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Adverse Childhood Experiences, or "ACEs," are stressful or traumatic experiences that disrupt the safe, nurturing relationships and environments that children need to thrive. Exposure to ACEs can lead individuals toward the adoption of unhealthy habits and the onset of negative long-term health and economic issues.

In 2012, the Tennessee Department of Health included the Adverse Childhood Experiences (ACEs) module in the Behavioral Risk Factor Surveillance System (BRFSS), a telephone survey conducted by the Centers for Disease Control and Prevention, to analyze how ACEs affect the state's general population. The findings from the analysis are included in the attached *Adverse Childhood Experiences in Tennessee* report.

We discovered that ACEs are widespread, common and prevalent in Tennessee. Overall, 52% of the statewide population had at least one ACE, while 21% had three or more ACEs. Emotional abuse and parental separation or divorce rank as the most common adverse experiences. ACEs are found all across the state, with multiple counties in which 42% of the population has experienced two or more ACEs.

After June 5th, 2015, the Report will be available for download on the Tennessee Department of Health's website at https://tn.gov/health/topic/MCH-reports.

The Tennessee Department of Health is committed to increasing awareness of ACEs and their impact. Developing and disseminating information about ACEs and their association to specific outcomes is an important first step to reducing ACEs and de-stigmatizing early childhood trauma. We encourage you to share this information with co-workers, family, friends, business leaders and neighbors.

We look forward to identifying opportunities and resources to prevent and reduce adverse childhood experiences in Tennessee.

Any questions or comments about this Report may be directed to Loraine Lucinski via email at Loraine.Lucinski@tn.gov .

ADVERSE CHILDHOOD EXPERIENCES IN TENNESSEE

FACT **NOT** FATE

Like a house's foundation, brain architecture is built over time and from the bottom up. Positive experiences in infancy and early childhood can build a strong and solid foundation. Negative experiences weaken the foundation which can lead to life-long problems.

Adverse Childhood Experiences, or "ACEs," are stressful or traumatic experiences that disrupt the safe, nurturing environments that children need to thrive. Exposure to ACEs can lead individuals toward the adoption of unhealthy habits and the onset of negative long-term health and economic issues.

Adverse childhood experiences that may negatively impact development include the following:

- Child maltreatment • Family dysfunction
- Witnessing community violence • Living in poverty
- Homelessness • Bullying by peers, siblings and others
- Death of a parent

ACEs cause stress and challenges during childhood, adolescence, and into adulthood. Some adult outcomes associated with ACEs include the following:

- Heart disease • Diabetes • Obesity • Cancer
- Liver disease • Intimate partner violence • Depression
- Suicide attempts • Poor anger control • Smoking
- Substance abuse • Multiple sexual partners
- Unintended pregnancies • Fetal death

The more exposure to ACEs a person has, the more his or her risk increases for the issues above.

A person's ACE score is calculated by totaling the number of different types of adverse events experienced in childhood

Child Maltreatment	Family Dysfunction
Physical	Substance abuse
Sexual	Incarceration
Psychological	Mental illness
Neglect	Divorce/Separation
	Domestic Violence

However, there is hope! Research shows that providing safe, stable and nurturing relationships early in life can buffer the damaging effects of childhood adversity. Tennessee can do a number of things to both prevent and reduce ACEs across the state and to build protective factors in and around children so they can grow up to be healthy and happy.

THE ACE STUDY

Trauma during childhood can have critical implications throughout the lifespan.

The Adverse Childhood Experiences (ACE) Study is a large-scale, ongoing research collaboration assessing the link between negative childhood experiences and negative adult outcomes. The study was initiated by Dr. Robert Anda and Dr. Vincent Felitti in 1995-1997 with more than 17,000 participants at Kaiser Permanente in San Diego, California in partnership with the Centers for Disease Control and Prevention (CDC). Each participant in the study had a physical examination and completed a confidential survey that contained questions about childhood maltreatment and family dysfunction as well as current health status and behaviors. Participants with exposure to early traumatic stressors, termed adverse childhood experiences or ACEs, showed an increased risk for both short-term and long-term health and social problems (see figure 1). As the number of ACEs increased for each person so did the amount of risk in a number of categories, suggesting that vulnerability builds with each ACE exposure. Both the findings and ongoing assessment tell a compelling story about the relationship between childhood stress and the risk for a multitude of problems across the lifespan.

Figure I

Sources: CDC http://www.cdc.gov/brfss and ACE Study http://acestudy.org
Figure adapted by Dr. Robert Anda

ACEs IN TENNESSEE: PREVALENCE

In 2012, Tennessee included an ACEs module in the Behavioral Risk Factor Surveillance System (BRFSS), a telephone survey conducted by the CDC, to see how ACEs affect the state's general population. The Tennessee Department of Health then analyzed data from 7,056 adults to assess outcomes. Data presented in this report may underestimate the prevelance of ACEs in Tennessee since BRFSS data collection excludes certain groups of individuals including those who are homeless, in prison, or do not have phones. In addition, ACEs data is population level data and should not be used to predict individual risk.

ACEs are widespread, common and prevalent in Tennessee. ACEs are found across the state, with multiple counties in which 42% of the population has experienced two or more ACEs (see figure 4). Overall, 52% of the statewide population had at least one ACE, while 21% had three or more ACEs (see figure 2). Emotional abuse and parental separation or divorce rank as the most common adverse experiences (see figure 5). In addition, males and females are exposed to adverse childhood experiences at about the same rate with the exception of sexual abuse, for which females report higher rates of exposure (see figure 3).

Figure 2: Prevalence of ACEs in TN

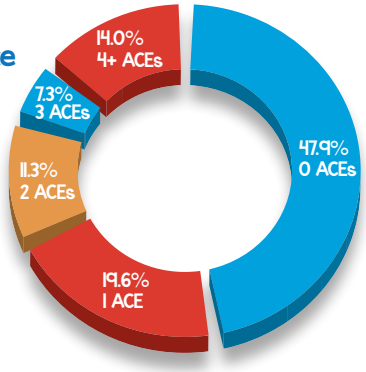


Figure 3: Prevalence of Specific ACEs in TN by Gender

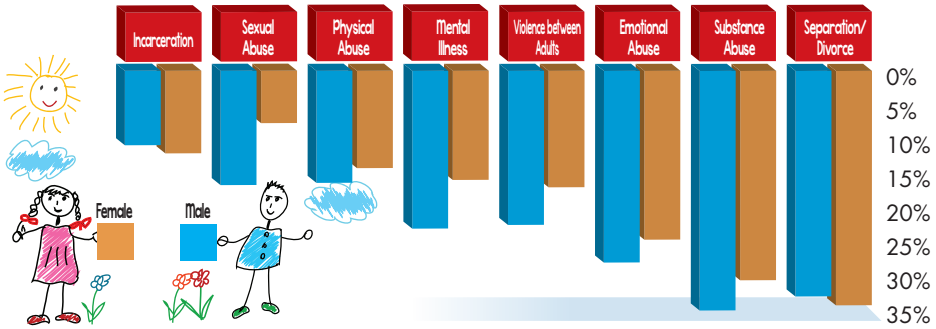


Figure 4: ACE Scores Across TN Counties, Percent of Population with an ACE Score of 2 or More

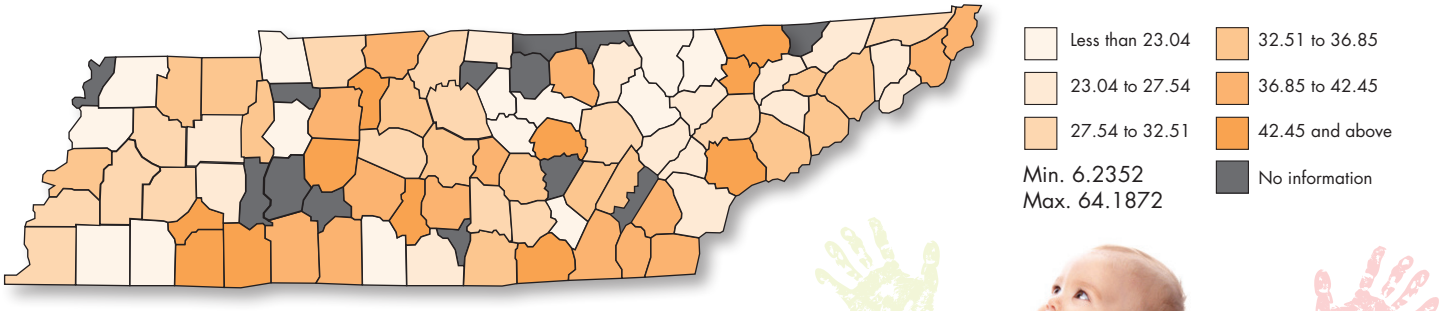
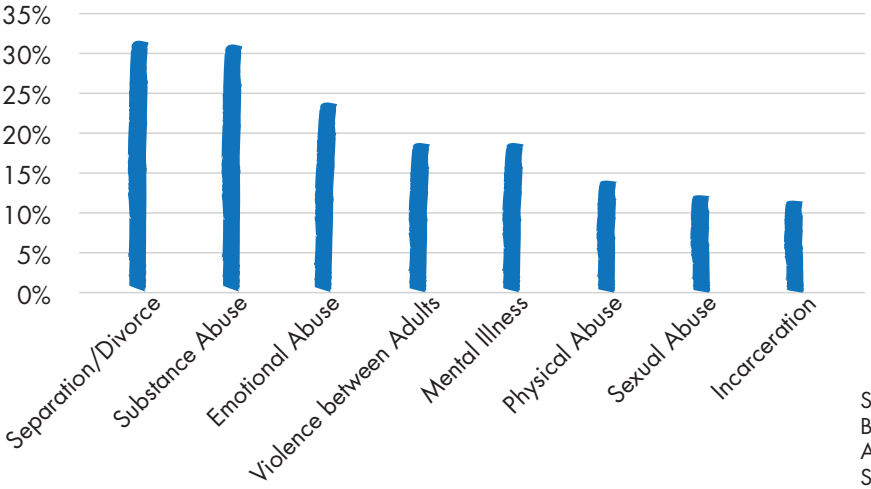


Figure 5: Prevalence of ACEs in TN by Category

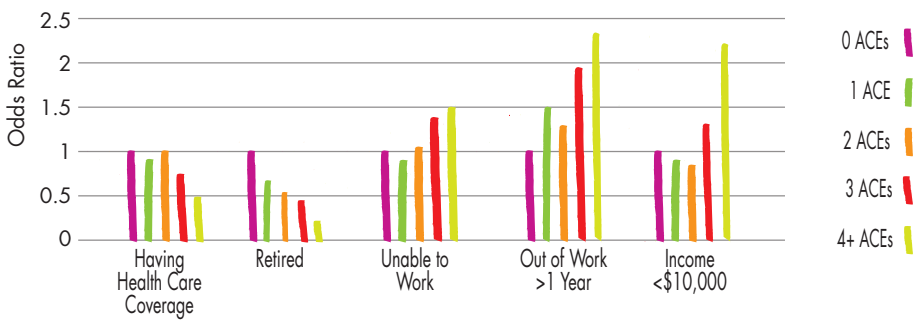


Source: Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2012].

ACEs IN TENNESSEE: SOCIAL AND ECONOMIC OUTCOMES AND BEHAVIORS

* All associations, unless otherwise noted, are statistically significant

Figure 6: Employment-Related Variables by ACE Score*



A person with four or more ACEs is over **twice as likely to be out of work** and be in the lowest income bracket as a person with 0 ACEs (see figure 6).

A person with four or more ACEs is **half as likely to have health care coverage** as a person with 0 ACEs (see figure 6).

A person with four or more ACEs is **less likely to be married** and **more likely to be separated or never married** than a person with 0 ACEs (see figure 7).

Figure 7: Marital Status by ACE Score*

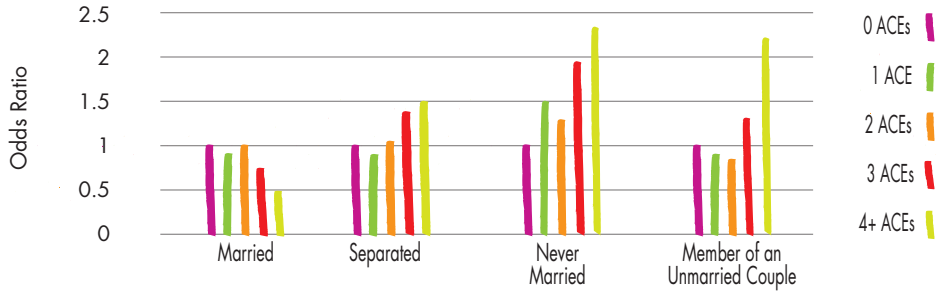
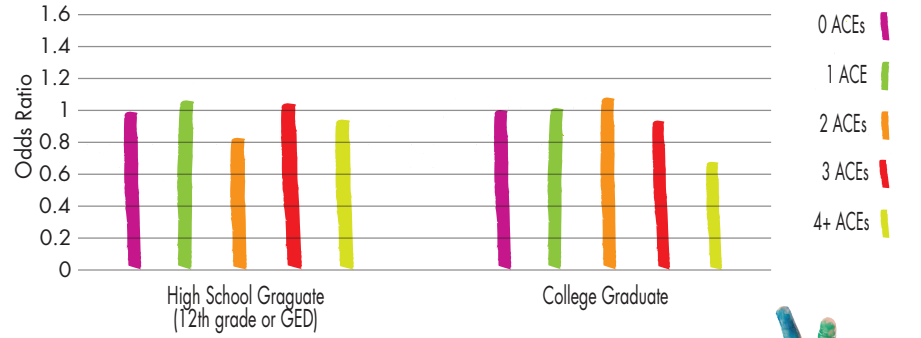


Figure 8: Graduation by ACE Score*



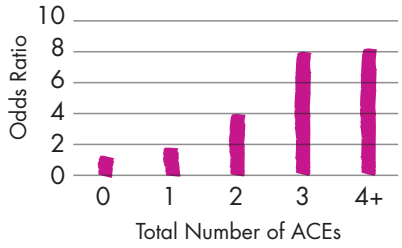
A person with four or more ACEs is **less likely to graduate high school** and much **less likely to graduate college** as a person with 0 ACEs (see figure 8).

Source: Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2012].

ACEs IN TENNESSEE: HEALTH OUTCOMES AND BEHAVIORS

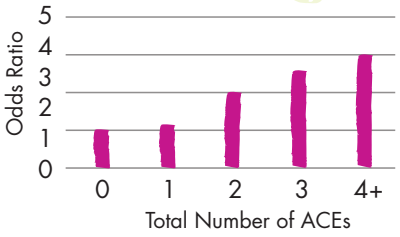
* All associations, unless otherwise noted, are statistically significant

Figure 9: HIV Risk Factors by ACE Score*



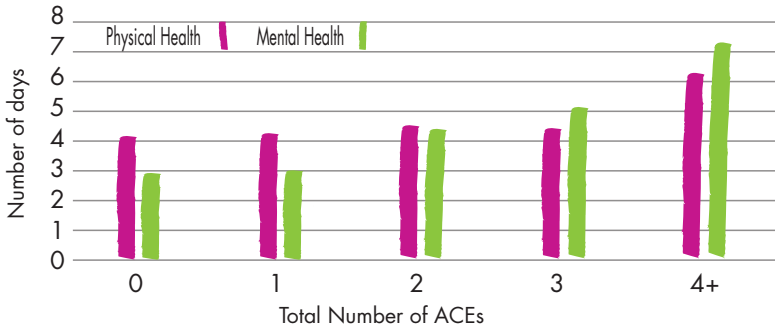
A person with four or more ACEs is **eight times as likely to have HIV risk factors** as a person with 0 ACEs (see figure 9).

Figure 10: Depression Diagnosis by ACE Score*



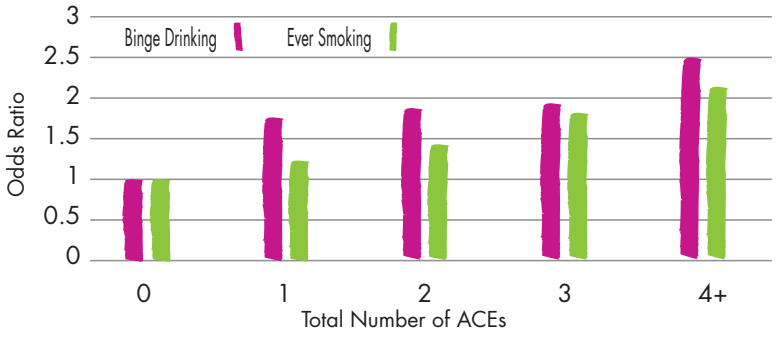
A person with four or more ACEs is **four times as likely to have depression** as a person with 0 ACEs (see figure 10).

Figure 11: Number of Days with Poor Health in Last 30 Days by ACE Score*



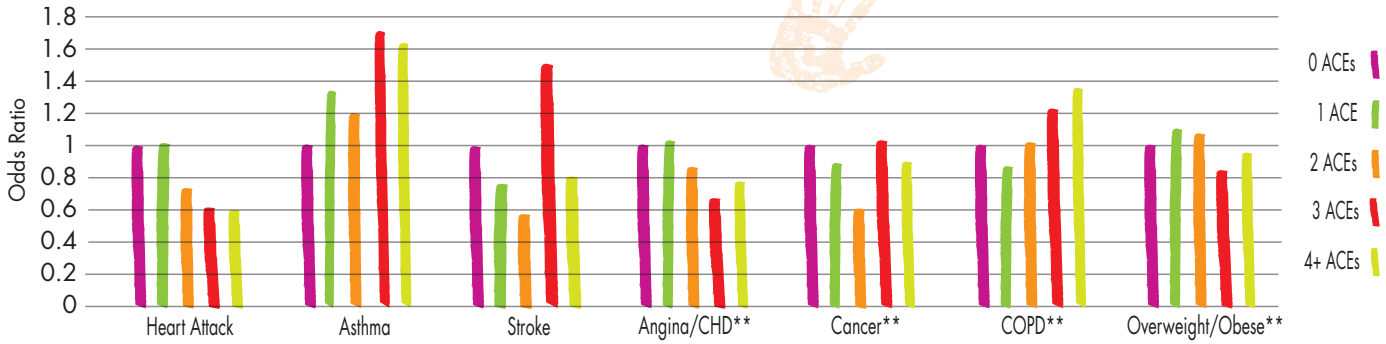
A person with four or more ACEs has seven days of **poor mental health** and six days of **poor physical health** each month on average (see figure 11).

Figure 12: Substance Use by ACE Score*



A person with four or more ACEs is **more likely to binge drink and smoke cigarettes** as a person with 0 ACEs (see figure 12).

Figure 13: Health Outcomes by ACE Score*



The more ACEs a person has, the **more likely** he or she is to have **asthma**.

** data is not statistically significant

Note; Compared to other state and national data, the Tennessee Health Outcomes data does not follow the typical data pattern where the more ACEs a person has, the higher his or her risk becomes (dose-response pattern). The reason for this is unclear at this time.

ACEs and Brain Development

Adverse childhood experiences are stressful.

Though experiencing some stress is a normal part of healthy brain development, cumulative adverse childhood experiences are a type of stress that negatively affects brain development. The National Scientific Council on the Developing Child has identified three primary types of stress:

Positive Stress

- Brief increase in heart rate
- Mild elevation of stress hormones
- "Fight or Flight"
- Example: Getting immunized at doctor's office

Tolerable Stress

- More prolonged activation of stress response
- Stress buffered by adult support
- Example: Grieving the loss of a loved one with support

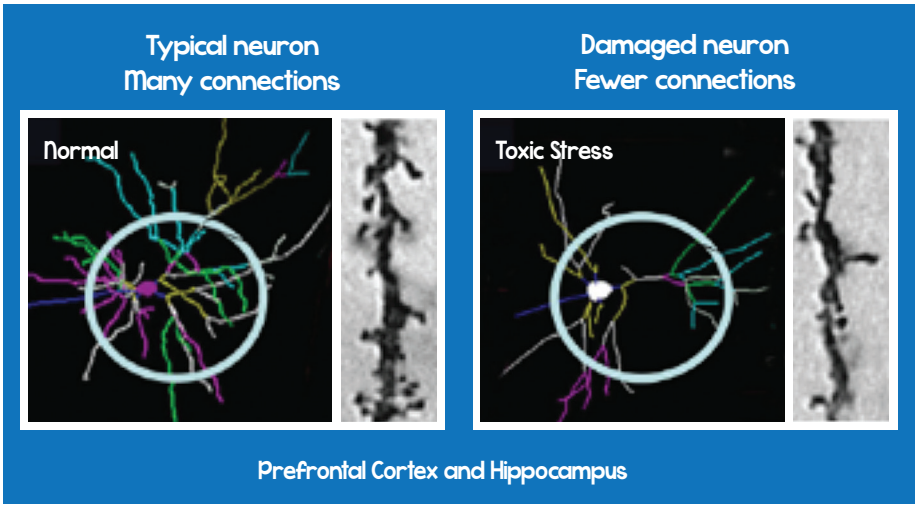
Toxic Stress

- Prolonged activation of stress response
- Disruption of brain architecture
- No adult support
- Example: Experiencing abuse and neglect

ACEs are harmful.

Traumatic experiences, including ACEs, can be particularly harmful during infancy and early childhood when the brain is immature and in some ways fragile. The nature and severity of the disruption in brain development is dependent on the type of experience, the level and duration of exposure, and the timing during the developmental process. Toxic stress that occurs continually or is triggered by multiple sources can have a cumulative toll on an individual and can actually damage brain cells (see figure 14).

Figure 14: Persistent Stress Changes Brain Architecture



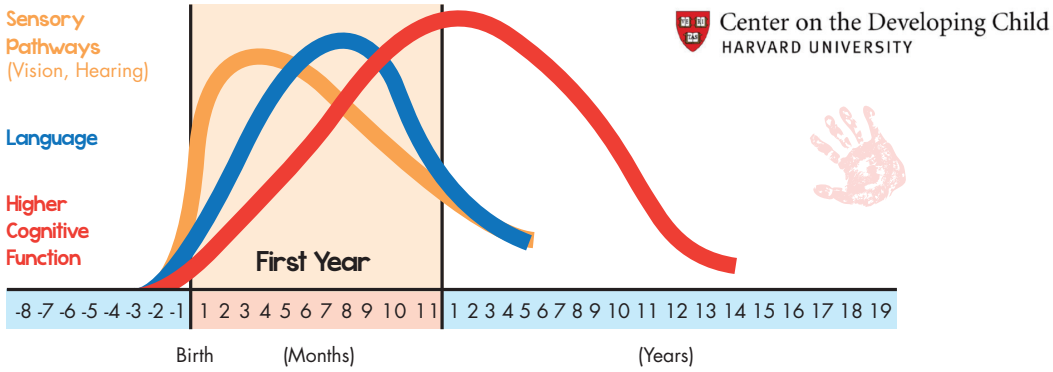
Sources: Radley et. al. (2004) and Bock et. al. (2005)

ACEs in TENNESSEE: BUILDING A STRONG FOUNDATION

ACEs and stress are not the only factors that affect brain development. Many factors, both internal and external, affect brain development. During infancy, babies' brains are developing 700 synapses per second; within the first year, development of neural connections in the brain peaks in sensory pathways such as vision, hearing, language and higher cognitive functions (See Figure 15). Sometimes, it's easier to think about brain architecture compared to a house's foundation. In the brain and a house, it's important to have a strong and solid foundation at the beginning so there are fewer problems later.

Figure 15: HUMAN BRAIN DEVELOPMENT

Neural Connections for Different Functions Develop Sequentially

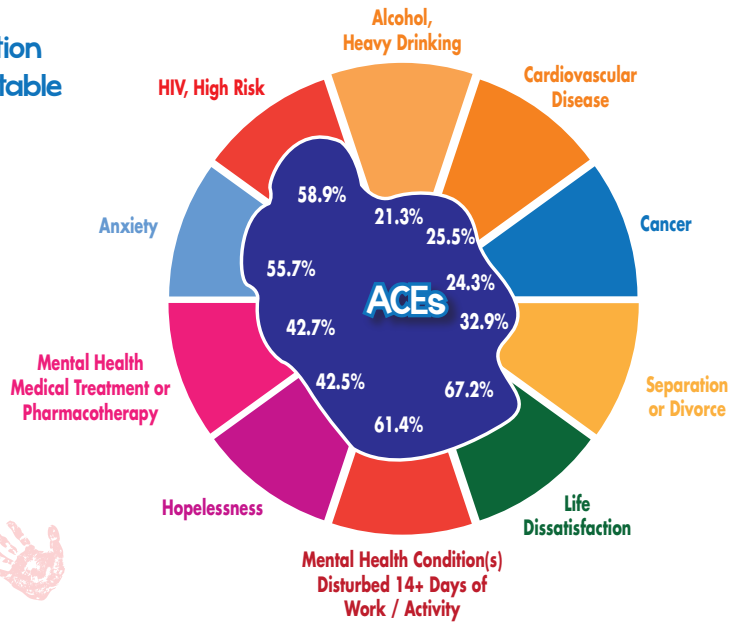


Sources: Harvard University Center on the Developing Child at Harvard University and C.A. Nelson (2000). http://developingchild.harvard.edu

So, what kinds of things can build a strong and solid foundation? Positive interactions with infants can help facilitate optimal brain development. Early on, it is important to **talk, sing, rhyme and read** to/with a baby-even before the baby has begun to talk. These types of routines will help children pick up language and can actually predict reading levels later. Also, "**Serve and Return**" is essential in shaping brain architecture. Serve and Return happens when a baby 'serves' a behavior such as babbling, facial expressions, gestures and other noises to provoke interaction with an adult, and the adult 'returns' the same kind of behavior. This type of back-and-forth communication between caregiver and baby is actually fundamental to the wiring of the brain. Other behaviors that are very important for a baby's brain development include **breastfeeding, good nutrition, regular sleep, medical check-ups and appropriate and consistent discipline**. Healthy development of the brain is critical for many life course outcomes including achievement, health, and successful parenting of the next generation.

Practicing these behaviors will instill protective factors and resilience in children so they are more likely to bounce back if, at some point, they do experience ACEs. Though prevention and reduction of ACEs is ideal, protective factors that lead to resiliency can help to decrease the effect ACEs have on later life outcomes. Imagine putting a sponge in the middle of the Population Attributable Risk 'ACEs oil spill' graph (see Figure 16) - risk for all of these outcomes can be decreased simultaneously if ACEs were prevented, reduced or mitigated. That's why it's important to start early!

Figure 16: Population Attributable Risk



Sources: Harvard University Center on the Developing Child. Toxic Stress: The Facts. Available at: http://developingchild.harvard.edu/topics/science_of_early_childhood/toxic_stress_response/

Harvard University Center on the Developing Child. In Brief: The Science of Early Childhood Development. Available at: http://developingchild.harvard.edu/index.php/resources/briefs/inbrief_series/inbrief_the_science_of_ecd/

PREVENTING AND REDUCING ACES IN TENNESSEE: OPPORTUNITIES AND RESOURCES

Increase awareness of ACEs and their impact

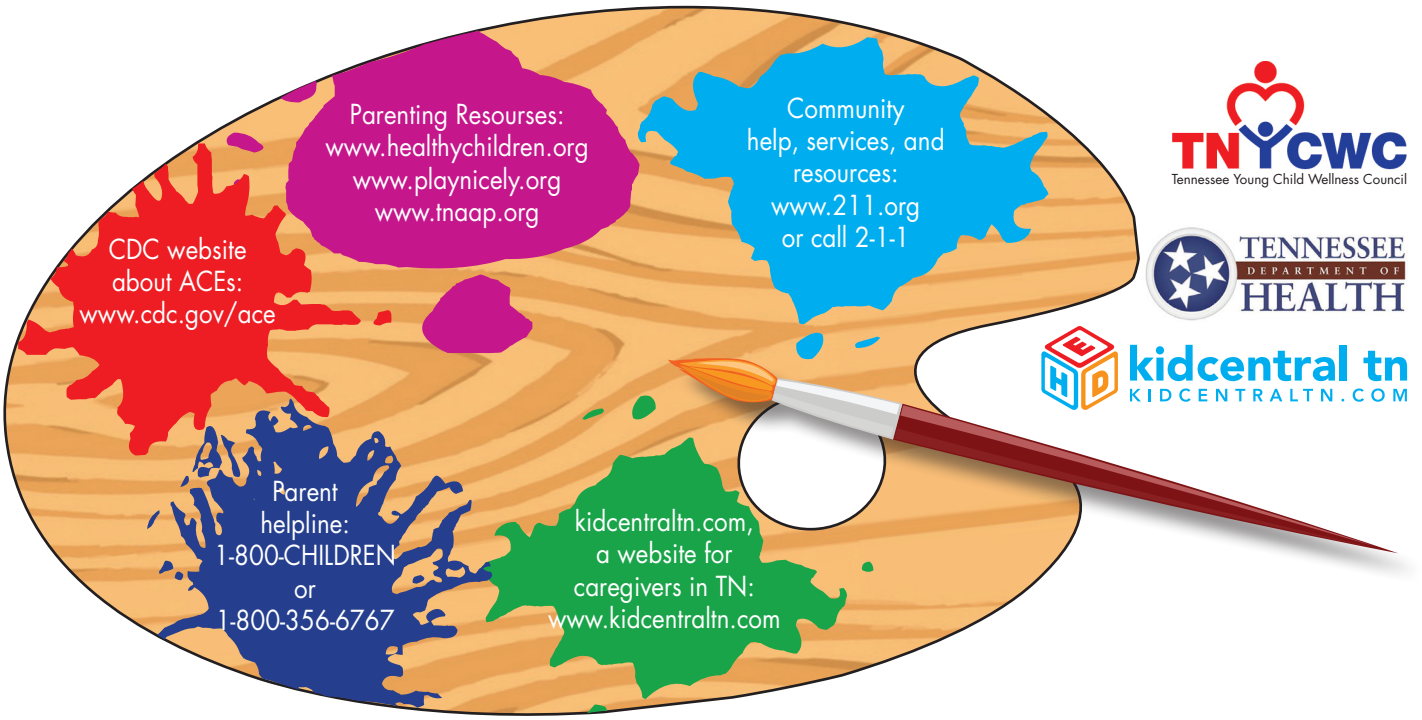
- Develop and disseminate information about ACEs and their association to specific outcomes as a first step to reducing ACEs and de-stigmatizing early childhood trauma. Share this information with family, friends, neighbors and coworkers.
- Work with the state's education, child welfare, mental health, public health, health care, substance abuse, juvenile justice and public safety systems to further understand the impact of ACEs and the health, social and economic benefits of reducing and preventing ACEs.

Continue to collect and use Tennessee-specific ACE data

- Increase the scope and utility of ACE data collection, analysis and dissemination in Tennessee.
- Compile a statewide inventory of community initiatives that reduce ACEs to use as a strategic tool to inform decision-making and move from awareness to solutions.

Prevent and respond to ACEs in communities

- Ensure safe, stable, nurturing relationships and environments for children by supporting protective factors including parental resilience, social connections, parenting education and concrete support in times of need.
- Enhance the capacity of communities to prevent and reduce ACEs by prioritizing investments toward evidence-based prevention and intervention programming that supports children and families, promote and fund the implementation and evaluation of promising approaches, and support community norms change where all share responsibility for the well-being of children.



All data in this report was gathered during the Tennessee BRFSS, 2012, and analyzed by the Tennessee Department of Health's Division of Policy, Planning and Assessment and epidemiologists in the Divison of Family Health and Wellness. Exposures to alcohol and/or substance abuse were combined into one substance abuse category. Similarly, three experiences of sexual abuse were combined in one category. This resulted in the initial 11 Adverse Childhood Events being collapsed to eight experiences. Participants with responses to at least 1 question (n=6918, 98%) were retained in the analysis. Complex survey analysis methods (PROC SURVEYFREQ) were used to obtain weighted frequencies and percentages. All analyses were performed using SAS 9.2 (Cary, NC).

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