

# Responding to Adverse Childhood Experiences: It Takes a Village

Kelly S. Kimple, Susan M. Kansagra

In working to improve the health of North Carolinians, a broader emphasis has been placed on determinants of health, or non-medical drivers of health. Critical examples of health determinants are adverse childhood experiences, or ACEs, that affect early brain development and lifelong health and function. Multiple organizations and communities have come together to acknowledge the importance of prevention, address toxic stress and trauma in childhood, promote resiliency and trauma-informed care, and invest in the future of North Carolina through its children. This issue of the NCMJ highlights the prevalence and magnitude of ACEs in North Carolina and the effects on our children and the impact into adulthood, and how people and communities can come together to improve public health over the life course by addressing ACEs.

In 1998, a landmark study was published that looked at childhood experiences and current health status and behaviors, becoming one of the largest investigations of childhood abuse and neglect on lifelong health and well-being. The Adverse Childhood Experiences (ACE) study, conducted at Kaiser Permanente, focused on traumatic or stressful events experienced during childhood, such as abuse (physical, sexual, and emotional), neglect (physical and emotional), and household dysfunction (incarceration, mental illness, substance abuse, violence in home, or parental separation or divorce) [1]. Expansive research on the topic has consistently confirmed the critical importance of early childhood experiences on lifelong health and behaviors and multiple studies have evaluated the relationship between ACEs and different risk factors for disease, disability, and premature death [1, 3, 4]. In addition, ACEs often co-occur and are interrelated [2], with a strong cumulative, dose-response relationship with the number of ACEs, adoption of health risk behaviors, and both child and adult health outcomes [3, 4].

Beyond the risk factors identified in the ACE landmark study, additional toxic stress that affects child health and development has been considered [5, 6, 7]. The term toxic stress refers to excessive or prolonged activation of the stress response in the absence of protective factors due to ACEs such as child maltreatment, parental substance abuse,

maternal depression, family violence, and even extreme poverty [8].

The understanding of how a child's experiences impact future life course has become more clear. Firstly, a child's experiences start prenatally and include previous intergenerational family trauma. Secondly, prolonged activation of the stress response system in the absence of protective factors is toxic to the developing brain, disrupting brain architecture and thus learning, memory, behavior, physiology, emotional regulation, and executive functioning [9]. The evidence from neuroscience, molecular biology, epigenetics, and genomics has demonstrated that early experiences and early stress become part of our bodies—stress can be “biologically embedded” in our physiology [10]. This disruption in physiology alters the stress response system, which in turn affects other organ systems, and the effects are lifelong and widen health disparities [11]. The ACEs Pyramid (see Figure 1) demonstrates the lifelong cascade of trauma and toxic stress leading to impaired neurodevelopment and social, emotional, and cognitive impairment. This then leads to adoption of health-risk behaviors, resulting in disease, disability, social problems, and early death [12].

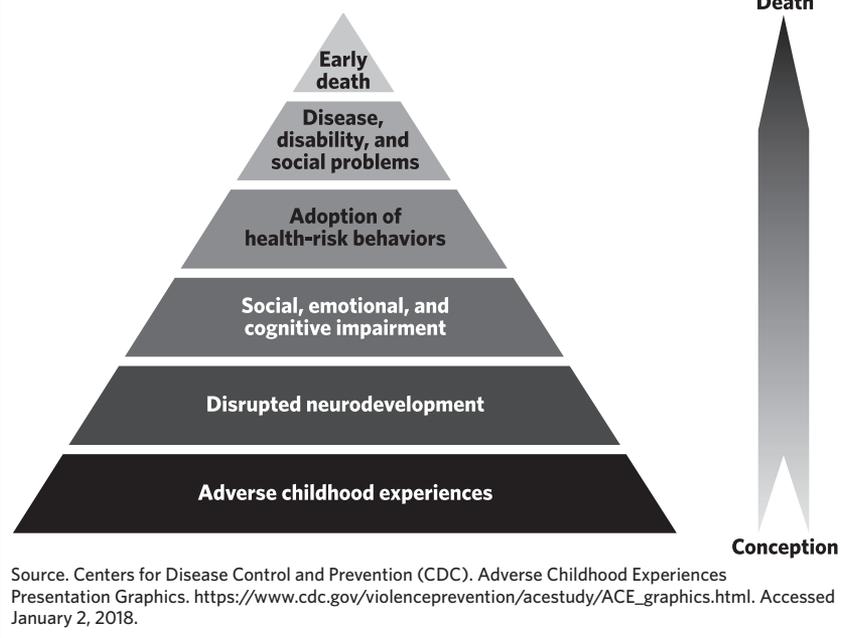
The health, social, and economic costs associated with ACEs and toxic stress are significant, and even more so when one considers the breadth of impact through adulthood and over generations. ACEs contribute to a variety of behavioral, mental, and physical health conditions, including smoking, cardiovascular disease, diabetes, emphysema, cancer, obesity, alcohol abuse, liver disease, drug abuse, high-risk sexual behavior, sexually transmitted infections, adolescent pregnancy, depression, anxiety, suicide, headaches, autoimmune disease, disability, and fetal death [13]. Those with 6 or more ACEs were found to have a 20-year shorter life expectancy than those with no ACEs [14]. A modeling study in England estimated that 11.9% of binge drinking, 13.6% of poor diet, 22.7% of smoking, 52.0% of violence perpetration, 58.7% of heroin/crack cocaine use, and 37.6% of unin-

Electronically published March 19, 2018.

Address correspondence to Kelly Kimple, 1928 Mail Service Center, Raleigh, NC 27699-1928 (kelly.kimple@dhhs.nc.gov).

**N C Med J.** 2018;79(2):95-98. ©2018 by the North Carolina Institute of Medicine and The Duke Endowment. All rights reserved. 0029-2559/2018/79204

**FIGURE 1.**  
**Mechanism by Which Adverse Childhood Experiences Influence Health and Well-being Throughout the Lifespan**



tended teenage pregnancy prevalence could be attributed to ACEs [15]. In addition, when considering the societal impact of ACEs such as job problems, work absenteeism, homelessness, exposure to violence, juvenile and criminal justice system involvement, poor academic achievement, and residential mobility, the impact is even larger. The lifetime economic toll for child maltreatment alone is over \$124 billion, and this does not take into account other ACEs [16]. When considering poverty as an ACE, as highlighted in this issue by Hughes and Tucker [17], the costs to the United States are even higher (up to \$500 billion) in reduced economic output and increased health and criminal justice spending [18].

## Resilience

Resilience is considered the ability to withstand, adapt to, and recover from adversity [19]. Just as evidence has emerged on ACEs, research has also determined protective factors that dampen the adverse impact of ACEs and promote resilience. Protective factors include characteristics of family, community, and systems, such as safe, stable, nurturing relationships with adult caregivers; socioeconomic advantages or supports; and cohesive social networks and communities.

Protective factors can be both preventive and can contribute to resilience and recovery. In this issue, Austin takes a closer look at the prevalence of ACEs in North Carolina, the effects within the life course and development of children, and promotes an opportunity for improving population health [20]. Hirsch considers upstream prevention of ACEs as a preventive public health problem on which we spend

countless resources and provides an example of efforts in Cumberland County [21].

## Interventions

A number of policies and programmatic strategies have also emerged to promote family, community, and social supports that reduce or mitigate the impact of ACEs and toxic stress. Interventions to address poverty as an ACE include policies and programs that strengthen economic supports for families and promote family friendly work policies [22]. In this issue, Hughes and Tucker explore the effects of poverty, a pressing issue in North Carolina, and offer potential recommendations in quality child care, strengthening public supports, Earned Income Tax Credits, and family health care coverage as a means to promote family financial security to address poverty [17]. Among multiple other studied interventions, quality child care and early education have been shown to promote positive early childhood development and improve outcomes in adulthood, including by reducing criminal involvement, raising earnings, and improving adult health status [23].

In addition to prevention or mitigation strategies, the ability to address ACEs and recover from adversity has led to systems and organizations recognizing the necessity of trauma-informed philosophy that integrates understanding of trauma into policies and practices. The Substance Abuse and Mental Health Services Administration outlines 6 guiding principles of effective trauma-informed practice in the proposed framework: safety; trustworthiness and transparency; peer support; collaboration and mutuality; empow-

erment; voice and choice; and cultural, historical, and gender issues. These principles are also centered around 4 assumptions: 1) full realization of the widespread impact of trauma; 2) recognition of the signs and symptoms of trauma; 3) response with knowledge about trauma integrated into policies, procedures, and practices; and 4) resistance of re-traumatization [24].

In the article "Trauma-informed primary care: prevention, recognition, and promoting resilience," Earls further explains the importance of being trauma-informed, additional components of trauma-informed care, and building resilience—especially as it relates to the medical home, employing screening for social/emotional well-being, and providing trauma-informed care as key components of a holistically designed health care system [25]. Preisler and Stewart describe the importance of identification of trauma through child welfare screening to better address a high-need population, with an intentional approach to avoid re-traumatization [26]. Innovation in the delivery of trauma-informed care is highlighted in schools [27, 28], the justice system [29], child welfare systems [30], and communities [28]. All are necessary in the need for collaborative commitment and collective efforts to accomplish common goals.

As many are considering changes in structure and a trauma-informed approach to support addressing toxic stress in childhood, the article by Staroneck and Ake examines innovative and proactive designs related to North Carolina's domestic violence response [31], and Idzikowski and Zachary look at available payment mechanisms for mobile crisis response teams under EPSDT and Medicaid, while acknowledging preventive mental health care is critical [32]. Steinberg and Lassiter explain how the Juvenile Justice Section of North Carolina's Department of Public Safety is working toward becoming trauma-informed [33], and Murphy discusses the role of payers in supporting ACE-informed, evidence-based treatment [34]. Innovation is emerging with this change in mindset throughout the nation, the state, and many localities including but not limited to Watauga, Buncombe, Cumberland, New Hanover, Edgecombe, and Halifax counties.

## Conclusion

In summary, ACEs increase the risk of subsequent health issues, toxic stress converts adversity to impairment, and trauma-informed care provides guidelines for treatment, providing an opportunity to bring it all together for an integrated approach to health starting in the earliest years [35]. The growing body of evidence and literature around ACEs and toxic stress, in addition to expanding emphasis and public awareness, is a call to action, not only for North Carolina, but beyond. There is much interest, motivation, and innovation among individuals, communities, and organizations in North Carolina, and we need to continue the momentum moving forward with a common vision: to prioritize prevention of ACEs while developing appropriate trauma-informed

responses, to break the cycle of trauma, and to promote resilient North Carolinians while becoming resilient as a state ourselves.

The toll on our children, their future, and our society, in the context of clear evidence, should motivate us all to look at opportunities to prevent adverse outcomes and to embrace the idea that adult diseases can be seen as early childhood developmental disorders due to ACEs, with opportunities for prevention and early intervention [11]. Medical innovations and technology have evolved over time, but so has our understanding of the root causes of disease to be better equipped for a prevention and public health strategy. Not only would we be caring for the child and the family, but also the community to further influence population health outcomes. The public health community, medical community, and others strive every day to combat health conditions such as chronic disease and mental illness, but often we are not focusing early enough or addressing true determinants. This frequently requires a multisector response.

ACEs are a risk factor more common and causal to many other public health issues facing our state, including tobacco use and opioid addiction. If we want to conceptualize broad population health and health equity, we have to recognize ACEs as a public health issue and address it from the very beginning, prior to each new life, thus investing in the well-being of current North Carolinians and generations ahead. It is time to come together with a strategic, coordinated public health approach to this crisis, invest in the future through our children, and promote supportive communities; safe, stable and nurturing environments; and strong, resilient children and families for a life course approach to North Carolina's health. **NCMJ**

**Kelly S. Kimple, MD, MPH** chief, Women's and Children's Health Section, Division of Public Health, North Carolina Department of Health and Human Services, Raleigh, North Carolina.

**Susan M. Kansagra, MD, MBA** chief, Chronic Disease and Injury Section, Division of Public Health, North Carolina Department of Health and Human Services, Raleigh, North Carolina.

## Acknowledgments

Thanks to Victoria Revelle for editorial assistance.

Potential conflicts of interest. K.K. and S.K. have no relevant conflicts of interest.

## References

1. Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *Am J Prev Med.* 1998;14(4):245-258
2. Dong M, Anda RF, Felitti VJ, et al. The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse and Negl.* 2004;28(7):771-784.
3. Dube SR, Felitti VJ, Dong M, Giles WH, Anda RF. The impact of adverse childhood experiences on health problems: evidence from four birth cohorts dating back to 1900. *Prev Med.* 2003;37(3):268-277.
4. Hillis SD, Anda RF, Dube SR, Felitti VJ, Marchbanks PA, Marks JS. The association between adverse childhood experiences and adolescent pregnancy, long-term psychosocial consequences, and fetal death. *Pediatrics.* 2004;113(2):320-327.
5. Evans GW, Kim P. Childhood poverty, chronic stress, self-regulation, and coping. *Child Development Perspectives.* 2013;7(1):43-48.

6. Steele H, Bate J, Steele M, et al. Adverse childhood experiences, poverty, and parenting stress. *Canadian Journal of Behavioural Science*. 2016;48(1):32-38.
7. Anda RF, Butchart A, Felitti VJ, Brown DW. Building a framework for global surveillance of the public health implications of adverse childhood experiences. *Am J Prev Med*. 2010;39(1):93-98.
8. National Scientific Council on the Developing Child. Excessive Stress Disrupts the Architecture of the Developing Brain: Working Paper No. 3. Cambridge, MA: National Scientific Council on the Developing Child, Harvard University Center on the Developing Child; 2014. Accessed January 2, 2018.
9. Garner AS, Shonkoff JP; Committee on Psychological Aspects of Child and Family Health; Committee on Early Childhood, Adoption, and Dependent Care; Section on Developmental and Behavioral Pediatrics. Early childhood adversity, toxic stress, and the role of the pediatrician: translating developmental science into lifelong health. *Pediatrics*. 2012;129(1):e224-e231.
10. Berens AE, Jensen SKG, Nelson CA. Biological embedding of childhood adversity: from physiological mechanisms to clinical implications. *BMC Med*. 2017;15(1):135.
11. Shonkoff JP, Garner AS; Committee on Psychosocial Aspects of Child and Family Health; Committee on Early Childhood, Adoption, and Dependent Care; Section on Developmental and Behavioral Pediatrics. The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*. 2012;129(1):e232-e246.
12. Centers for Disease Control and Prevention. Adverse childhood experiences presentation graphics. CDC website. [https://www.cdc.gov/violenceprevention/acestudy/ACE\\_graphics.html](https://www.cdc.gov/violenceprevention/acestudy/ACE_graphics.html). Accessed January 2, 2018.
13. Centers for Disease Control and Prevention. Adverse childhood experiences journal articles by topic area. CDC website. <https://www.cdc.gov/violenceprevention/acestudy/journal.html>. Accessed January 2, 2018.
14. Brown DW, Anda RF, Tiemeier H, et al. Adverse childhood experiences and the risk of premature mortality. *Am J Prev Med*. 2009;37(5):389-396.
15. Bellis M, Hughes K, Leckenby N, et al. National household survey of adverse childhood experiences and their relationship with resilience to health-harming behaviors in England. *BMC Med*. 2014;12:72.
16. Fang X, Brown DS, Florence CS, Mercy JA. The economic burden of child maltreatment in the United States and implications for prevention. *Child Abuse & Negl*. 2012;36(2): 156-165.
17. Hughes M, Tucker W. Poverty as an adverse childhood experience. *N C Med J*. 2018;79(2):124-126 (in this issue).
18. Coley RJ, Baker B. Poverty and Education: Finding the Way Forward. Princeton, NJ: Educational Testing Service Center for Research on Human Capital and Education; 2013. [https://www.ets.org/s/research/pdf/poverty\\_and\\_education\\_report.pdf](https://www.ets.org/s/research/pdf/poverty_and_education_report.pdf). Accessed January 2, 2018.
19. Traub F, Boynton-Jarrett R. Modifiable resilience factors to childhood adversity for clinical pediatric practice. *Pediatrics*. 2017;139(5).
20. Austin A. Association of adverse childhood experiences with life course health and development. *N C Med J*. 2018;79(2):99-103 (in this issue).
21. Hirsch S. Investing in community-based upstream solutions. *N C Med J*. 2018;79(2):132-133 (in this issue).
22. Centers for Disease Control and Prevention. Child abuse and neglect: prevention strategies. CDC website. <https://www.cdc.gov/violenceprevention/childmaltreatment/prevention.html>. Accessed January 2, 2018.
23. Campbell F, Conti G, Heckman JJ, et al. Early childhood investments substantially boost adult health. *Science*. 2014;343(6178):1478-1485.
24. Substance Abuse and Mental Health Services Administration. SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2014. <https://store.samhsa.gov/shin/content/SMA14-4884/SMA14-4884.pdf>. Accessed January 2, 2018.
25. Earls MF. Trauma-informed primary care: prevention, recognition, and promoting resilience. *N C Med J*. 2018;79(2):108-112 (in this issue).
26. Preisler JJ, Stewart CJ. Domestic violence in child welfare. *N C Med J*. 2018;79(2):130-131 (in this issue).
27. Presnell D. Preventing and treating trauma, building resiliency: the movement toward compassionate schools in Watauga County, North Carolina. *N C Med J*. 2018;79(2):113-114 (in this issue).
28. Gettinger J, Sturtevant-Gilliam A, Marmon-Saxe K, Wilson SW. Buncombe county: one path toward a resilient community. *N C Med J*. 2018;79(2):104-107 (in this issue).
29. Freeman NL. Addressing adverse childhood experiences in an effort to end criminal offender recidivism. *N C Med J*. 2018;79(2):116.
30. Smith E. Fostering Health in North Carolina. *N C Med J*. 2018;79(2):109-110 (in this issue).
31. Starsoneck L, Ake G. Reconsidering our domestic violence system. *N C Med J*. 2018;79(2):127-129 (in this issue).
32. Idzikowski S, Zachary C. EPSDT as a pathway toward trauma-informed care for children with Medicaid coverage. 2018;79(2):120-121.
33. Steinberg JL, Lassiter WL. Toward a trauma-responsive juvenile justice system. *N C Med J*. 2018;79(2):115-118 (in this issue).
34. Murphy RA. How Medicaid and managed care can support evidence-based treatment in North Carolina that is informed by adverse childhood experiences. *N C Med J*. 2018;79(2):119-123 (in this issue).
35. Shonkoff JP. Capitalizing on advances in science to reduce the health consequences of early childhood adversity. *JAMA Pediatr*. 2016;170(10):1003-1007.