuse, depression, suicide attempt
 - 2-4x for smoking, poor self-rated health, sexually transmitted infections
 - 1.4-1.6x for physical inactivity and severe obesity

Am J Prev Med 1998;14:245-258



ACEs in Native People: National

National Survey of Children's Health

- 1,453 AI/AN children aged 0-17 yrs compared with 61,381 white children from the 2011-2012 National Survey of Children's Health
- AI/AN children were more likely to have experienced:
 - 2+ ACEs (40.3% vs. 21%)
 - 3+ ACEs (26.8% vs. 11.5%)
 - 4+ ACEs (16.8% vs. 6.2%)
 - 5+ ACEs (9.9% vs. 3.3%)
- **AI/AN kids with 3+ ACEs compared with AI/AN with < 2 ACEs**
 - **Prevalence of depression, anxiety, ADHD 14.4%, 7.7%, 12.5% vs. 0.4%, 1.8%, 5.5%**
 - **School problems, grade failures, need for medication and counseling were 2-3x higher**



Historical Trauma

- Helps explain the present
- Traumas that are often intentionally inflicted and occur at about the same time to a defined group of people—these traumas:
 - Have effects like individual traumas, *plus*
 - Because the traumas are so pervasive, devastate parents as well as children, disrupt community and cultural infrastructures—they have profound effects on the ability to:
 - Cope with and adapt to traumatic event and aftermath
 - Interpret the meaning and psychologically incorporate the trauma
- Not unique to any particular group
 - Research in Holocaust survivors and descendants
- **Intergenerational Trauma:** Traumatized parents are then the “Vector of transmission” to subsequent generations
- Traumas are ongoing: chronic poverty, food insecurity, and racism/discrimination



Stress During Pregnancy

- High levels of racial and socioeconomic inequality increase the risk of SGA (small) birth, particularly when they co-occur.

Am J Public Health 2015;105:1681–1688

- Maternal stressful life events during 1st trimester ↑ risk of preterm birth (OR 2.4)

Am J Obstet Gynecol 2010;203:34.e1-8

- **Being born early and/or small are *strongly* associated with later risk for diabetes and heart disease**

Diabetes 2009;58:523-526



What Happens Early Affects the Rest of Our Lives

“...many adult diseases should be viewed as developmental disorders that begin early in life...”

American Academy of Pediatrics

“The Lifelong Effects of Early Childhood Adversity and Toxic Stress”

Pediatrics 2012;129:e232-e246

“...a substantial component of metabolic disease risk has a prenatal developmental basis.”

Diabetes 2011;60:1528-1534



How Does Early Life Adversity Get Programmed In?

Stress and inadequate nutrition in the womb can lead to:

- Changes in gene expression (epigenetic “on/off switches”)
- Reduced muscle development
- Reduced organ development (e.g., pancreas, kidneys)
 - Small for gestational age birthweight
- Changes in the “set points” for several hormone systems, including those that affect glucose regulation, appetite, stress response, etc.
- Insulin resistance and visceral fat starting even before birth
 - So birthweight may be normal or even large for gestational age



What Happens Early Affects the Rest of Our Lives

“Psychological distress at any point in the life course is associated with higher cardiometabolic risk.
...even if distress appears to remit by adulthood, heightened risk of cardiometabolic disease remains.
...early emotional development may be a target for primordial prevention and for promoting lifelong cardiovascular health.”

J Am Coll Cardiol 2015;66:1577–86



How Does Early Life Adversity Get Programmed In?

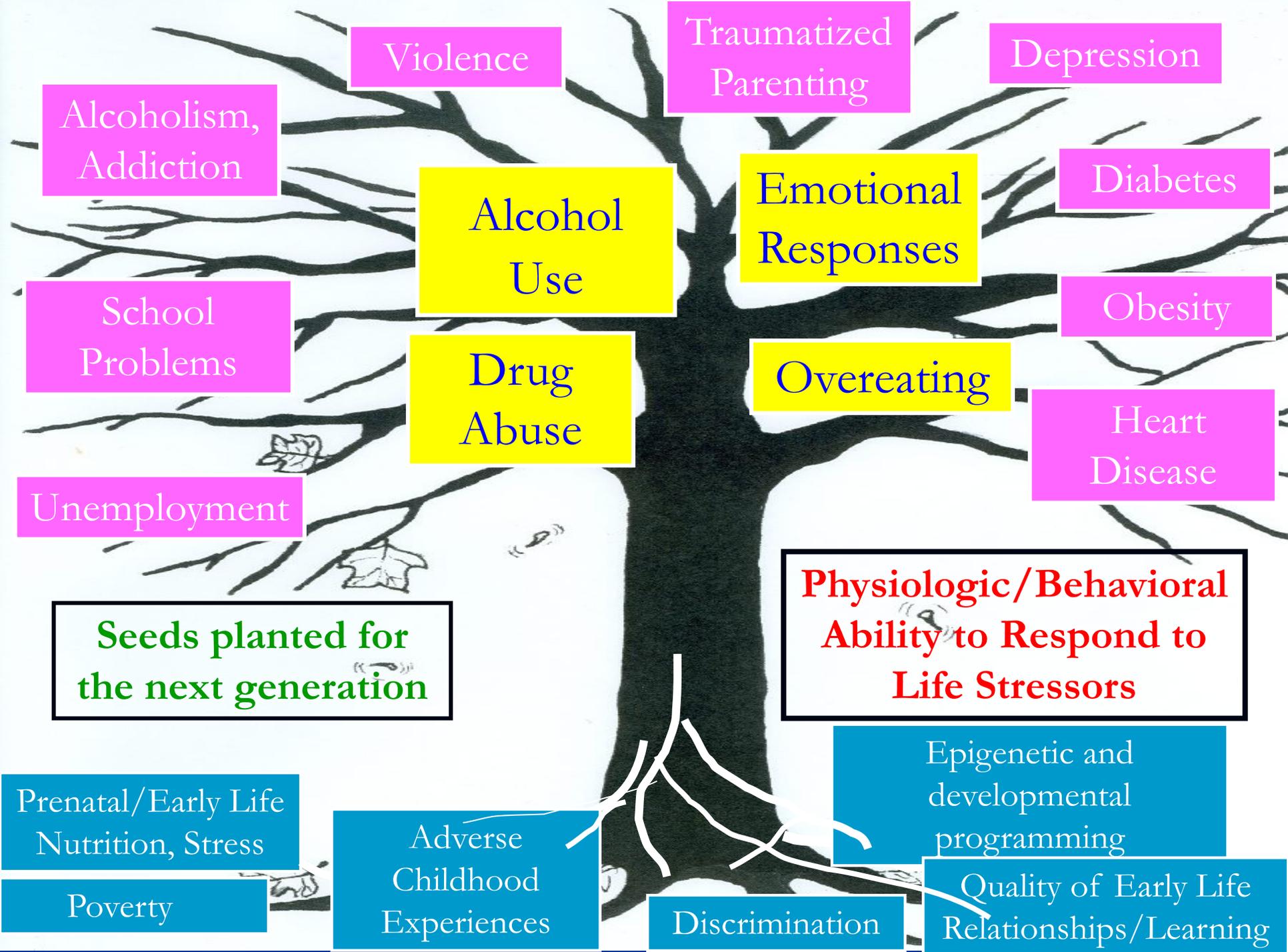
Stress and inadequate nutrition in the first few years of life can lead to:

- Stressed parents unintentionally transmitting trauma to their children (intergenerational trauma, ACEs)
- Stress response “set points” can be further ramped up
 - Risk for using substances which “externally modulate” this, including food
- Stress affects brain development, behavior, cognition, ability to attach to others
- Food insecurity alters appetite regulation, increases risk for behavior problems, depression



The Developing Brain is Affected By Stress

- “What fires together, wires together”
- Complex process of “sculpting” the brain, converting experience into neuronal changes
 - Cortisol, Brain-Derived Neurotrophic Factor
 - Chronic stress and depression:
 - shrink the hippocampus and prefrontal cortex
 - » ↓ Memory, selective attention, executive function/decision making
 - potentiate growth of the amygdala
 - » ↑ Fear, hypervigilance, anxiety, aggression



What to do?





Food Insecurity

- **Diet quality** associated with weight gain even if calories restricted

JAMA 2014;311(21):2167-2168

- Prevalence of **overweight** in women ↑'s as food insecurity ↑

J Nutr 2001;131:1738-1745

- **Pregnancy:** food insecurity associated with pre-pregnancy obesity, ↑ pregnancy weight gain, and gestational diabetes

Am Diet Assoc 2010;110:692-701

- ↑ Risk for poor blood sugar control

Diabetes Care 2012;35:233-238

- **42%** of households below poverty level are food insecure

- as are **21%** of all households with **children**

NEJM 2010;363:6-9

- Screen for food insecurity and connect people to food resources

- Food Insecurity Assessment Tool on IHS Division of Diabetes website

- **Housing Insecurity**

- Top 5% of hospital users—overwhelmingly poor and housing insecure—account for 50% of health care costs.

- A few health care systems starting to invest in housing with case management

- early data show ↓ ER visits and hospital stays

JAMA 2017;318:2291-2 & 2293-4



Home Visiting

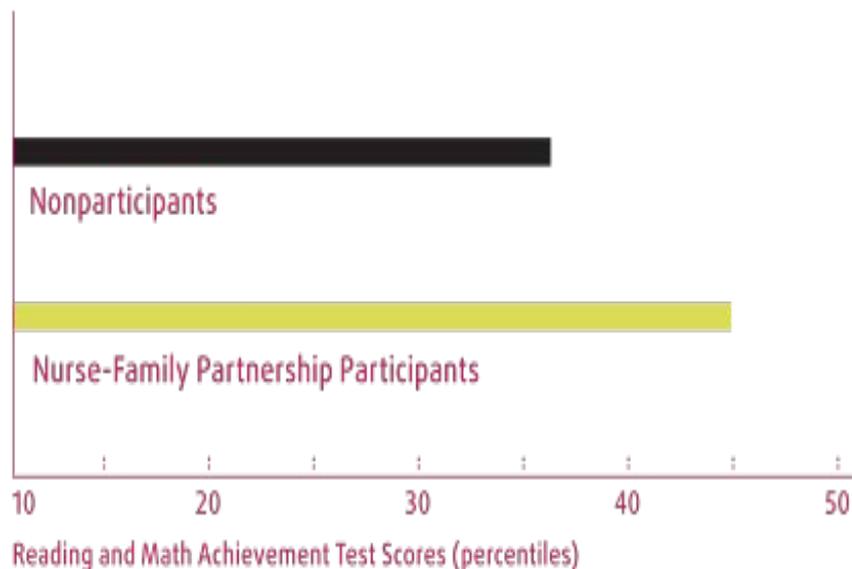
- Several dozen evidence-based home visiting models
 - Nurse-Family Partnership
 - Family Spirit: evidence in AI communities
- Minding the Baby: Yale University
 - Significantly lowered the rate of obesity in low SES 2-yr olds (19.7% control vs. 3.3% intervention)
 - Among Hispanic children, less likely to be overweight or obese (OR=0.32)

Pediatrics 2018;141(2):e20171076



Academic Achievement

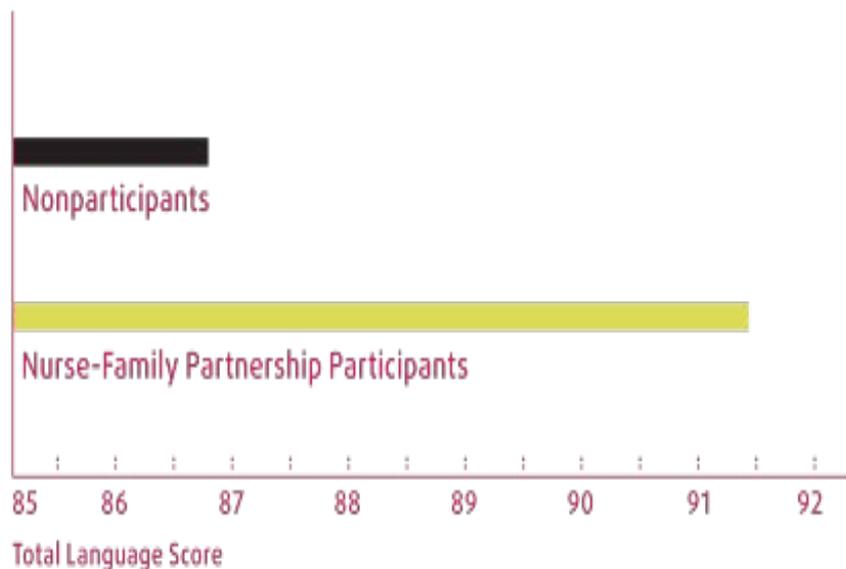
Grades 1-3, Age 9—Memphis
(Born to low-resource mothers)



Source: Reproduced with permission from *Pediatrics*, Vol. 120, e838, Copyright © 2007 by the AAP.

Preschool Language Scale

Age 4—Denver
(Born to low-resource mothers)

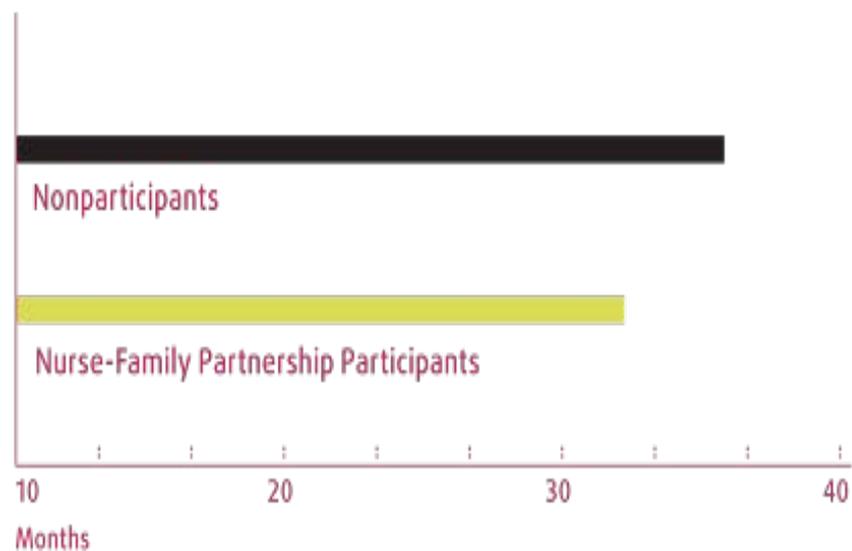


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Months Receiving Welfare Assistance (AFDC)

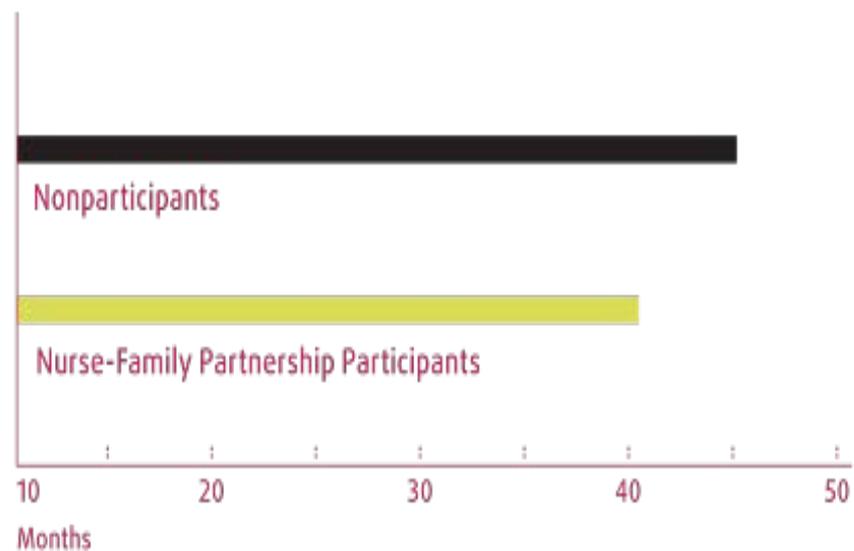
Birth through age 5—Memphis



Source: JAMA, 2000, Vol. 283, 1987, Copyright © 2000, American Medical Association. All rights reserved.

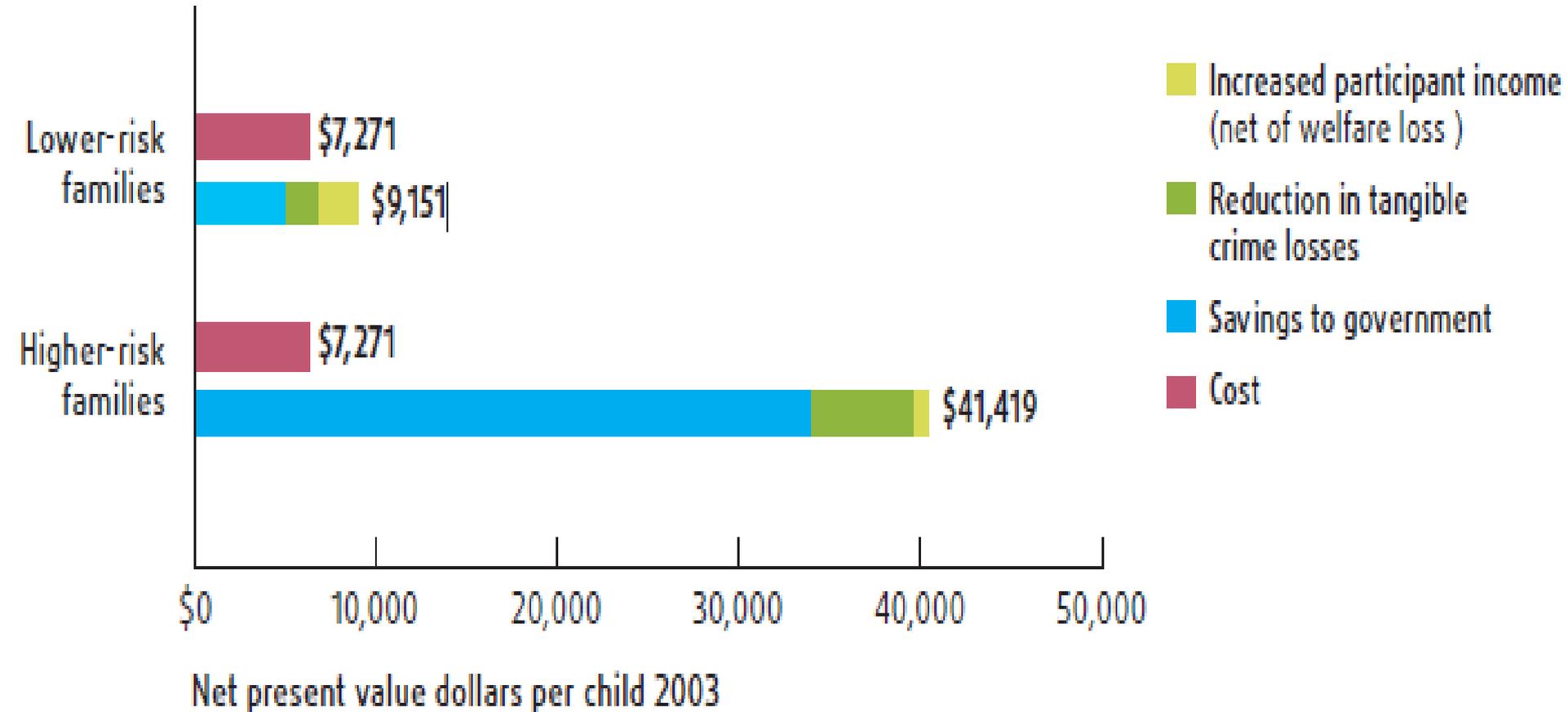
Months Receiving Food Stamps

Birth through age 5—Memphis



Source: JAMA, 2000, Vol. 283, 1987, Copyright © 2000, American Medical Association. All rights reserved.

Monetary Benefits



Source: 2005 RAND Corporation Study

Family Spirit Impact: Pregnancy to Age 3

Parenting

- Increased maternal knowledge^{1,2,3,4}
- Increased parent self-efficacy^{3,4}
- Reduced parent stress^{2,4}
- Improved home safety attitudes³

Mothers' Outcomes

- Decreased depression.^{1,2,4}
- Decreased substance use⁴
- Fewer risky behaviors^{3,4}

Child Outcomes

- Fewer social, emotional and behavior problems through age 3.^{2, 3, 4}
- Lower clinical risk of behavior problems over life course⁴



Decreased Externalizing,
Internalizing and Dysregulation

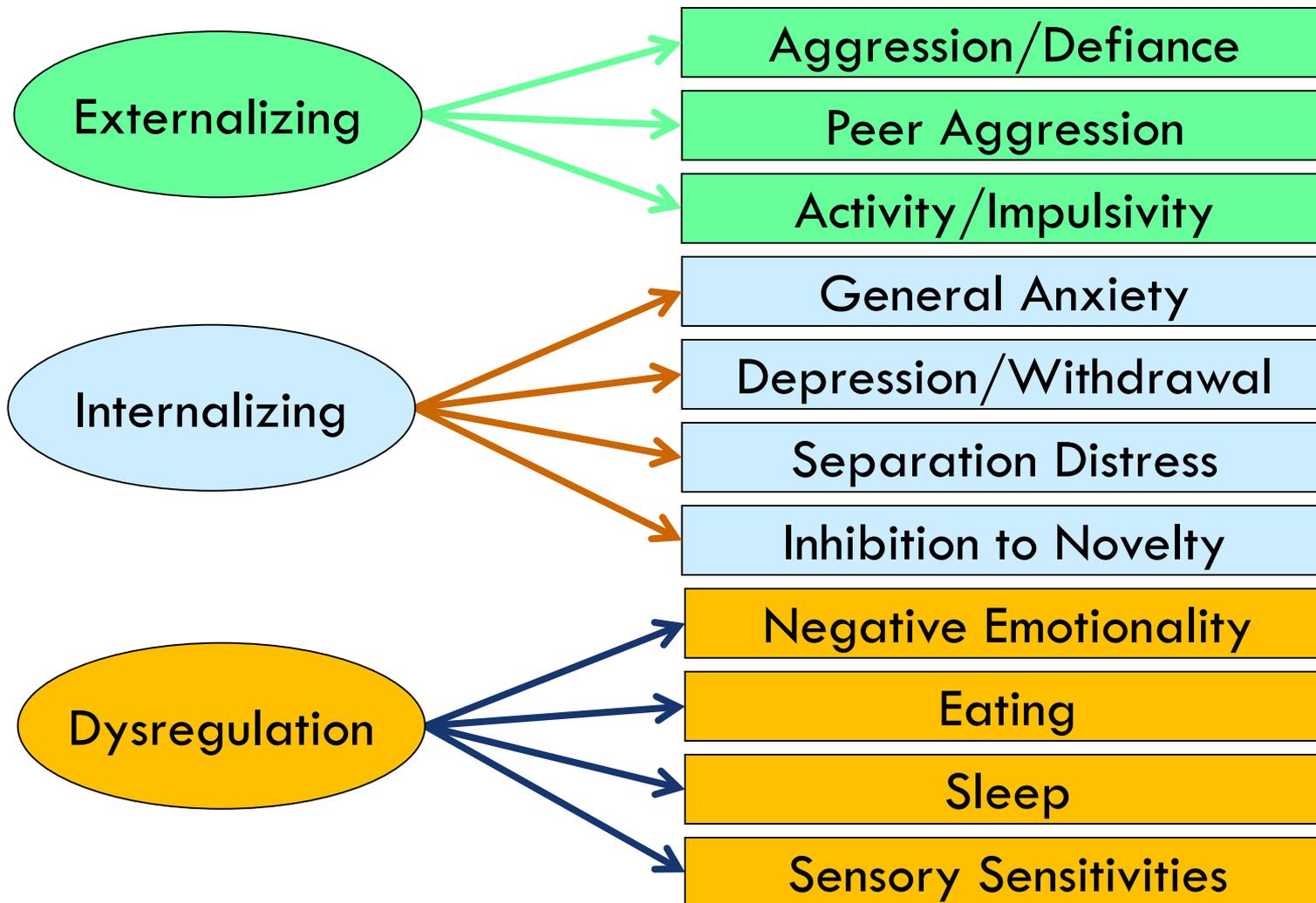
1 Barlow A, Varipatis-Baker E, Speakman K, et al *Arch Pediatr Adolesc Med.* 2006; 160:1101-1107

2 Walkup J, Barlow A, Mullany B, et al. *Journal of the American Academy of Child and Adolescent Psychiatry.* June 2009.

3 Barlow A, Mullany B, Neault N, et al. *American Journal of Psychiatry.* January 2013.

4 Barlow A, Mullany B, Neault N, et al. *American Journal of Psychiatry.*, February 2015.

ITSEA Problem Domains and Subscales within Domains





Quality Child Care: “Early Life Investments Substantially Boost Adult Health”

Carolina Abecedarian Project

- 4 cohorts of disadvantaged children born 1972-77
 - Intervention provided from birth to age 5 years
- Intervention:
 - Level of language, emotional regulation, cognitive skills
 - Caregiving/supervised play
 - Nutrition: 2 meals and a snack at childcare center
 - Primary pediatric care

In their mid-30s: lower prevalence of CVD and metabolic disease risk factors including blood pressure, A1C, obesity; better HDL-cholesterol

The Path We *Could* Take

Rewind: “Mary’s” life

- As soon as mother’s pregnancy diagnosed:
 - Matched with a home visitor/case manager
 - Weekly/biweekly visits focusing on developing a mentoring-type relationship, building on mother’s strengths, helping her to set goals, teaching her new skills
 - All services needed were tailored to her needs
 - WIC foods supplemented so mother had enough good food even though shared with family
 - Mother went to 90% of her prenatal appointments
 - All but first urine drug screen negative and most cotinine screens
 - Mary born at 39 wks gest, normal weight for gestation

Rewind: “Mary”

- Visits from home visitor continued until Mary was 3 yrs old
- Mother set/achieved goals: became a nursing assistant through health occupations class and graduated from high school
 - Mary cared for during day by excellent tribal child care program: bonding, learning, good food, social skills, active play, tribal language all emphasized
- Mother attended parenting classes
 - Praised and hugged Mary, appropriately disciplined her
 - Ate dinner together and read to Mary most evenings
 - Left her boyfriend when he wouldn't stop drinking
- Mary's weight stayed around the 90th percentile
- Mary graduated from high school, went to tribal college, got a good job, married a guy she met at college
- Now Mary becomes pregnant...



“The medicine is already within the pain and suffering. You just have to look deeply and quietly. Then you realize it has been there the whole time.”

Duran, 2006

Thank you

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