

The **Adverse Childhood Experiences Study (ACE Study)** is a research study conducted by the American [health maintenance organization Kaiser Permanente](#) and the [Centers for Disease Control and Prevention](#).^[1] Participants were recruited to the study between 1995 and 1997 and have been in long-term follow up for health outcomes. The study has demonstrated an association of adverse childhood experiences (ACEs) (aka [childhood trauma](#)) with health and social problems across the lifespan. The study has produced many scientific articles and conference and workshop presentations that examine ACEs.^[1]

Background

In the 1980s, the dropout rate of participants at [Kaiser Permanente's obesity clinic](#) in [San Diego, California](#), was about 50%; despite all of the dropouts successfully [losing weight](#) under the program.^[2] Vincent Felitti, head of Kaiser Permanente's Department of Preventive Medicine in San Diego, conducted interviews with people who had left the program, and discovered that a majority of 286 people he interviewed had experienced [childhood sexual abuse](#). The interview findings suggested to Felitti that weight gain might be a coping mechanism for [depression, anxiety, and fear](#).^[2]

Felitti and Robert Anda from the [Centers for Disease Control and Prevention](#) (CDC) went on to survey childhood trauma experiences of over 17,000 Kaiser Permanente patient volunteers.^[2] The 17,337 participants were volunteers from approximately 26,000 consecutive Kaiser Permanente members. About half were female; 74.8% were white; the average age was 57; 75.2% had attended college; all had jobs and good health care, because they were members of the Kaiser [health maintenance organization](#).^[3] Participants were asked about different types of [childhood trauma](#) that had been identified in earlier research literature:^[4]

- [Physical abuse](#)
- [Sexual abuse](#)
- [Emotional abuse](#)
- [Physical neglect](#)
- [Emotional neglect](#)
- [Exposure to domestic violence](#)

- Household [substance abuse](#)
- Household [mental illness](#)
- Parental [separation](#) or [divorce](#)
- [Incarcerated](#) household member

Findings



The ACE Pyramid represents the conceptual framework for the ACE Study, which has uncovered how adverse childhood experiences are strongly related to various risk factors for disease throughout the lifespan, according to the [Centers for Disease Control and Prevention](#).^{[5][6]}

According to the United States' [Substance Abuse and Mental Health Services Administration](#), the ACE study found that:

- Adverse childhood experiences are common. For example, 28% of study participants reported physical abuse and 21% reported sexual abuse. Many also reported experiencing a divorce or parental separation, or having a parent with a mental and/or [substance use disorder](#).^[7]
- Adverse childhood experiences often occur together. Almost 40% of the original sample reported two or more ACEs and 12.5% experienced four or more. Because ACEs occur in clusters, many subsequent studies have examined the cumulative effects of ACEs rather than the individual effects of each.^[7]
- Adverse childhood experiences have a [dose–response relationship](#) with many health problems. As researchers followed participants over time, they discovered that a person's cumulative ACEs score has a strong, graded relationship to numerous health, [social](#), and behavioral problems throughout their lifespan, including substance use disorders.

Furthermore, many problems related to ACEs tend to be [comorbid](#), or co-occurring.^[7]

About two-thirds of individuals reported at least one adverse childhood experience; 87% of individuals who reported one ACE reported at least one additional ACE.^[4] The number of ACEs was strongly associated with adulthood high-risk health behaviors such as smoking, alcohol and drug abuse, promiscuity, and severe obesity, and correlated with ill-health including depression, [heart disease](#), [cancer](#), [chronic lung disease](#) and shortened lifespan.^{[4][8][9]} Compared to an ACE score of zero, having four adverse childhood experiences was associated with a seven-fold (700%) increase in [alcoholism](#), a doubling of risk of being diagnosed with cancer, and a four-fold increase in [emphysema](#); an ACE score above six was associated with a 30-fold (3000%) increase in attempted suicide.

The ACE study's results suggest that maltreatment and [household dysfunction](#) in childhood contribute to health problems decades later. These include [chronic](#) diseases—such as heart disease, cancer, [stroke](#), and [diabetes](#)—that are the most common causes of death and [disability](#) in the [United States](#).^[10] The study's findings, while relating to a specific population within the United States, might reasonably be assumed to reflect similar trends in other parts of the world, according to the [World Health Organization](#).^[10] The study was initially published in the *[American Journal of Preventive Medicine](#)*.^[11]

Subsequent surveys

The ACE Study has produced more than 50 articles that look at the prevalence and consequences of ACEs.^[12] It has been influential in several areas. Subsequent studies have confirmed the high frequency of adverse childhood experiences, or found even higher incidences in urban or youth populations.

The original study questions have been used to develop a 10-item [screening](#) questionnaire.^{[13][14]} Numerous subsequent surveys have confirmed that adverse childhood experiences are frequent.

States Collecting ACEs Data 2009 - 2015



State ACEs Study surveys diagram color coded from the year 2009 to 2015

The CDC runs the [Behavioral Risk Factor Surveillance System \(BRFSS\)](#),^[15] an annual survey conducted by individual state health departments in all 50 states. An expanded survey instrument in several states found each state to be similar.^[13] Some states have collected additional local data.^{[16][17]} Adverse childhood experiences were even more frequent in studies in urban Philadelphia^[18] and in a survey of young mothers (mostly younger than 19).^[19] Internationally, an [Adverse Childhood Experiences International Questionnaire \(ACE-IQ\)](#) is undergoing [validation testing](#).^[20] Surveys of adverse childhood experiences have been conducted in Romania,^[21] the Czech Republic,^[22] the Republic of Macedonia,^[23] Norway, the Philippines, the United Kingdom, Canada, China and Jordan.^[6] Child Trends used data from the 2011/12 National Survey of Children's Health (NSCH) to analyze ACEs prevalence in children nationally, and by state. The NSCH's list of "adverse family experiences" includes a measure of economic hardship and shows that this is the most common ACE reported nationally.^[24]

Neurobiology of stress

See also: [Social stress](#) and [Stress in early childhood](#)

Cognitive and neuroscience researchers have examined possible mechanisms that might explain the negative consequences of adverse childhood experiences on adult health.^[25] Adverse childhood experiences can alter the structural [development](#) of neural networks and the [biochemistry](#) of [neuroendocrine systems](#)^{[26][27][28][29]} and may have long-term effects on the body, including speeding up the processes of disease and aging and compromising immune systems.^{[30][31][32]}

[Allostatic load](#) refers to the adaptive processes that maintain homeostasis during times of [toxic stress](#) through the production of mediators such as adrenalin, cortisol and other

chemical messengers. According to researcher [Bruce S. McEwen](#), who coined the term:

These mediators of the stress response promote adaptation in the aftermath of acute stress, but they also contribute to allostatic overload, the wear and tear on the body and brain that result from being 'stressed out.' This conceptual framework has created a need to know how to improve the efficiency of the adaptive response to stressors while minimizing overactivity of the same systems, since such overactivity results in many of the common diseases of modern life. This framework has also helped to demystify the biology of stress by emphasizing the protective as well as the damaging effects of the body's attempts to cope with the challenges known as stressors.^[23]

Additionally, [epigenetic](#) transmission may occur due to stress during pregnancy or during interactions between mother and newborns. Maternal stress, depression, and exposure to partner violence have all been shown to have epigenetic effects on infants.^[29]

Implementing practices

As knowledge about the prevalence and consequences of adverse childhood experiences increases, trauma-informed and resilience-building practices based on the research is being implemented in communities, education, public health departments, social services, faith-based organizations and criminal justice. A few states are considering legislation.

Communities

As knowledge about the prevalence and consequences of ACEs increases, more communities seek to integrate trauma-informed and resilience-building practices into their agencies and systems. Tarpon Springs, Florida, became the first trauma-informed community in 2011.^{[34][35]} Trauma-informed initiatives in Tarpon Springs include trauma-awareness training for the local housing authority, changes in programs for ex-offenders, and new approaches to educating students with learning difficulties.^[36] Research with American Indian tribal communities has demonstrated that social support and cultural involvement can

ameliorate the effects of ACEs.^[37]

Education

ACEs exposure is widespread in the US, one study from the National Survey of Children's Health reported that approximately 68% of children 0–17 years old had experienced one or more ACEs.^[38] The impact of ACEs on children can manifest in difficulties focusing, self-regulating, trusting others, and can lead to negative cognitive effects. One study found that a child with 4 or more ACEs was 32 times more likely to be labeled with a behavioral or cognitive problem than a child with no ACEs.^[39] Another study by the Area Health Education Center of Washington State University found that students with at least three ACEs are three times as likely to experience academic failure, six times as likely to have behavioral problems, and five times as likely to have attendance problems.^[40] The trauma-informed school movement aims to train teachers and staff to help children self-regulate, and to help families that are having problems that result in children's normal response to trauma. It also seeks to provide behavioral consequences that will not re-traumatize a child.^[41]

Trauma-informed education refers to the specific use of knowledge about trauma and its expression to modify support for children to improve their developmental success.^[42] The National Child Traumatic Stress Network (NCTSN) describes a trauma-informed school system as a place where school community members work to provide trauma awareness, knowledge and skills to respond to potentially negative outcomes following traumatic stress.^[43] The NCTSN published a study that discussed the ARC (attachment, regulation and competency) model, which other researchers have based their subsequent studies of trauma-informed education practices off of.^{[39][44]} Trauma-sensitive or trauma-informed schooling has become increasingly popular in Washington, Massachusetts, and California in the last 10 years.^[38]

One study details how several San Francisco schools provided trauma-informed support based on the ARC model to students, adults in the system, and the school system as a whole through universal learning strategies, plans and techniques for children with trauma, and by providing trauma-informed therapy to those children.^[44] At El Dorado, an elementary school in this study in San Francisco, trauma-informed practices were associated with a suspension reduction of 89%.^[45]

Lincoln High School in Walla Walla, Washington, adapted a trauma-informed approach to

discipline and reduced its suspensions by 85%.^[46] Rather than standard punishment, students are taught to recognize their reaction to stress and learn to control it. Spokane, Washington, schools conducted a research study that demonstrated that academic risk was correlated with students' experiences of traumatic events known to their teachers.^{[40][47]} The same school district has begun a study to test the impact of trauma-informed intervention programs, in an attempt to reduce the impact of toxic stress.

In Brockton, Massachusetts, a community-wide meeting led to a trauma-informed approach being adopted by the Brockton School District.^[41] So far, all of the district's elementary schools have implemented trauma-informed improvement plans, and there are plans to do the same in the middle school and high school. About one-fifth of the district teachers have participated in a course on teaching traumatized students. Police alert schools when they have arrested someone or visited at a student's address. Massachusetts state legislation has sought to require all schools to develop plans to create "safe and supportive schools".^[41]

Social services

Social service providers—including welfare systems, housing authorities, homeless shelters, and [domestic violence](#) centers – are adopting trauma-informed approaches that help to prevent ACEs or minimize their impact. Utilizing tools that screen for trauma can help a social service worker direct their clients to interventions that meet their specific needs.^[48] Trauma-informed practices can also help social service providers look at how trauma impacts the whole family.^[49]

Trauma-informed approaches can improve child welfare services by 1) openly discussing trauma and 2) addressing parental trauma.^[50] The New Hampshire Division for Children Youth and Families (DCYF) is taking a trauma-informed approach to their foster care services by educating staff about childhood trauma, screening children entering foster care for trauma, using trauma-informed language to mitigate further traumatization, mentoring birth parents and involving them in collaborative parenting, and training foster parents to be trauma-informed.^[48]

In Albany, New York the HEARTS Initiative has led to local organizations developing trauma-informed practice.^[50] Senior Hope Inc., an organization serving adults over the age of 50, began implementing the 10-question ACE survey and talking with their clients about childhood trauma. The LaSalle School, which serves orphaned and abandoned boys, began

looking at delinquent boys in from a trauma-informed perspective and began administering the ACE questionnaire to their clients.

Housing authorities are also becoming trauma-informed. Supportive housing can sometimes recreate control and power dynamics associated with clients' early trauma.^[51] This can be reduced through trauma-informed practices, such as training staff to be respectful of clients' space by scheduling appointments and not letting themselves into clients' private spaces, and also understanding that an aggressive response may be trauma-related coping strategies.^[51] The housing authority in Tarpon Springs provided trauma-awareness training to staff so they could better understand and react to their clients' stress and anger resulting from poor employment, health, and housing.^[36]

A survey of 200 homeless individuals in California and New York demonstrated that more than 50% had experienced at least four ACEs.^[52] In Petaluma, California, the Committee on the Shelterless (COTS) uses a trauma-informed approach called Restorative Integral Support (RIS) to reduce intergenerational homelessness.^[53] RIS increases awareness of and knowledge about ACEs, and calls on staff to be compassionate and focus on the whole person. COTS now consider themselves ACE-informed and focus on resiliency and recovery.

Health care services

Screening for or talking about ACEs with parents and children can help to foster healthy physical and psychological development and can help doctors understand the circumstances that children and their parents are facing. By screening for ACEs in children, pediatric doctors and nurses can better understand behavioral problems. Some doctors have questioned whether some behaviors resulting in [attention deficit hyperactivity disorder](#) (ADHD) diagnoses are in fact reactions to trauma. Children who have experienced four or more ACEs are three times as likely to take ADHD medication when compared with children with less than four ACEs.^[54] Screening parents for their ACEs allows doctors to provide the appropriate support to parents who have experienced trauma, helping them to build resilience, foster attachment with their children, and prevent a family cycle of ACEs.^{[55][56]} Trauma-informed pediatric care also allows doctors to develop a more trusting relationship with parents, opening the lines of communication.^[57] At [Montefiore Medical Center](#) ACEs screenings will soon be implemented in 22 pediatric clinics. In a pilot program, any child with one parent who has an ACE score of four or higher is offered enrollment and receive a variety of services. For families enrolled in the program parents report fewer ER visits and children

have healthier emotional and social development, compared with those not enrolled.^{[55][58]}

Public health

Most American doctors as of 2015 do not use ACE surveys to assess patients. Objections to doing so include that there are no [randomized controlled trials](#) that show that such surveys can be used to actually improve health outcomes, there are no standard protocols for how to use the information gathered, and that revisiting negative childhood experiences could be emotionally traumatic.^[59] Other obstacles to adoption include that the technique is not taught in medical schools, is not billable, and the nature of the conversation makes some doctors personally uncomfortable.^[59]

Some public health centers see ACEs as an important way (especially for mothers and children)^[60] to target health interventions for individuals during sensitive periods of development early in their life, or even in utero.^[60] For example, Jefferson County Public Health clinic in Port Townsend, Washington, now screens pregnant women, their partners, parents of children with special needs, and parents involved with CPS for ACEs.^[61] With regard to patient counseling, the clinic treats ACEs like other health risks such as smoking or alcohol consumption.

Resilience and Resources

This section needs additional citations for verification.

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Resilience is not a trait that people either have or do not have. It involves behaviors, thoughts and actions that can be learned and developed in anyone. According to the American Psychological Association (2017), resilience is the ability to adapt in the face of adversity, tragedy, threats or significant stress — such as family and relationship problems, serious health problems or workplace and financial stressors. Resilience refers to bouncing back from difficult experiences in life. There is nothing extraordinary about resilience. People often demonstrate resilience in times of adversity. However, being resilient does not mean that a person will not experience difficulty or distress, as emotional pain is common for people when they suffer from a major adversity or trauma. In fact, the path to resilience often involves considerable emotional pain [70].

Resilience and access to other resources are protective factors.^{[37][62][63]} Having resilience

can benefit children who have been exposed to trauma and have a higher A.C.E score. Children who can learn to develop it, can use resilience to build themselves up after trauma. A child who has not developed resilience will have a harder time coping with the challenges that can come in adult life. People and children who are resilient, embrace the thinking that adverse experiences do not define who they are. They also can think about past events in their lives that were traumatic, and, try to reframe them in a way that is constructive. They are able to find strength in their struggle and ultimately can overcome the challenges and adversity that was faced in childhood.^[64] In childhood, resiliency can come from having a caring adult in a child's life. Resiliency can also come from having meaningful moments such as an academic achievement or getting praise from teachers or mentors. In adulthood, resilience is the concept of self-care. If you are taking care of yourself and taking the necessary time to reflect and build on your experiences, then you will have a higher capacity for taking care of others. Adults can also use this skill to counteract some of the trauma they have experienced. Self-care can mean a variety of things. One example of self-care, is knowing when you are beginning to feel burned out and then taking a step back to rest and recuperate yourself. Another component of self-care is practicing mindfulness or engaging in some form of prayer or meditation. If you are able to take the time to reflect upon your experiences, then you will be able to build a greater level of resiliency moving forward. All of these strategies put together can help to build resilience and counteract some of the childhood trauma that was experienced. With these strategies children can begin to heal after experiencing adverse childhood experiences. This aspect of resiliency is so important because it enables people to find hope in their traumatic past. When first looking at the A.C.E. study and the different correlations that come with having 4 or more traumas, it is easy to feel defeated. It is even possible for this information to encourage people to have unhealthy coping behaviors. Introducing resilience and the data that supports its positive outcome in regards to trauma, allows for a light at the end of a tunnel. It gives people the opportunity to be **proactive** instead of reactive when it comes to addressing the traumas in their past.

Criminal justice

Since research suggests that incarcerated individuals are much more likely to have been exposed to violence and suffer from **posttraumatic stress disorder** (PTSD),^[65] a trauma-informed approach may better help to address some of these criminogenic risk factors and can create a less traumatizing criminal justice experience. Programs, like Seeking Safety, are

often used to help individuals in the criminal justice system learn how to better cope with trauma, PTSD, and substance abuse.^[66] Juvenile courts better help deter children from crime and delinquency when they understand the trauma many of these children have experienced.^[67] The criminal justice system itself can also retraumatize individuals.^[68] This can be prevented by creating safer facilities where correctional and police officers are properly trained to keep incidents from escalating.^[65] Partnerships between police and mental health providers can also reduce the possible traumatizing effects of police intervention and help provide families with the proper mental health and social services.^[69] The Women's Community Correctional Center of Hawaii began a Trauma-Informed Care Initiative that aims to train all employees to be aware and sensitive to trauma, to screen all women in their facility for trauma, to assess those who have experienced trauma, and begin providing trauma-informed mental health care to those women identified.^[68]

Faith-based organizations

This section relies too much on references to primary sources.

[Learn more](#)

Some faith-based organizations offer spiritual services in response to traumas identified by ACE surveys. For example, the founder of ACE Overcomers^[70] combined the epidemiology of ACEs, the neurobiology of toxic stress and principles of the Christian Bible into a workbook and 12-week course used by clergy in several states.^{[71][72]} Another example of this integration of faith-based principles and ACEs science is the work of Intermountain Residential's Chaplain Chris Haughee, who has created a curriculum called "Bruised Reeds and Smoldering Wicks" a six week study meant to introduce the science behind ACEs and early childhood trauma within the context of Christian theology and ministry practice.^[73] Published in 2017, it has been used by ministry professionals in 30 states, the District of Columbia, and two Canadian provinces.^[73] Faith-based organizations also participate in the online group ACES Connection Network.^[74] The Faith and Health Connection ministry^[75] also applies principles of Christian theology to address childhood traumas in their teachings.

Legislation

Vermont has passed a bill, Act 43(H.508), an act relating to building resilience for individuals experiencing adverse childhood experiences which acknowledges the life span effects of ACEs on health outcomes, seeks wide use of ACE screening by health providers and aims to

educate medical and health school students about ACEs.^{[76][77]} "Vermont first state to propose bill to screen for ACEs in health care"], *ACEs Connection*, 18 March 2014</ref> Previously Washington State passed legislation to set up a public-private partnership to further community development of trauma-informed and resilience-building practices that had begun in that state; but it was not adequately funded.^[78] On August 18, 2014, California lawmakers unanimously passed ACR No. 155, which encourages policies reducing children's exposure to adverse experiences.^[79] Recent Massachusetts legislation supports a trauma-informed school movement as part of The Reduction of Gun Violence bill (No. 4376). This bill aims to create "safe and supportive schools" through services and initiatives focused on physical, social, and emotional safety.^[80]

See also

- [Adverse Childhood Experiences \(ACEs\) Movement](#)
- [Early childhood trauma](#)
- [Pedophilia](#)
- [Alcoholism in family systems](#)
- [Child abuse](#)
- [Effects of domestic violence on children](#)
- [Social determinants of health](#)
- [Verbal abuse](#)

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External links

- [CAPT: Adverse Childhood Experiences \(ACE\)](#) via [Substance Abuse and Mental Health Services Administration](#)
- [Adverse Childhood Experiences Resources](#) Centers for Disease Control and Prevention
- [Adverse Childhood Experiences: Risk Factors for Substance Misuse and Mental Health](#) Dr. Robert Anda, co-principal investigator, explains some of the study's basic findings (video)
- [Center on the Developing Child, Harvard University](#) (Environmental factors in child development)
- [Take The ACE Quiz – And Learn What It Does And Doesn't Mean](#) National Public Radio
- [The ACE Score](#) Acestudy.org

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ABOUT THE SPEAKER

Nadine Burke Harris • Pediatrician

Nadine Burke Harris' healthcare practice focuses on a little-understood, yet very common factor in childhood that can profoundly impact adult-onset disease: trauma.

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