



Center on the Developing Child
HARVARD UNIVERSITY

Three Levels of Stress

Positive

Brief increases in heart rate,
mild elevations in stress hormone levels.

Tolerable

Serious, temporary stress responses,
buffered by supportive relationships.

Toxic

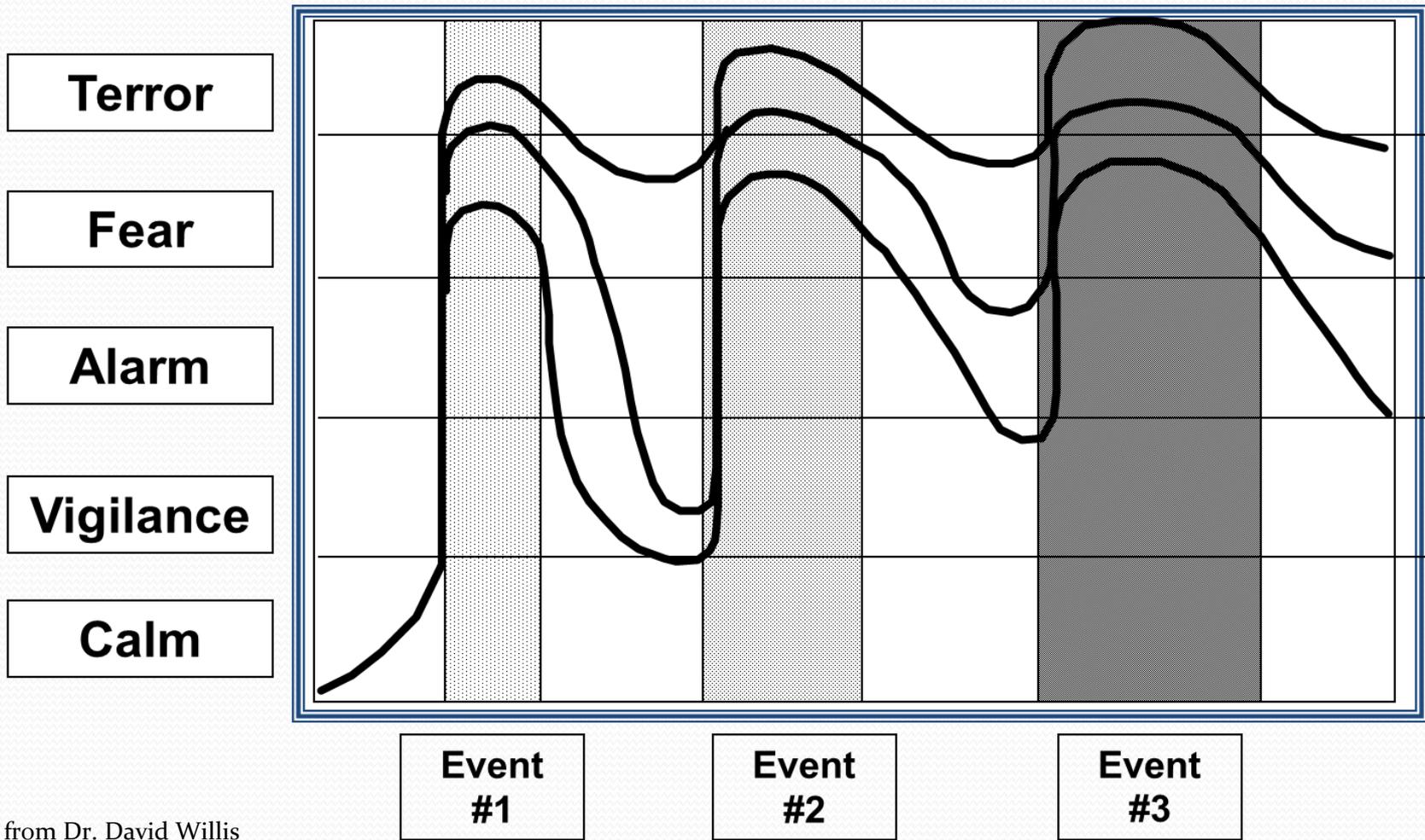
Prolonged activation of stress response systems
in the absence of protective relationships.

Traumatic Stress

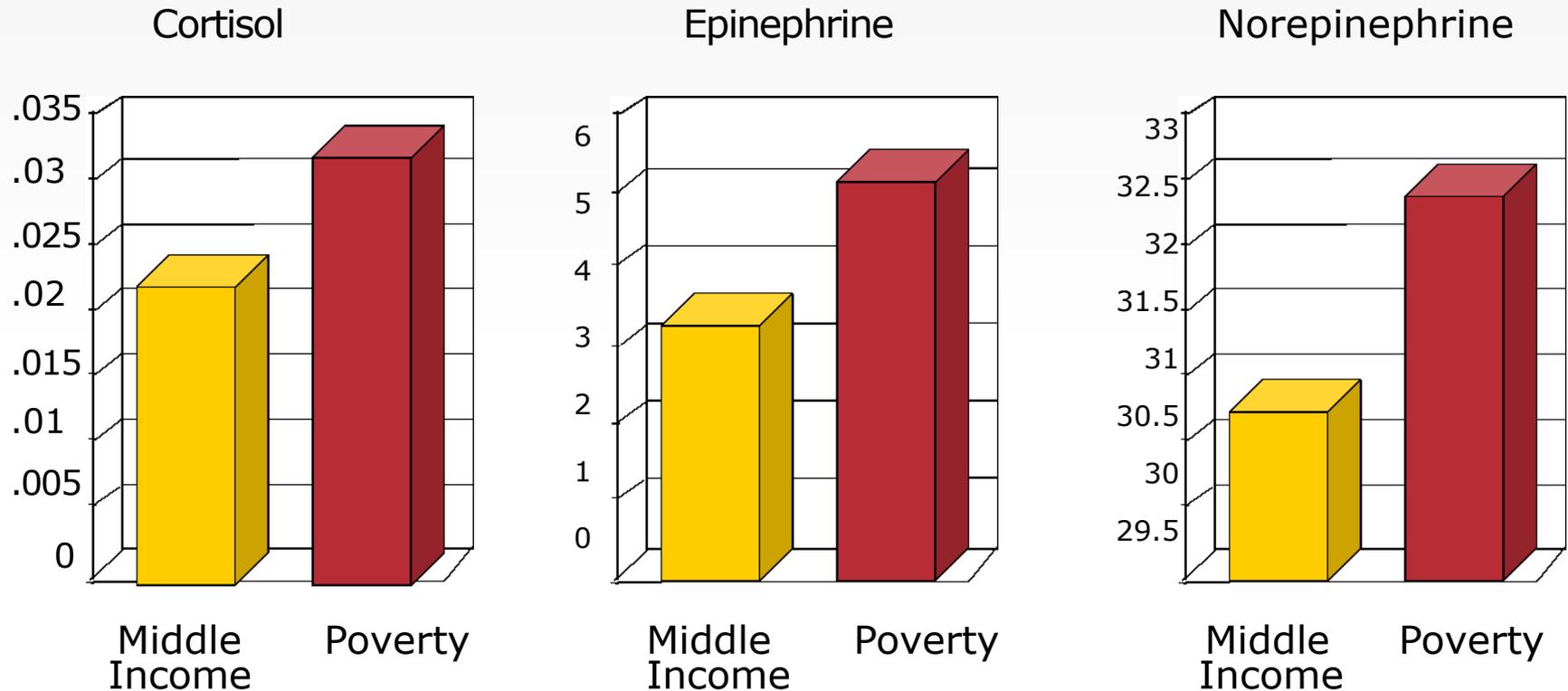
- Traumatic stress is the physical and emotional responses of a child to events that are *perceived* to threaten the life or physical integrity of the child, or someone critically important to the child (such as a parent or sibling). [Event, Experience, Effect]
- This out-of-control physiologic response that *overwhelms the capacity to cope* is the hallmark of stress that becomes traumatic and damaging.
- Effects multiply when the trauma continues.
- Varies with child's age, developmental status, prior experiences, support systems, relationship to victim, witness or experiencing the violence

Traumatic stress becomes toxic when it is recurring, prolonged, and not buffered by a caring adult

Multiple Traumatic Events



Poor Children Experience Elevated Stress



Overnight levels in rural 9-year-old white children

•Source: Evans, GW and English, K. (2002)

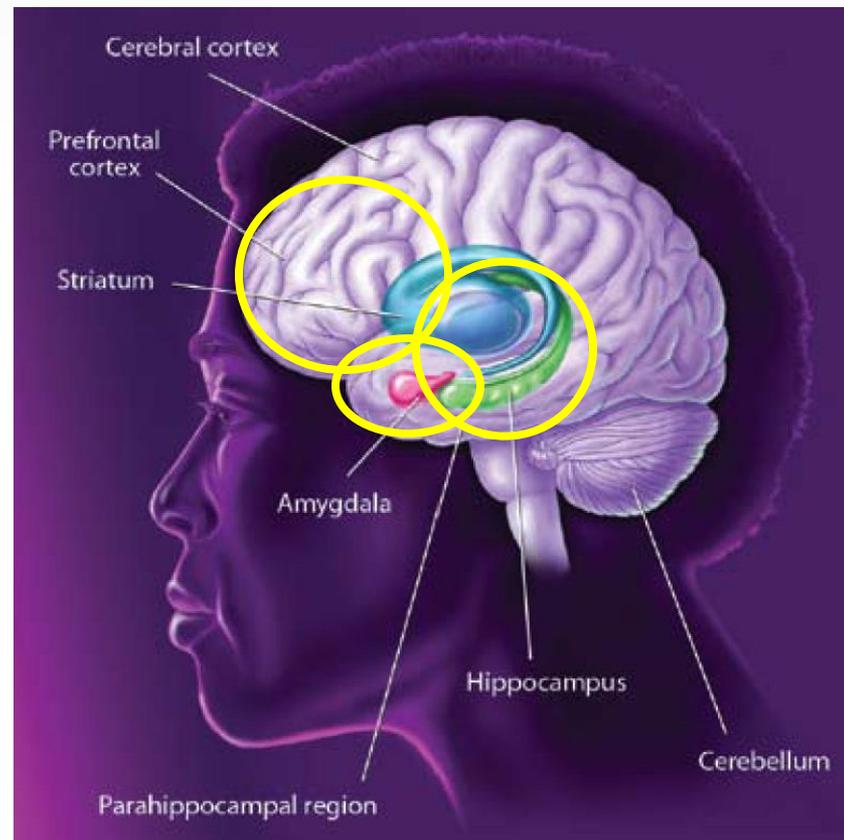
Toxic Stress





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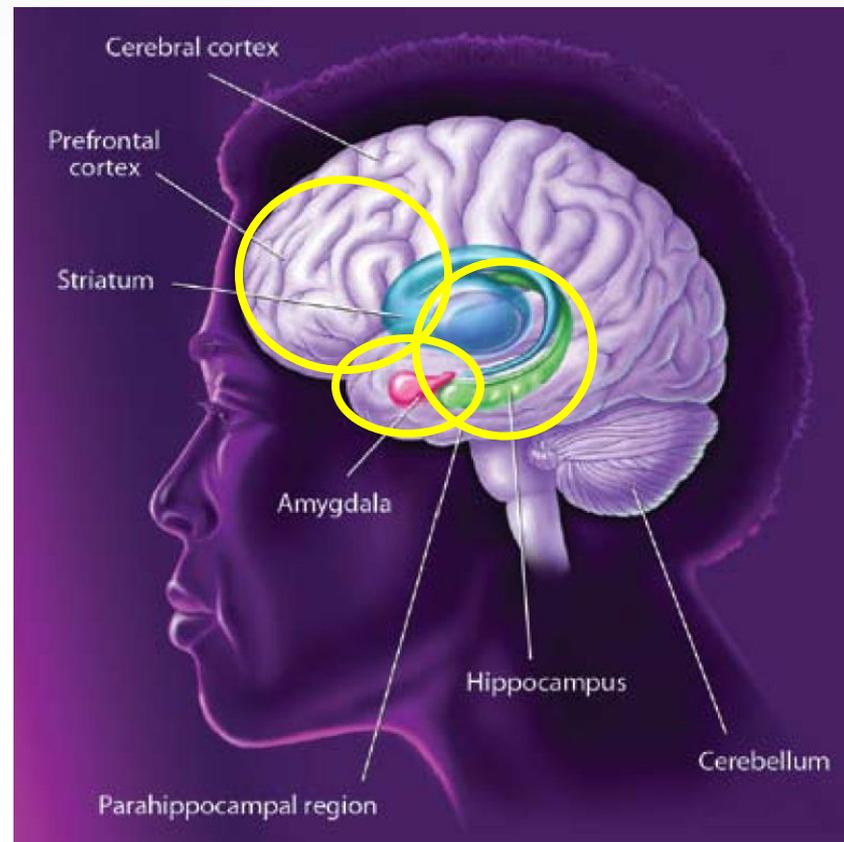
The Brain Architecture of Anxiety and Fear





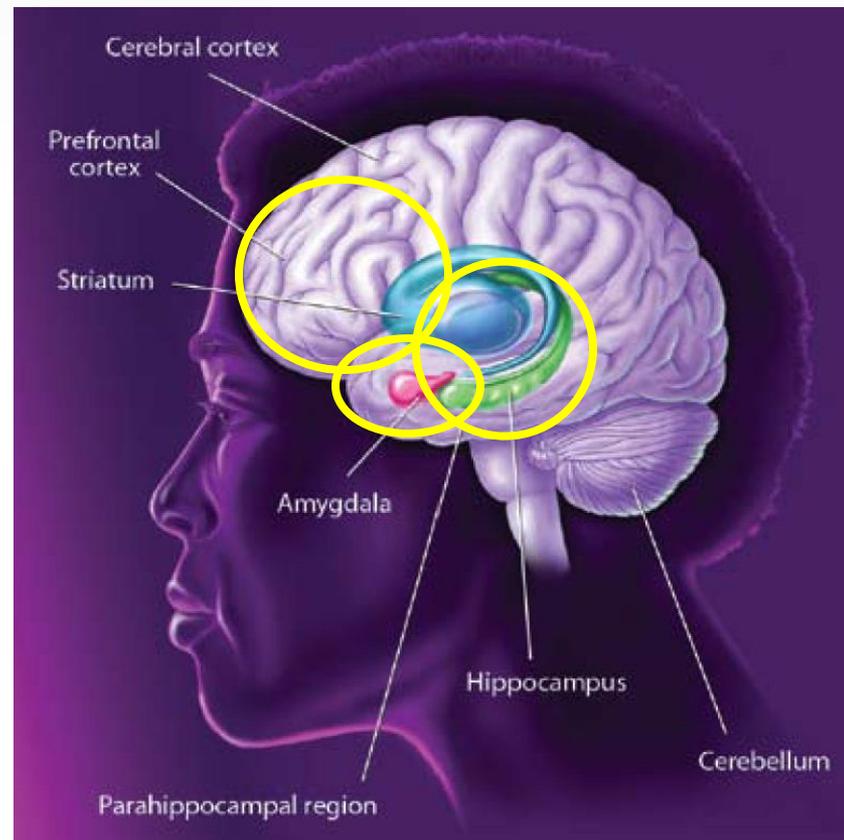
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The Brain Architecture of Memory and Learning

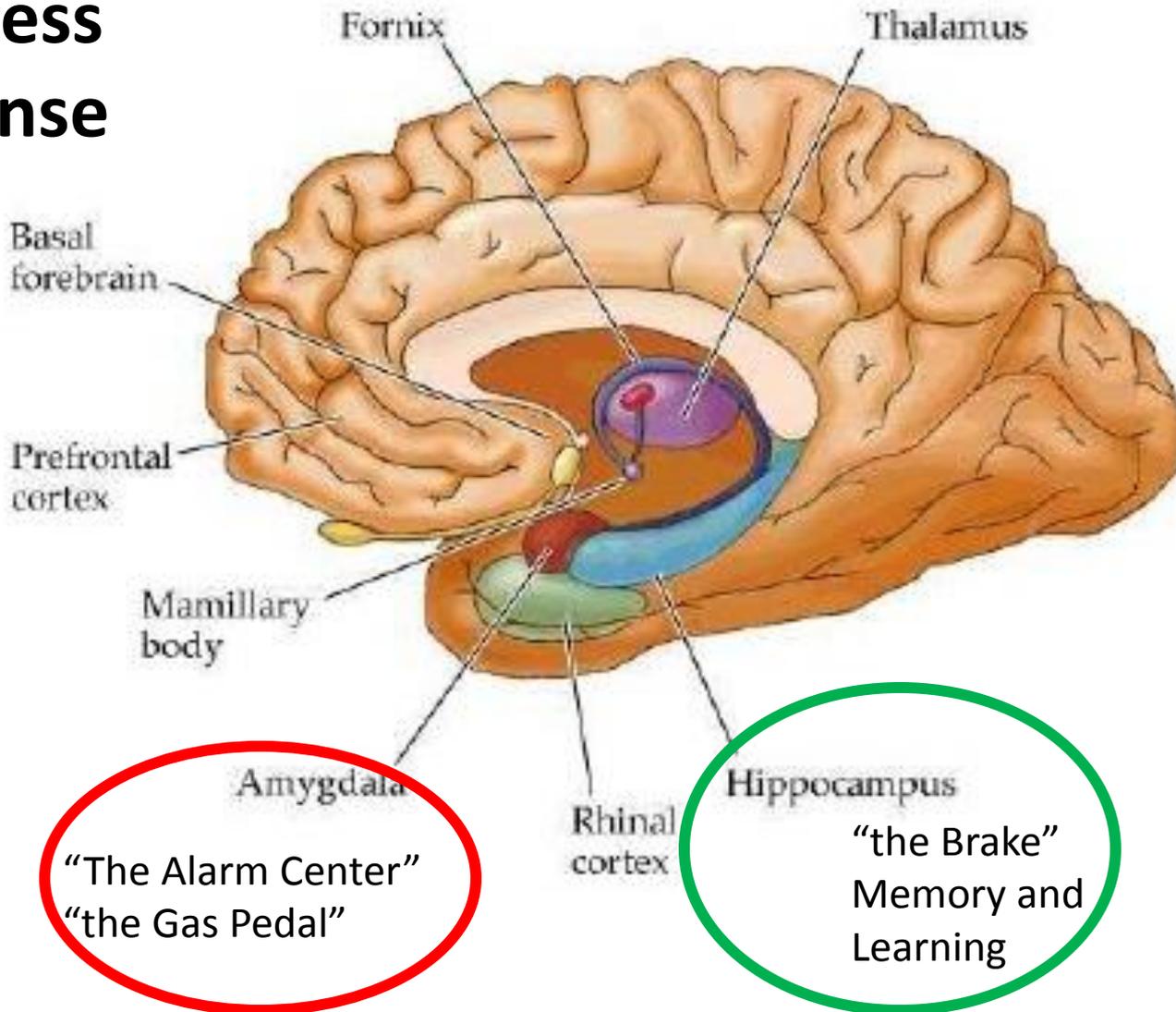




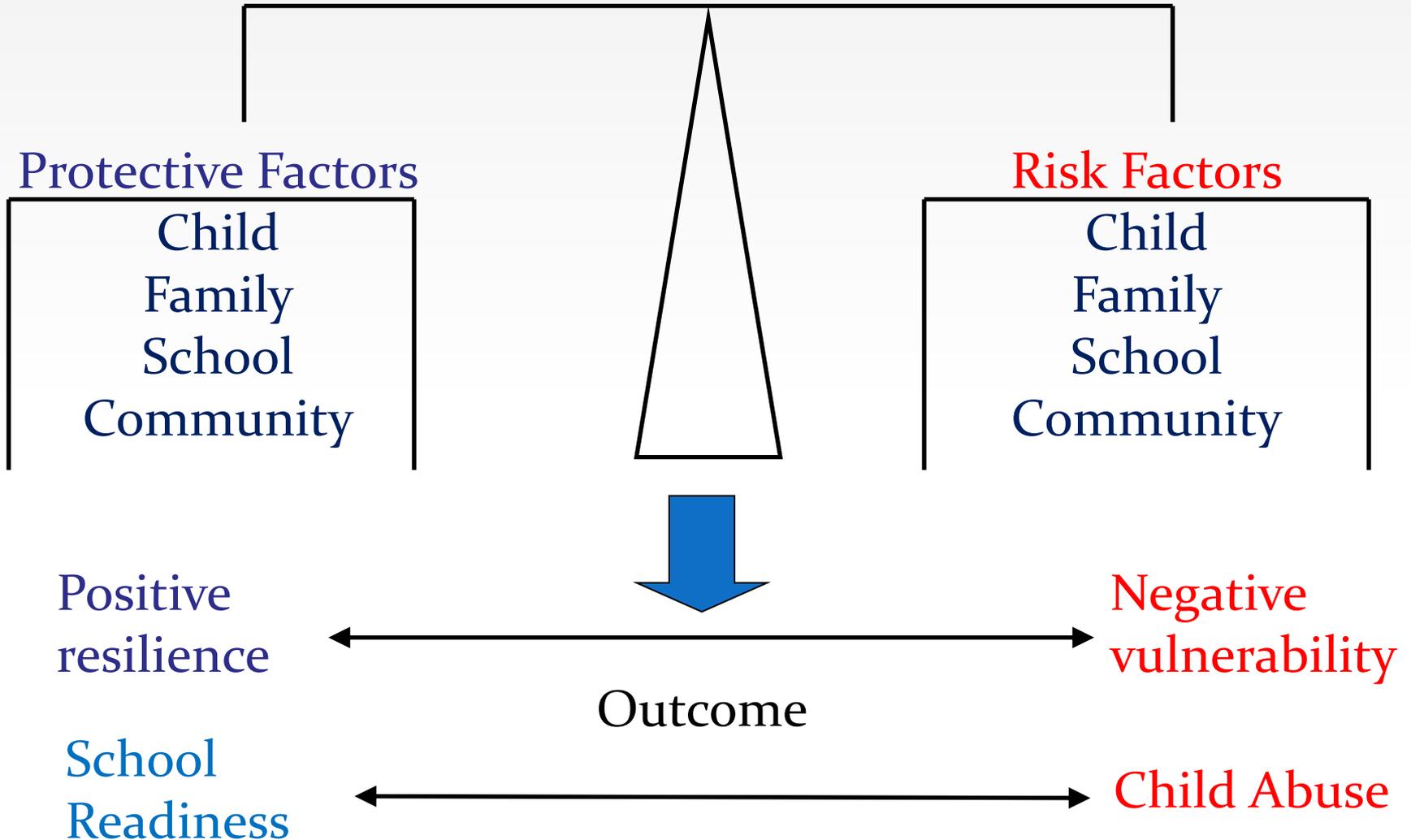
Cognitive, Emotional, and Social Capacities Are Inextricably Intertwined Within the Architecture of the Brain



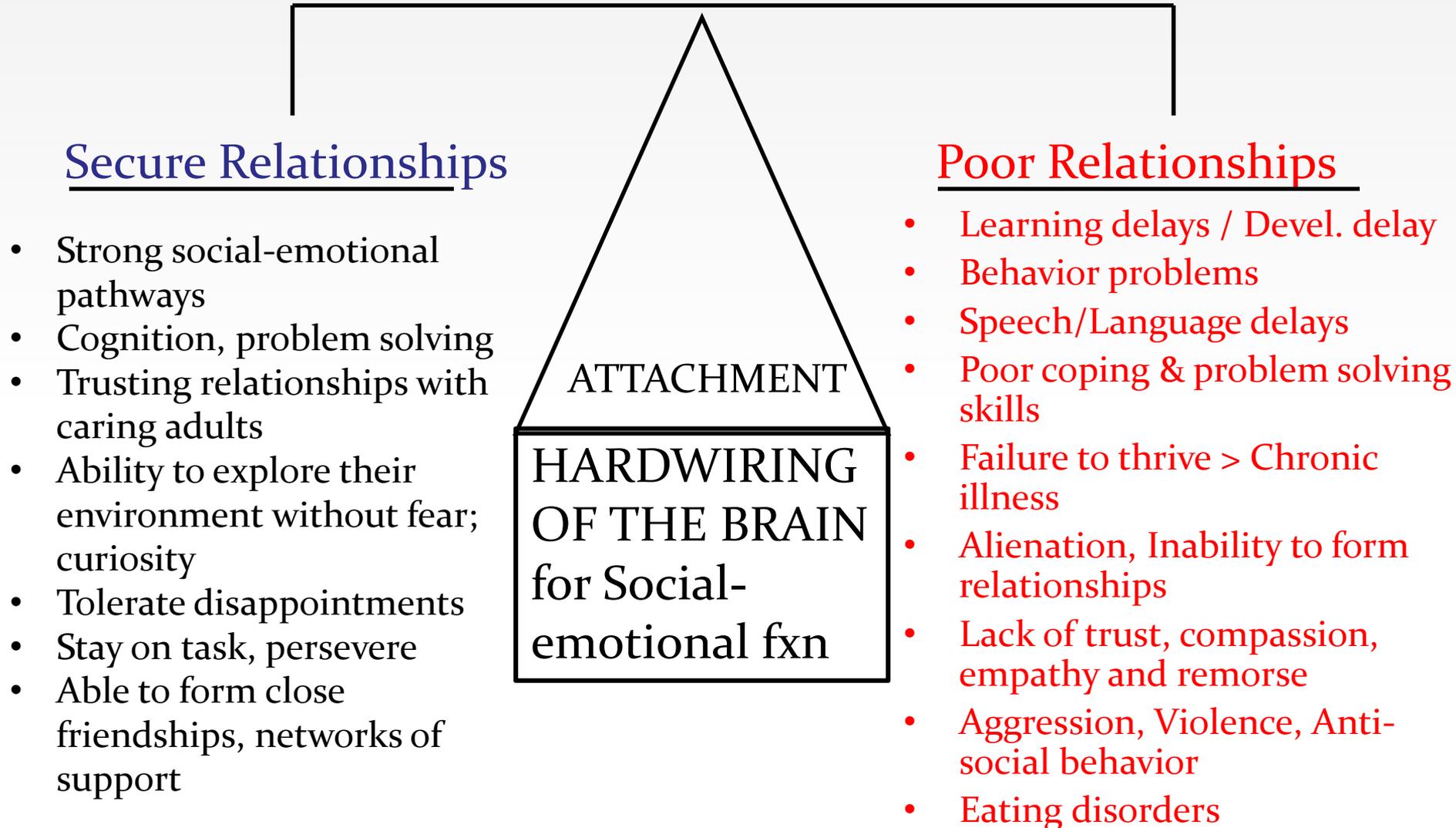
Brain Centers for Stress Response



Life Course Trajectory: A Balance of Risk and Protective Factors



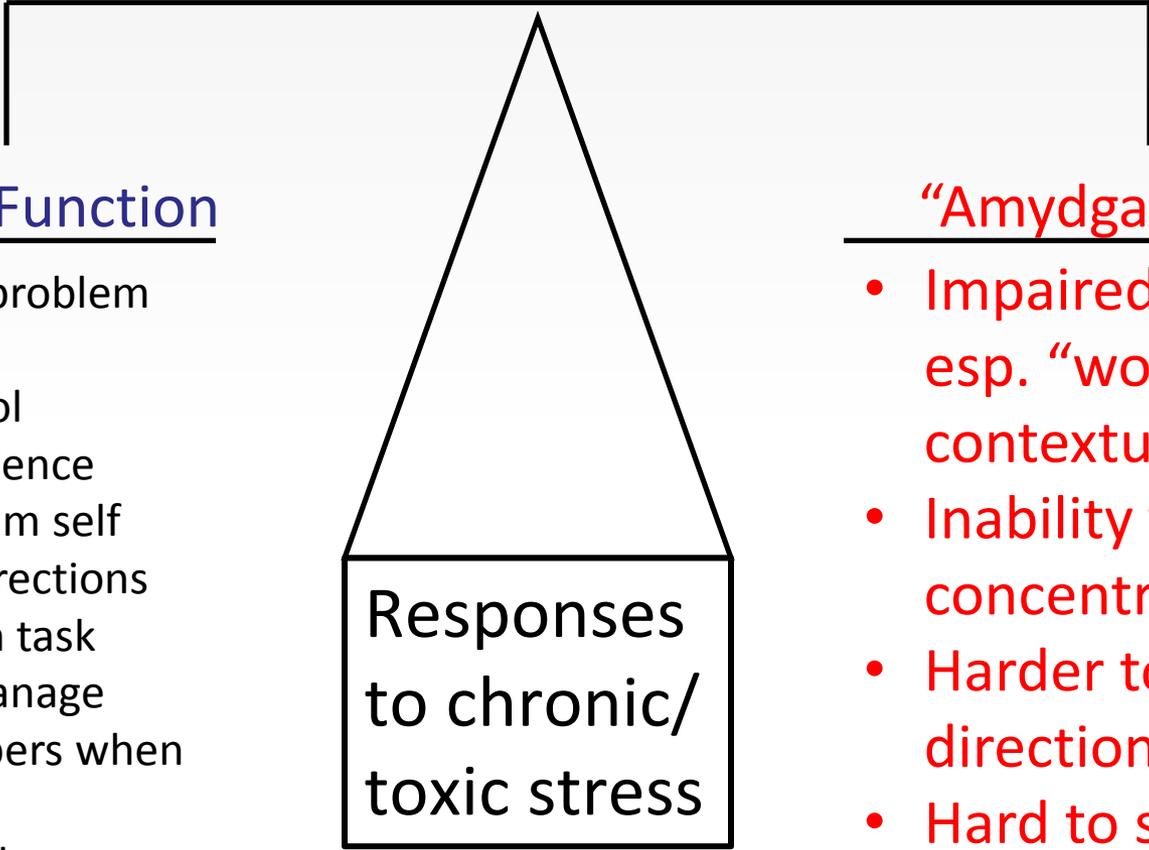
Life Course Trajectory: A Balance of Risk and Protective Factors



Life Course Trajectory: A Balance of Risk and Protective Factors

Executive Function

- Ability to problem solve
- Self-control
- Self confidence
- Able to calm self
- Follows directions
- Persists on task
- Able to manage their tempers when provoked
- Able to delay gratification
- Able to plan



Responses
to chronic/
toxic stress

“Amygdala Hijack”

- Impaired memory, esp. “working” and contextual memory
- Inability to concentrate
- Harder to follow directions
- Hard to sit still
- Constantly on edge
- Easily provoked
- Impulsive



THE OFFICIAL NEWSMAGAZINE OF THE AMERICAN ACADEMY OF PEDIATRICS

AAP News

PAS Meeting Update

May 6, 2014

www.aapnews.org

Study finds ADHD and trauma often go hand in hand

Children with attention-deficit/hyperactivity disorder experienced more adversities than those without ADHD

by **Carla Kemp** • Senior Editor

VANCOUVER, BRITISH COLUMBIA – When children struggle with focusing on tasks, staying organized, controlling their behavior and sitting still, they may be evaluated for attention-deficit/hyperactivity disorder (ADHD). Clinicians, however, shouldn't stop there, according to a study to be presented Tuesday, May 6, at the Pediatric Academic Societies (PAS) annual meeting in Vancouver, British Columbia, Canada.

Researchers found that many children with ADHD also face challenges such as poverty, divorce, neighborhood violence and substance abuse among family members.

“Our findings suggest that children with ADHD experience significantly higher rates of trauma than those without ADHD,” said lead author Nicole M. Brown, M.D., M.P.H., M.H.S., FAAP. “Providers may focus on ADHD as the primary diagnosis and overlook the possible presence of a trauma history, which may impact treatment.”

Dr. Brown and her colleagues analyzed data from the 2011 National Survey of Children's Health. They identified 65,680 children ages 6-17 years whose parents answered questions regarding ADHD diagnosis, severity and medication use as well as nine adverse childhood experiences (ACEs): poverty, divorce, death of a parent/guardian, domestic violence, neighborhood violence, substance abuse, incarceration, familial mental illness and discrimination.

About 12% of the children were diagnosed with ADHD. Their parents reported a higher prevalence of all of the adverse events than parents of children without ADHD.

Parents of children with ADHD also reported a higher number of adverse childhood experiences compared to children without ADHD; 17% of children with ADHD had four or more ACEs compared to 6% of children without ADHD.

Children dealing with four or more adverse experiences were almost three times more likely to use ADHD medications compared to children with three or fewer adverse experiences. Children with four or more adverse experiences also were more likely to have a parent rate their ADHD as moderate to severe compared to children with three or fewer ACEs.

“Knowledge about the prevalence and types of adverse experiences among children diagnosed with ADHD may guide efforts to address trauma in this population and improve ADHD screening, diagnostic accuracy and management,” said Dr. Brown, assistant professor of pediatrics, Division of General Pediatrics, The Children's Hospital at Montefiore, Albert Einstein College of Medicine, New York.

“Pediatric providers should consider screening for adverse childhood experiences in children who they suspect may have ADHD and/or those who carry the diagnosis, and initiate evidence-based treatment/intervention plans for children who screen positive for ACEs,” she concluded.

To view the study abstract, go to http://www.abstracts2view.com/pas/view.php?nu=PAS14L1_4670.7.

Direct Link Between ADHD and Premature Death

Nancy A. Melville | February 26, 2015

Individuals with attention-deficit/hyperactivity disorder (ADHD) are more than twice as likely to die prematurely compared with their counterparts without the disorder, new research shows.

The study, which is the first to demonstrate a direct association between ADHD and increased mortality, included nearly 2 million people and had a 32-year follow-up period.

"I did expect to see an increase in mortality with ADHD, but it was a surprise to see the difference was this large, and I think most clinicians will also be surprised by the magnitude of increased mortality," lead author Søren Dalsgaard, MD, PhD, told *Medscape Medical News*.

The study was published online February 26 in the *Lancet*.

Mortality Highest in Undiagnosed Adults

According to investigators, many mental disorders are associated with increased mortality. However, little is known about whether this association also applies to ADHD.

For the study, investigators with the National Centre for Register-based Research, at Aarhus University, in Denmark, evaluated data on 1.9 million individuals in Danish national registers from their first birthday through 2013. Among the cohort, 32,061 had been diagnosed with ADHD.

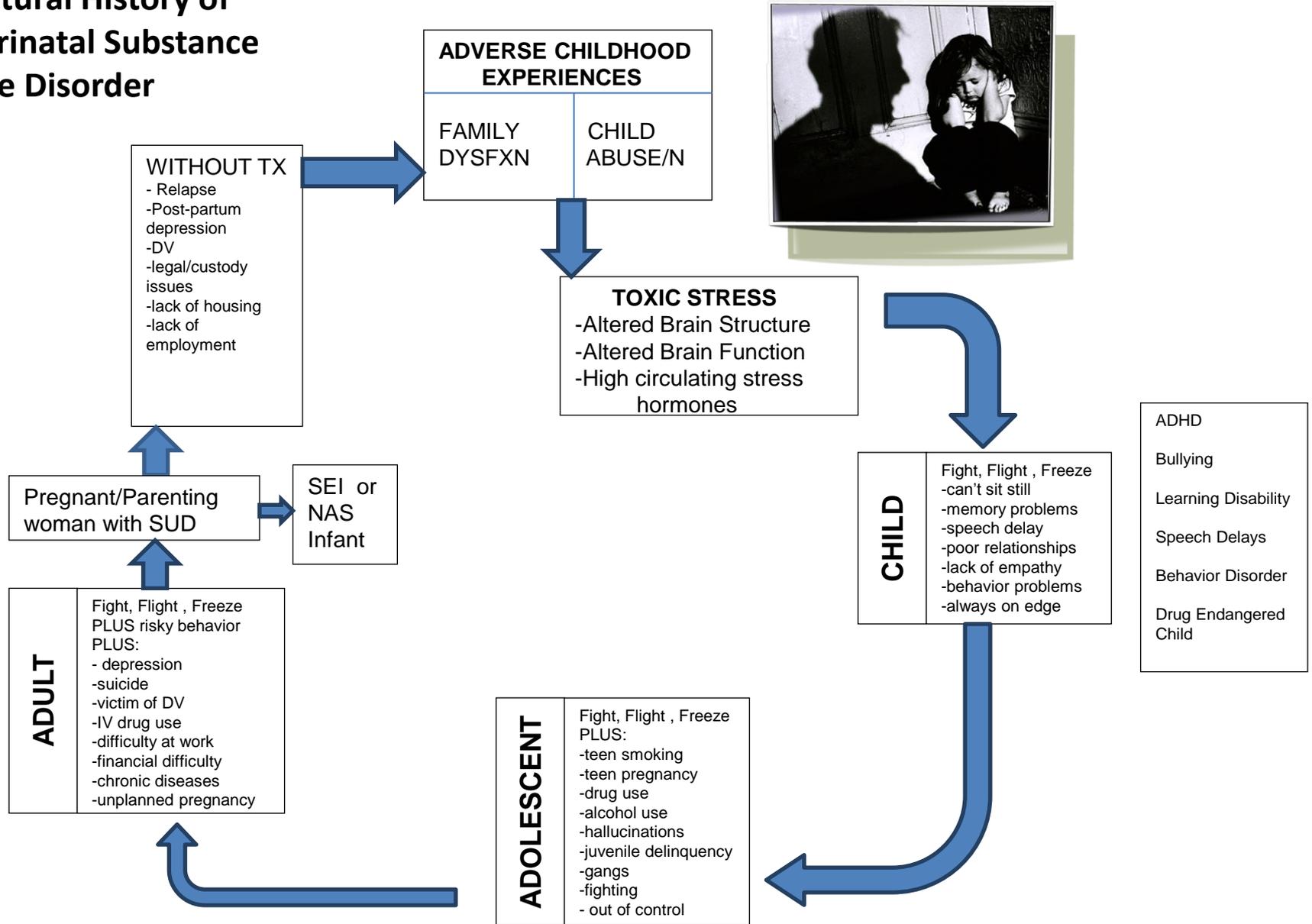
The researchers found a mortality rate of 5.85 per 10,000 person-years among children and adults with ADHD, compared with a rate of 2.21 among those without ADHD.

After adjusting for a range of factors, including age, sex, family history of psychiatric disorders, and employment status, people with ADHD were found to have a mortality rate ratio (MRR) that was more than twice as high as individuals without ADHD (MRR, 2.07; 95% confidence interval [CI], 1.70 - 2.50; $P < .0001$).

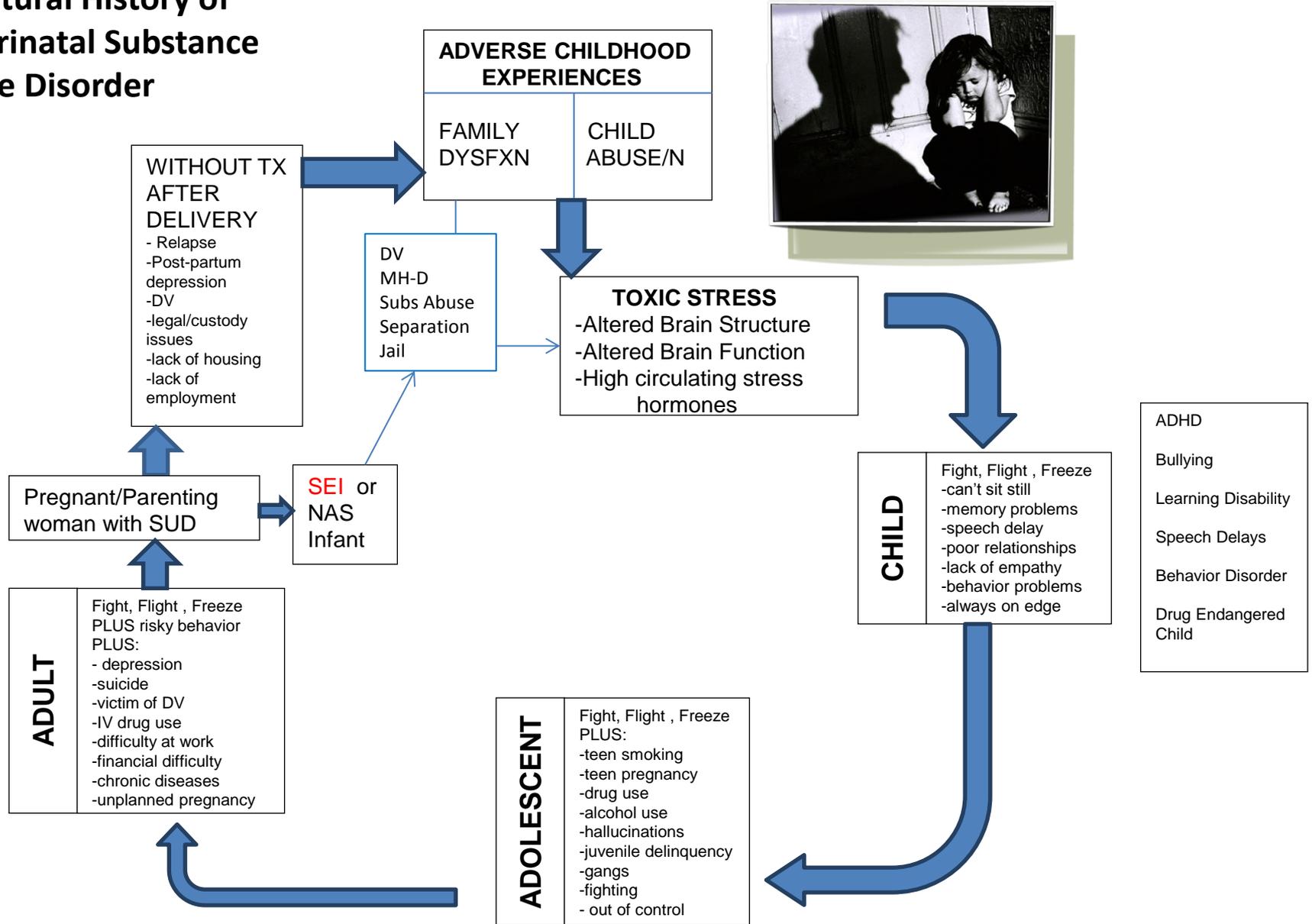


**Dr Søren
Dalsgaard**

Natural History of Perinatal Substance Use Disorder



Natural History of Perinatal Substance Use Disorder



Substance Exposed Infants/Neonatal Abstinence “Drug Endangered Children”

Emotional Problems:

- Attachment Disorders
- Anxiety
- Depression
- Complex emotions
- Lack of empathy

Behavioral Problems:

- Interpersonal Problems
- Inappropriate sexual behaviors
- Impulsive, low threshold for stimulation
- Eating disorders

Cognitive Problems

- Difficulty talking and listening
- Difficulty Paying Attention
- Difficulty Remembering
- Trouble reading
- Do not learn from mistakes or experiences
- Do not pick up on social cues

The Two Generation Approach

- To ensure that kids thrive and succeed from birth onward, we must simultaneously address the obstacles facing their parents. To give families more opportunities to succeed, we must bring together programs for children and adults and take an intentional, coordinated approach.

Annie E Casey Foundation Policy Report, 2014

- Building Adult Capabilities to Improve Child Outcomes: A Theory of Change
Harvard Center for the Developing Child

Why is understanding ACEs and Trauma important?

- ❖ When we are uninformed about trauma, we can inadvertently re-traumatize
- ❖ Whether or not a given event evokes a trauma response, particularly with children, greatly depends on the response of caregivers
- ❖ Each service provider a child/adolescent comes into contact with after a trauma event can either hinder, harm or help stimulate healing

CHILDREN'S EXPOSURE TO VIOLENCE – NATIONAL SURVEY (2009)

60% of American Children were exposed to violence, crime, or abuse in their homes, schools, and communities.

Almost 40% of American children were direct victims of TWO or more violent acts, and one in 10 were victims of violence five or more times.

Almost **1 in 10** American children saw one family member assault another family member, and **more than 25%** had been exposed to family violence during their lifetime.

Exposure to one type of violence increased the likelihood that a child would be exposed to other types of violence and exposed multiple times.

Finkelhor, et al “Children’s Exposure to Violence: A Comprehensive National Survey”
Juvenile Justice Bulletin, October 2009 [Defending Childhood Initiative]

Finkelhor. *Pediatrics* (2009) 124(5); 1411-1423

Datasource:

National Survey of Children's Health

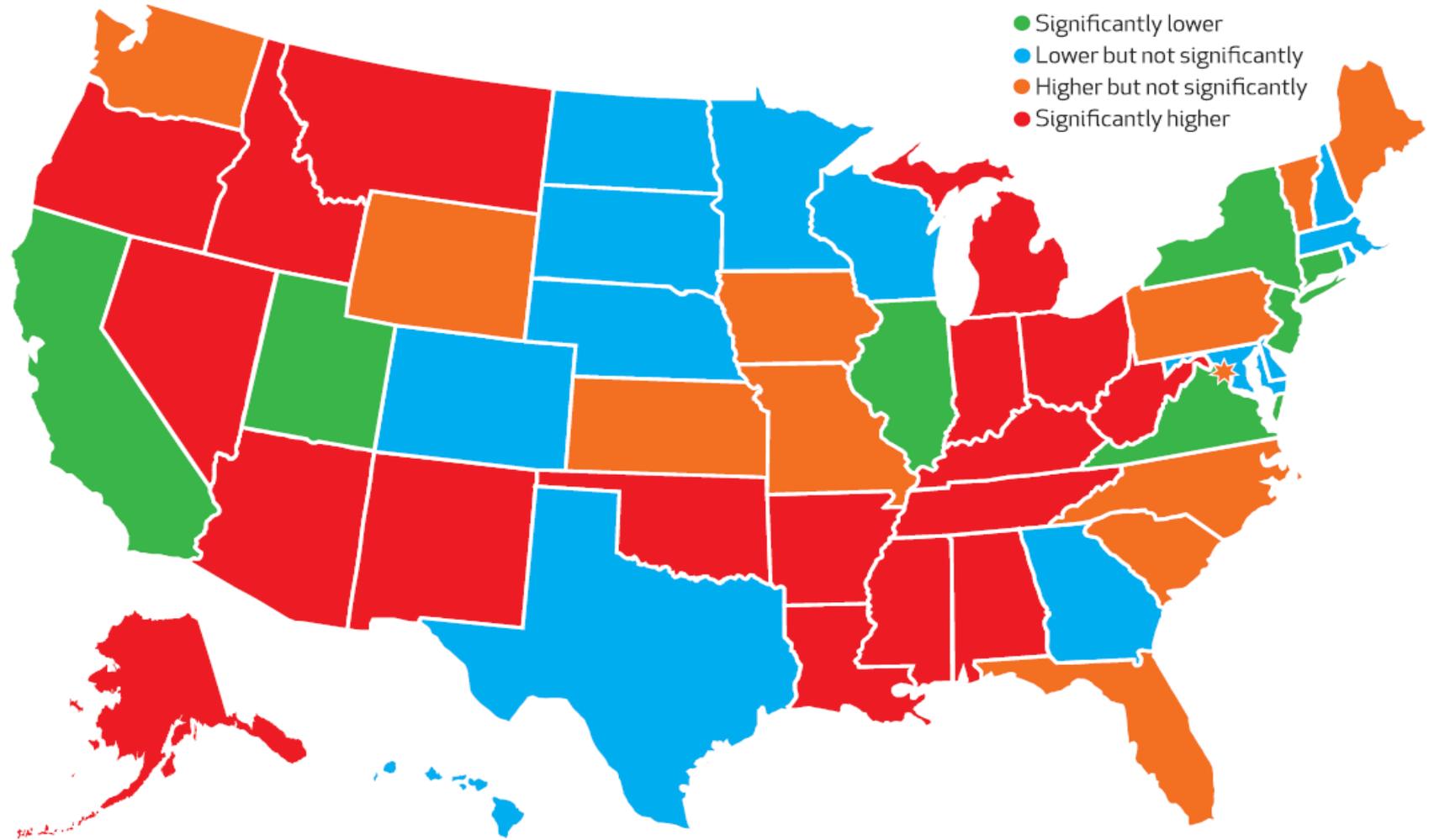
National Survey of Children with Special Health Care Needs

Conducted 2011-2012

Representative sample of children age 0-17

Approximately 1800 per state

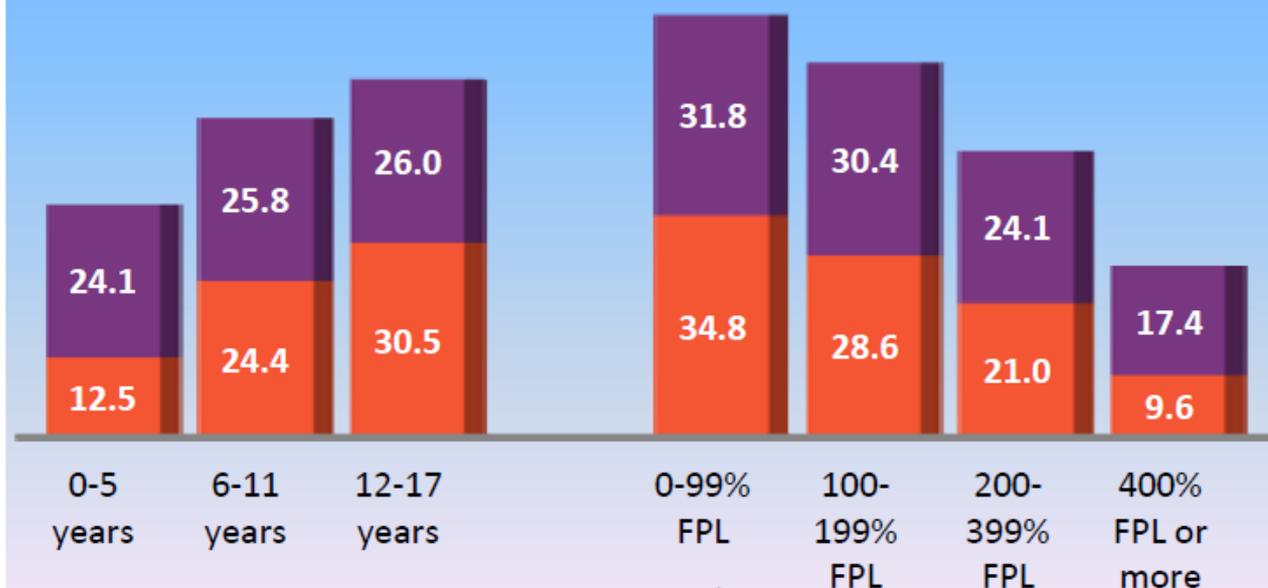
Parent report;

EXHIBIT 1**Prevalence Of Children Ages 0-17, By State, Who Experienced Two Or More Of The Nine Adverse Childhood Experiences Evaluated In The 2011-12 National Survey Of Children's Health**

SOURCE Authors' analysis of data from the 2011-12 National Survey of Children's Health. **NOTES** The map shows prevalence in each state compared to the US average. In the key, lower indicates better performance. Nationwide, 22.6 percent of children experienced two or more of the nine adverse childhood experiences. The state with the lowest percentage of such children (16.3 percent) was New Jersey; the state with the highest percentage (32.9 percent) was Oklahoma. Statistical significance indicates $p < 0.05$.

Figure 2. Prevalence of Adverse Child and Family Experiences, by Age and Household Income* Subgroups

- Two or more adverse family experiences
- One adverse family experience

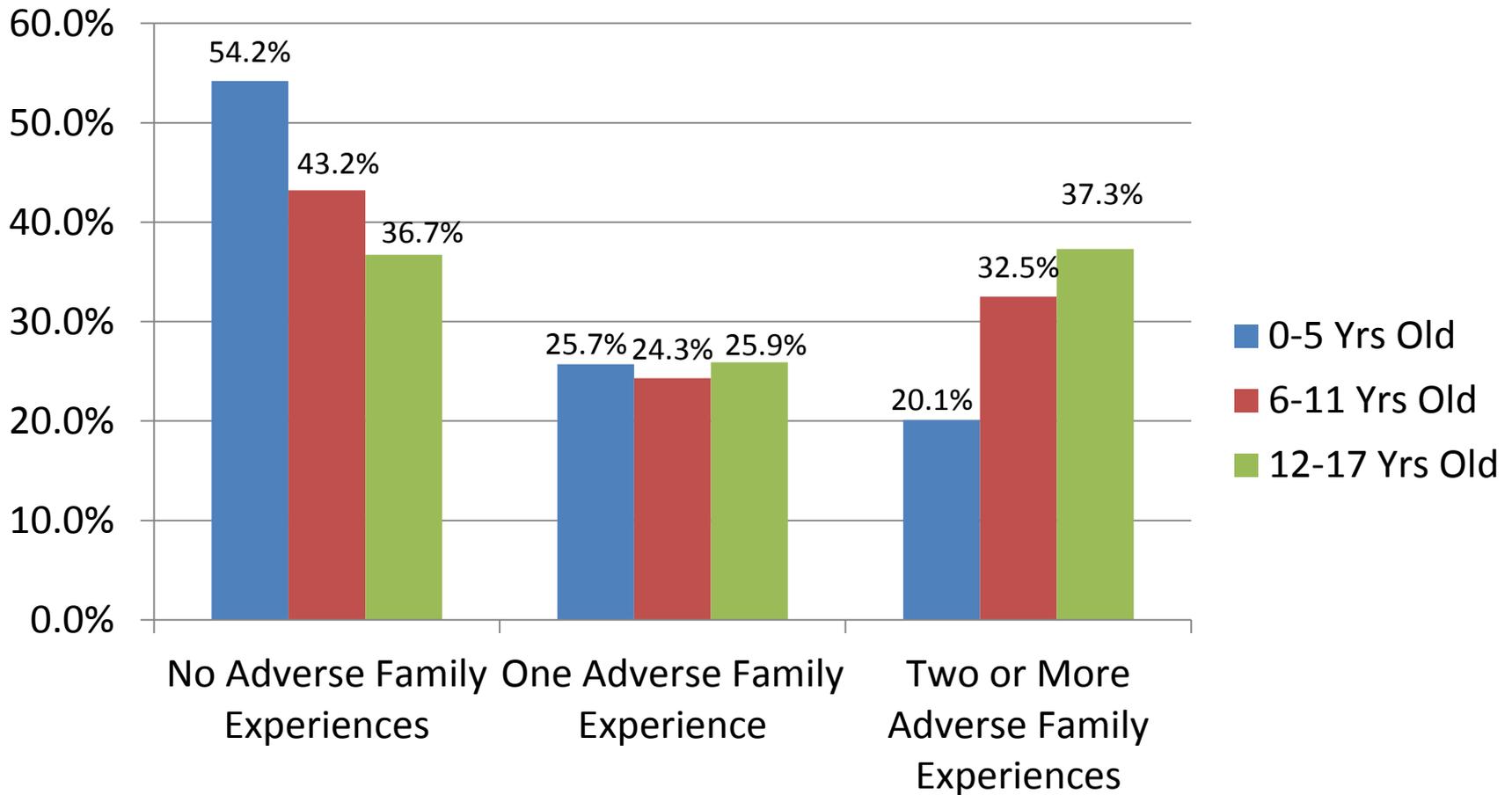


*FPL = Federal Poverty Level⁴
Source: 2011/12 NSCH

National and Kentucky Prevalence of Adverse Childhood Experiences Among Children Age 0-17

Adverse Child or Family Experiences	Kentucky Prevalence	National Prevalence	State Range
Child had ≥ 1 Adverse Child/Family Experience	55.3%	47.9%	40.6% (CT) – 57.5% (AZ)
Child had ≥ 2 Adverse Child/Family Experiences	30.0%	22.6%	16.3% (NJ) – 32.9% (OK)
Extreme economic hardship	29.6%	25.7%	20.1% (MD) – 34.3% (AZ)
Family discord leading to divorce or separation	28.9%	20.1%	15.2% (DC) – 29.5% (OK)
Having lived with someone who had an alcohol or drug problem	14.4%	10.7%	6.4% (NY) – 18.5% (MT)
Having been a victim or witness of neighborhood violence	9.3%	8.6%	5.2% (NJ) – 16.6% (DC)
Having lived with someone who was mentally ill or suicidal	11.1%	8.6%	5.4% (CA) – 14.1% (MT)
Witnessing domestic violence in the home	9.7%	7.3%	5.0% (CT) – 11.1% (OK)
Parent served time in jail	13.2%	6.9%	3.2% (NJ) – 13.2% (KY)
Treated or judged unfairly due to race/ethnicity	3.7%	4.1%	1.8% (VT) – 6.5% (AZ)
Death of parent	4.2%	3.1%	1.4% (CT) – 7.1% (DC)

Percentage of Kentucky Children With Adverse Childhood Experiences by Age Group



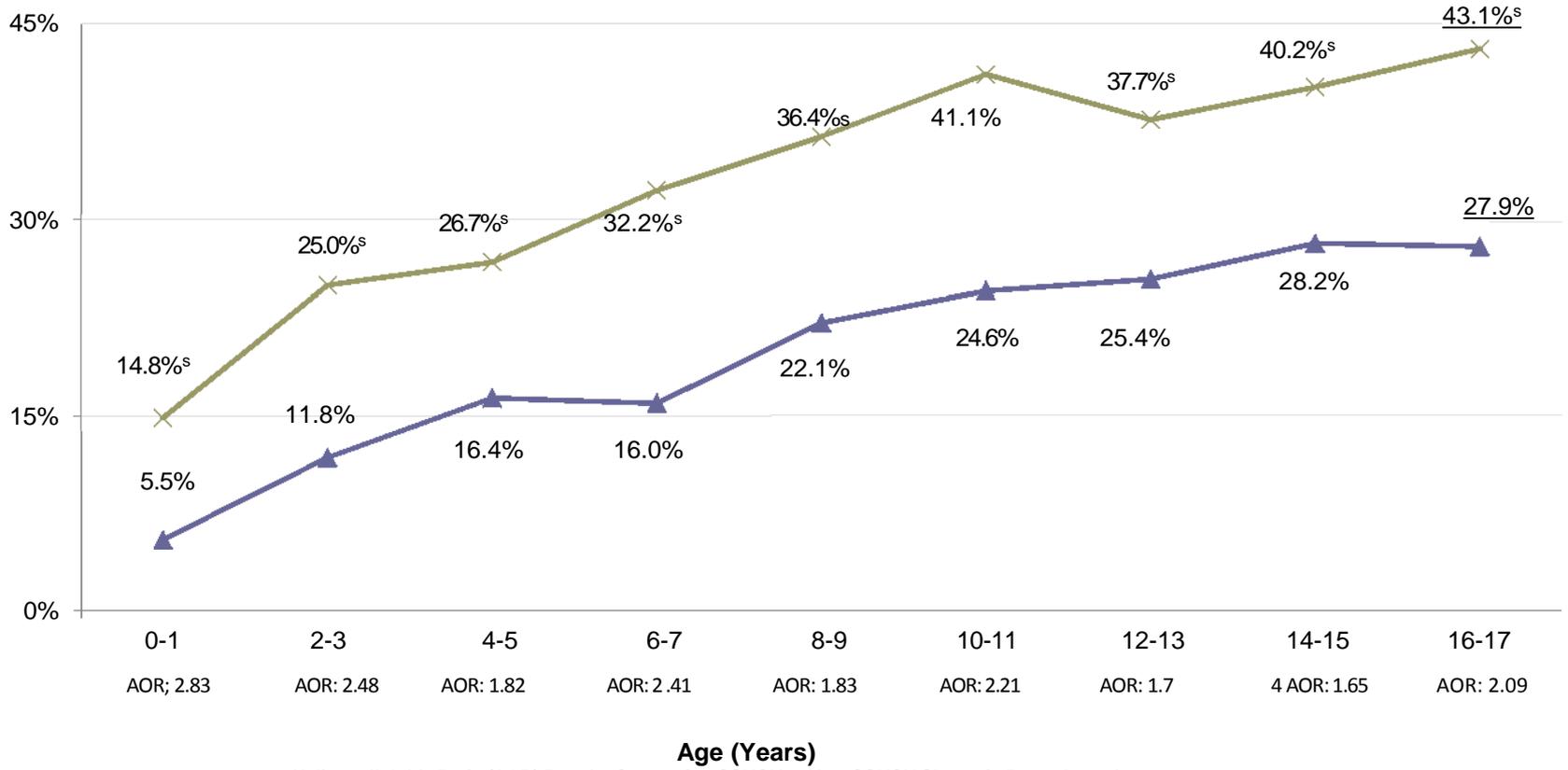
Source: 2011/2012 National Survey of Children's Health
Available at <http://www.childhealthdata.org/home>

EXHIBIT 3**Prevalence Of Adverse Childhood Experiences (ACEs) Among Children Age 0–17, By Eleven Child And Risk Factors, By Number Of ACEs, 2011–12**

Category of children	Study population (%)	Prevalence of ACEs (%)	
		1 ACE	2 or more ACEs
All	100.0	25.3	22.6
In fair or poor overall health	3.2	31.8	39.3
With special health care needs	19.8	25.9	36.0
With special health care needs and EBD	7.2	23.7	51.9
At high or moderate risk for developmental, behavioral, or social delays	26.2	26.9	18.8
With asthma	8.8	27.3	33.4
With ADHD	7.9	24.8	45.2
With autism spectrum disorder	1.8	27.1	34.4
Who are overweight or obese	31.3	25.5	37.1
With a behavior problem	3.2	23.6	61.4
Who bully ^d	2.2	23.0	55.4

SOURCE Authors' analysis of data from the 2011–12 National Survey of Children's Health. **NOTES** AOR is ; race/ethnicity). EBD is emotional, behavioral, or developmental problems. ADHD is attention deficit h variation remains ($p < 0.05$), after adjustment for child-level characteristics across states using mult

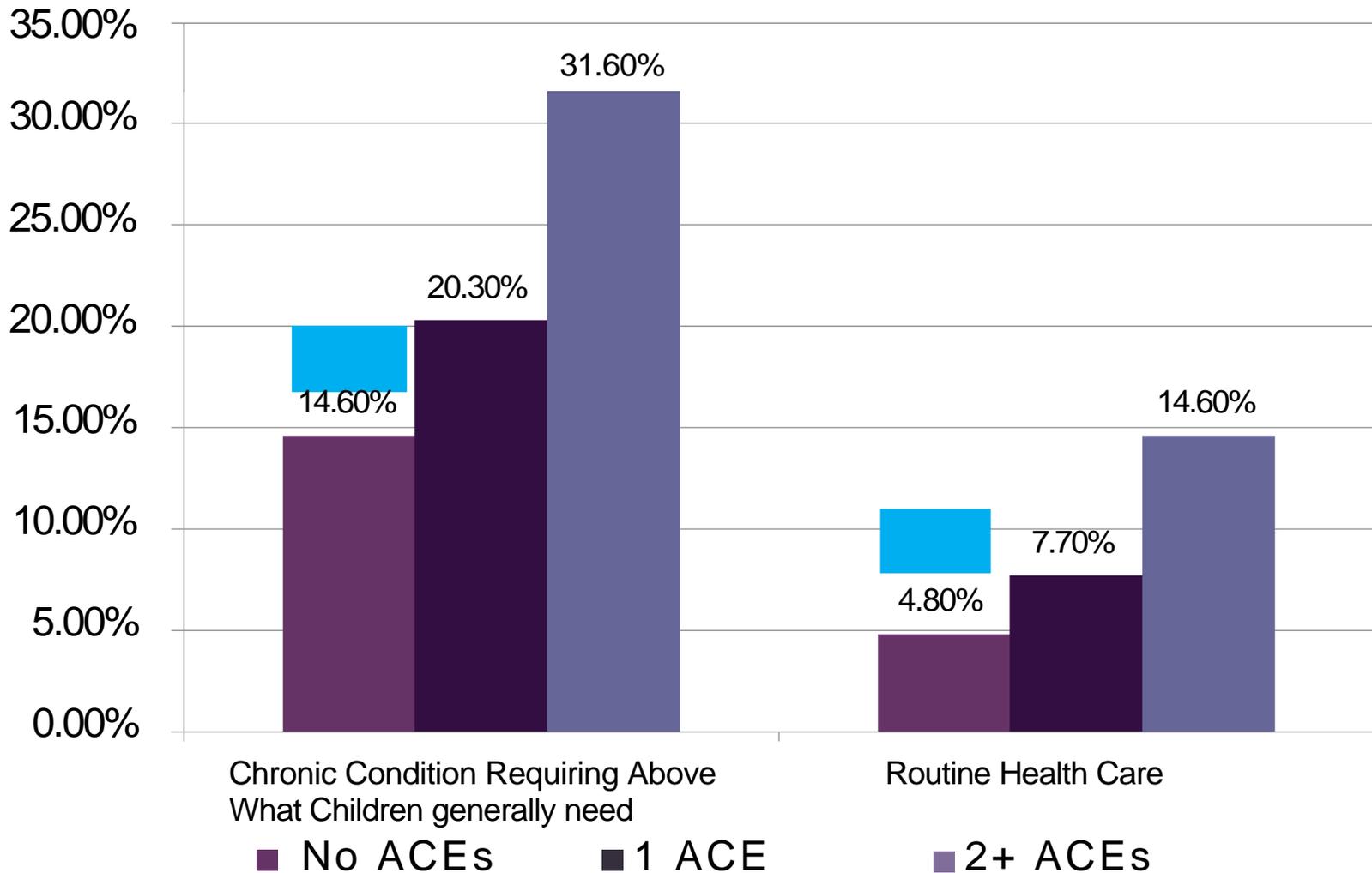
Prevalence of Children With Two or More Adverse Child/Family Experiences (ACEs), by CSHCN Status and Age



▲ Non-CSHCN with 2+ ACEs

✕ CSHCN with 2+ ACEs

Impacts on chronic condition status appear early in life.



Bethell, C, Newacheck, P, Hawes, E, Halfon, N. Adverse childhood experiences: assessing the impact on health and school engagement and the mitigating role of resilience. (2014) Health Affairs Dec;



“Associations between early childhood experiences and health are readily apparent in childhood -- which is when the health system has ample opportunity to intervene and possibly prevent the long-term medical complications described in the adult-focused Adverse Childhood Experiences Study”

Bethell, C, Newacheck, P, Hawes, E, Halfon, N. Adverse childhood experiences: assessing the impact on health and school engagement and the mitigating role of resilience. (2014) Health Affairs Dec; 33(12);210-2016

■ Adverse Childhood Experiences

are **not** destiny, and early trauma does not have to dictate a life story.

Research shows that

protective factors –

chiefly the presence of a nurturing adult -

can cushion the impact of adversity

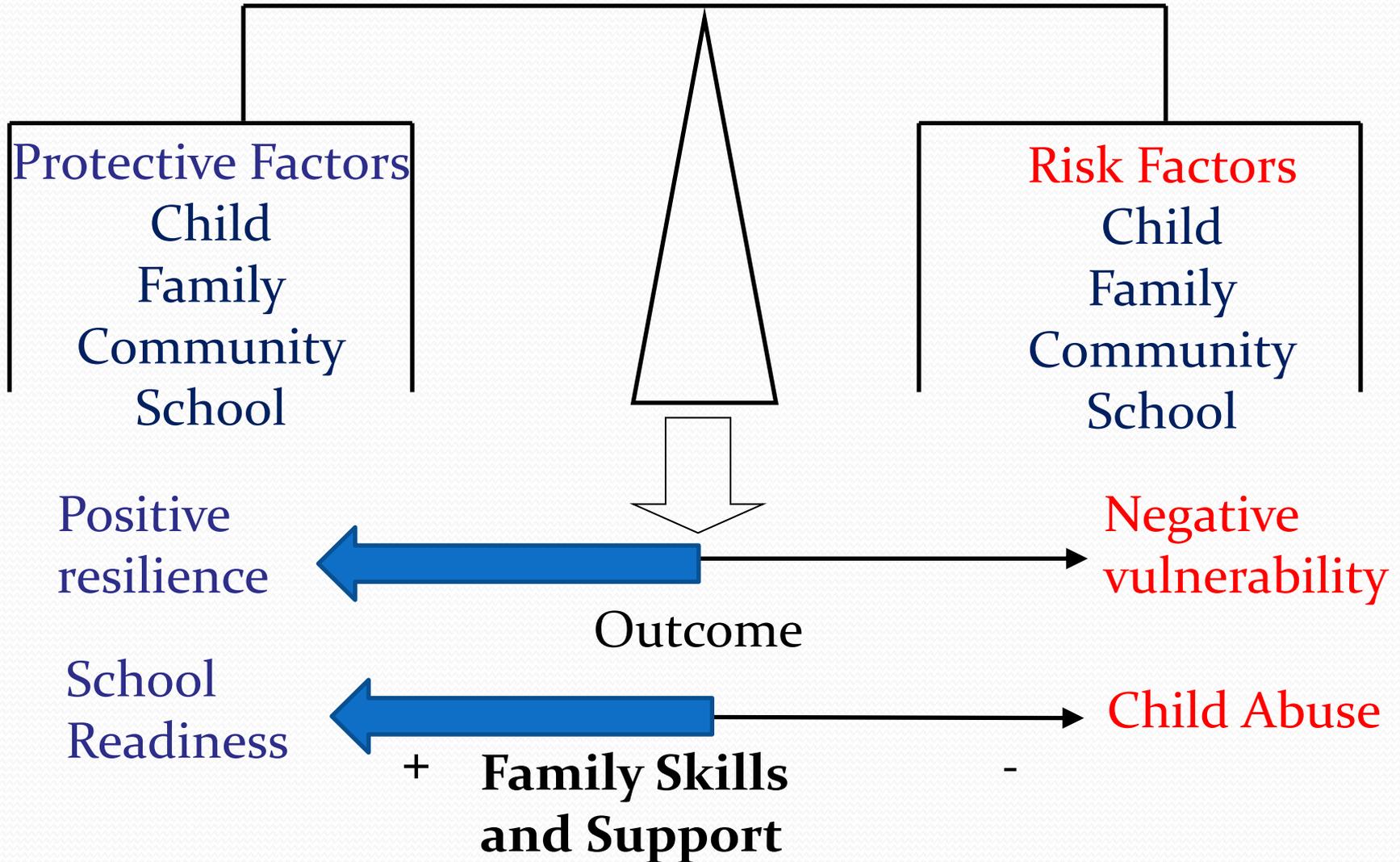
in a child's life.



Building Resilience

- Resilience....the ability to recover from traumatic events...the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of threat (APA)
- The natural ability to navigate life well (HeavyRunner & Marshall, 2003)
- Research has shown that 2/3 of children who experience adverse childhood events will grow up and “beat the odds” (Michenbaum, n.d.)

Life Course Trajectory: A Balance of Risk and Protective Factors



Relative
Magnitude
of Influence

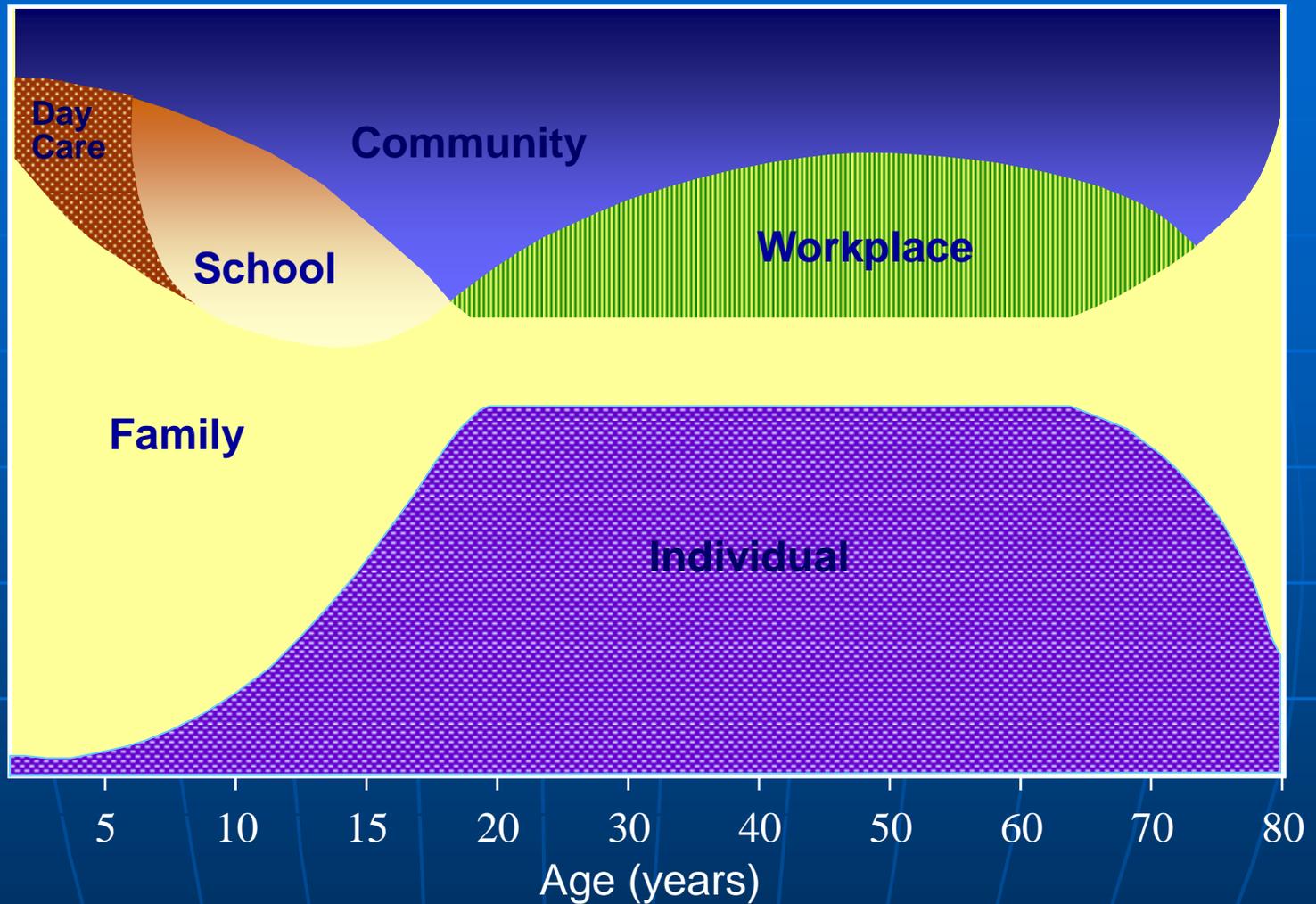


FIGURE 2: INFLUENCE OF HEALTH STATUS ACROSS THE LIFE COURSE. Across the life course, the health status of individuals is a function of endogenous factors (genetic, physiological, psychological), family influences, and a range of influences from the immediate community (school and workplace), and the larger community (neighborhood, city, and nation). As illustrated in figure 2, the relative influence of these factors changes as a function of age. Adapted from Nordio S. 1978. Needs in Child and Maternal Care. Rational Utilization and Social-Medical Resources. *Rivista Italiana di Pediatria* 4:3-20.

Relationships are Protective

- **Supportive early relationships offer protection** from the effects of stress, and the absence of such relationships can imperil the brain's capacities for managing stress and/or its recovery
- Early relationships also protect against biological hazards to healthy brain growth -- nutritional inadequacy, physical illness, sensory impairment, dangerous exposures -- *beginning prenatally*
- The intersection of brain maturation and relational experience also helps to explain fundamental aspects of healthy psychological development



Building Resilience

- The foundation of resilience is the combination of
 - (1) Supportive relationships- every child needs a nurturing adult to care about them, accept them unconditionally, and encourage them to be their best.
 - (2) Adaptive skill building- the ability to learn to face challenges and build a sense of accomplishment and confidence
 - (3) Experience a feeling of belonging and making a contribution
- The capabilities that underlie resilience can be strengthened at any age

Adapted from Harvard Center for the Developing Child. Resilience Key Concepts

Building Resilience

Home visiting

- **Builds Relationships**
- Strengths-based, building parent skills
- Nurturing and Attachment
- Positive parenting, early brain development
- **Builds self sufficiency in parents** – education, goal setting, anger management, planning, resourcing
- **TWO GENERATION APPROACH**

IMPROVED OUTCOMES

- ❖ **31% less Prematurity**
- ❖ **33% less LBW**
- ❖ **55% less VLBW**
- ❖ **50% less Pregnancy Induced Hypertension**
- ❖ **50% less ER Usage**
- ❖ **40% less Child Abuse and Neglect**
- ❖ **26% improved/increased Education**



**Cabinet for Health and Family
Services
Department for Public Health**

“We don’t lift these families out of poverty, we help them build the skills they need to face their adversity.”