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ESSAYS

Childhood, disrupted

Adversity in childhood can create long-lasting scars, damaging our cells and our DNA, and making us sick as adults

by Donna Jackson Nakazawa

Photo by Charles Gullung/Gallery Stock

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If you saw Laura walking down the New York City street where she lives today, you'd see a well-dressed 46-year-old woman with auburn hair and green eyes, who exudes a sense of 'I matter here.' She looks entirely in charge of her life, but behind Laura's confident demeanour lies a history of trauma: a bipolar mother who vacillated between braiding her daughter's hair and peppering her with insults, and a father who moved out-of-state with his wife-to-be when Laura was 15 years old.

She recalls a family trip to the Grand Canyon when she was 10. In a photo taken that day, Laura and her parents sit on a bench, sporting tourist whites. 'Anyone looking at us would have assumed that we were a normal, loving family.' But as they put on fake smiles for the camera, Laura's mother suddenly pinched her daughter's midriff and told her to stop 'staring off into space'. A second pinch: 'No wonder you're turning into a butterball, you ate so much cheesecake last night you're hanging over your shorts!' If you look hard at Laura's face in the photograph, you can see that she's not squinting at the Arizona sun, but holding back tears.

After her father left the family, he sent cards and money, but called less and less. Meanwhile, her mother's untreated bipolar disorder worsened. Sometimes, Laura says: 'My mom would go on a vitriolic diatribe about my dad until spittle foamed on her chin. I'd stand there, trying not to hear her as she went on and on, my whole body shaking inside.' Laura never invited friends over, for fear they'd find out her secret: her mom 'wasn't like

other moms'.

Some 30 years later, Laura says: 'In many ways, no matter where I go or what I do, I'm still in my mother's house.' Today, 'If a car swerves into my lane, a grocery store clerk is rude, my husband and I argue, or my boss calls me in to talk over a problem, I feel something flip over inside. It's like there's a match standing inside too near a flame, and with the smallest breeze, it ignites.'

To see Laura, you'd never know that she is 'always shaking a little, only invisibly, deep down in my cells'.

Her sense that something is wrong inside is mirrored by her physical health. During a routine exam, Laura's doctor discovered that Laura was suffering from dilated cardiomyopathy and would require a cardioverter defibrillator to keep her heart pumping. The two-inch scar from her surgery only hints at the more severe scars she hides from her childhood.

For as long as John can remember, he says, his parents' marriage was deeply troubled, as was his relationship with his father. 'I consider myself to have been raised by my mom and her mom. I longed to feel a deeper connection with my dad, but it just wasn't there. He couldn't extend himself in that way.' John's poor relationship with his father was due, in large part, to his father's reactivity and need for control. For instance, if John's father said that the capital of New York was New York City, there was just no use telling him that it was Albany.

As John got older, it seemed wrong to him that his father 'was

constantly pointing out all the mistakes that my brother and I made, without acknowledging any of his own'. His father relentlessly criticised his mother, who was 'kinder and more confident'. Aged 12, John began to interject himself into the fights between his parents. He remembers one Christmas Eve, when he found his father with his hands around his mother's neck and had to separate them. 'I was always trying to be the adult between them,' John says.

John is now a boyish 40, with warm hazel eyes and a wide, affable grin. But beneath his easy, open demeanour, he struggles with an array of chronic illnesses. By the time he was 33, his blood pressure was shockingly high; he began to experience bouts of stabbing stomach pain and diarrhoea and often had blood in his stool; he struggled from headaches almost daily. By 34, he'd developed chronic fatigue, and was so wiped out that he sometimes struggled to make it through an entire workday.

John's relationships, like his body, were never completely healthy. He ended a year-long romance with a woman he deeply loved because he felt riddled with anxiety around her normal, 'happy family'. He just didn't know how to fit in. 'She wanted to help,' he says, 'but instead of telling her how insecure I was around her, I told her I wasn't in love with her.' Bleeding from his inflamed intestines, exhausted by chronic fatigue, debilitated and distracted by pounding headaches, often struggling with work, and unable to feel comfortable in a relationship, John was stuck in a universe of pain and solitude, and he couldn't get out.

Laura's and John's life stories illustrate the physical price we

can pay, as adults, for trauma that took place 10, 20, even 30 years ago. New findings in neuroscience, psychology and immunology tell us that the adversity we face during childhood has farther-reaching consequences than we might ever have imagined. Today, in labs across the country, neuroscientists are peering into the once-inscrutable brain-body connection, and breaking down, on a biochemical level, exactly how the stress we experience during childhood and adolescence catches up with us when we are adults, altering our bodies, our cells, and even our DNA.

Emotional stress in adult life affects us on a physical level in quantifiable, life-altering ways. We all know that when we are stressed, chemicals and hormones can flush our body and increase levels of inflammation. That's why stressful events in adult life are correlated with the likelihood of getting a cold or having a heart attack.

But when children or teens face adversity and especially unpredictable stressors, they are left with deeper, longer-lasting scars. When the young brain is thrust into stressful situations over and over again without warning, and stress hormones are repeatedly ramped up, small chemical markers, known as methyl groups, adhere to specific genes that regulate the activity of stress-hormone receptors in the brain. These epigenetic changes hamper the body's ability to turn off the stress response. In ideal circumstances, a child learns to respond to stress, and recover from it, learning resilience. But kids who've faced chronic, unpredictable stress undergo biological changes that cause their inflammatory stress response to stay activated.

Joan Kaufman, director of the Child and Adolescent Research and Education (CARE) programme at the Yale School of Medicine, recently analysed DNA in the saliva of happy, healthy children, and of children who had been taken from abusive or neglectful parents. The children who'd experienced chronic childhood stress showed epigenetic changes in almost 3,000 sites on their DNA, and on all 23 chromosomes – altering how appropriately they would be able to respond to and rebound from future stressors.

> *Kids who've had early adversity have a drip of fight-or-flight hormones turned on every day – it's as if there is no off switch*

Likewise, Seth Pollak, professor of psychology and director of the Child Emotion Research Laboratory at the University of Wisconsin at Madison, uncovered startling genetic changes in children with a history of adversity and trauma. Pollak identified damage to a gene responsible for calming the stress response. This particular gene wasn't working properly; the kids' bodies weren't able to reign in their heightened stress response. 'A crucial set of brakes are off,' says Pollak.

Imagine for a moment that your body receives its stress hormones and chemicals through an IV drip that's turned on high when needed and, when the crisis passes, it's switched off again. You might think of kids whose brains have undergone epigenetic changes because of early adversity as having an inflammation-promoting drip of fight-or-flight hormones turned on every day – it's as if there is no off switch.

Experiencing stress in childhood changes your set point of wellbeing for decades to come. In people such as Laura and John, the endocrine and immune systems are churning out a damaging and inflammatory cocktail of stress neurochemicals in response to even small stressors – an unexpected bill, a disagreement with their spouse, a car that swerves in front of them on the highway, a creak on the staircase – for the rest of their lives. They might find themselves overreacting to, and less able to recover from, the inevitable stressors of life. They're always responding. And all the while, they're unwittingly marinating in inflammatory chemicals, which sets the stage for full-throttle disease down the road, in the form of autoimmune disease, heart disease, cancer, fibromyalgia, chronic fatigue, fibroid tumours, irritable bowel syndrome, ulcers, migraines and asthma.

Scientists first came to understand the relationship between early chronic stress and later adult disease through the work of a dedicated physician in San Diego and a determined epidemiologist from the Centers for Disease Control and Prevention (CDC) in Atlanta. Together, during the 1980s and '90s – the years when Laura and John were growing up – these two researchers began a paradigm-shifting public-health investigation known as the Adverse Childhood Experiences (ACE) Study.

In 1985, Vincent J Felitti, chief of a revolutionary preventive care initiative at the Kaiser Permanente Medical Care programme in San Diego, noticed a startling pattern in adult patients at an obesity clinic. A significant number were, with the support of Felitti and his nurses, successfully losing

hundreds of pounds a year, a remarkable feat, only to withdraw from the programme despite weight-loss success. Felitti, determined to get to the bottom of the attrition rate, conducted face-to-face interviews with 286 patients. It turned out there was a common denominator. Many confided that they had suffered some sort of trauma, often sexual abuse, in their childhoods. To these patients, eating was a solution, not a problem: it soothed the anxiety and depression they had harboured for decades; their weight served as a shield against undesired attention, and they didn't want to let it go.

Felitti's interviews gave him a new way of looking at human health and wellbeing that other physicians just weren't seeing. He presented his findings at a national obesity conference, arguing that 'our intractable public health problems' had root causes hidden 'by shame, by secrecy, and by social taboos against exploring certain areas of life experience'. Felitti's peers were quick to blast him. One even stood up in the audience and accused Felitti of offering 'excuses' for patients' 'failed lives'. Felitti, however, remained unfazed; he felt sure that he had stumbled upon a piece of information that would hold enormous import for the field of medicine.

After a colleague who attended that same conference suggested that he design a study with thousands of patients who suffered from a wide variety of diseases, not just obesity, Felitti joined forces with Robert Anda, a medical epidemiologist at the CDC who had, at the time, been researching the relationship between coronary heart disease and depression. Felitti and Anda took advantage of Kaiser Permanente's vast patient cohort to set up a national

epidemiology laboratory. Of the 26,000 patients they invited to take part in their study, more than 17,000 agreed.

Anda and Felitti surveyed these 17,000 individuals on about 10 types of adversity, or adverse childhood experiences (ACEs), probing into patients' childhood and adolescent histories. Questions included: 'Was a biological parent ever lost to you through divorce, abandonment or other reason?'; 'Did a parent or other adult in the household often swear at you, insult you, put you down or humiliate you?'; and 'Was a household member depressed or mentally ill?' Other questions looked at types of family dysfunction that included growing up with a parent who was an alcoholic or addicted to other substances; being physically or emotionally neglected; being sexually or physically abused; witnessing domestic violence; having a family member who was sent to prison; feeling that there was no one to provide protection; and feeling that one's family didn't look out for each other. For each category to which a patient responded 'yes', one point would be added to her ACE score, so an ACE score of 2 would indicate that she had suffered two adverse childhood experiences.

To be clear, the patients Felitti and Anda surveyed were not troubled or disadvantaged; the average patient was 57, and three-quarters had attended college. These were 'successful' men and women, mostly white, middle-class, with stable jobs and health benefits. Felitti and Anda expected their number of 'yes' answers to be fairly low.

> *The correlation between having a difficult childhood and facing illness as an adult offered a*

whole new lens through which we could view human health and disease

When the results came in, Felitti and Anda were shocked: 64 per cent of participants answered 'yes' to having encountered at least one category of early adversity, and 87 per cent of those patients also had additional adverse childhood experiences; 40 per cent had suffered two or more ACEs; 12.5 per cent had an ACE score greater than or equal to 4.

Felitti and Anda wanted to find out whether there was a correlation between the number of adverse childhood experiences an individual had faced, and the number and severity of illnesses and disorders she developed as an adult. The correlation proved so powerful that Anda was not only 'stunned', but deeply moved.

'I wept,' he says. 'I saw how much people had suffered, and I wept.'

Felitti, too, was deeply affected. 'Our findings exceeded anything we had conceived. The correlation between having a difficult childhood and facing illness as an adult offered a whole new lens through which we could view human health and disease.'

Here, says Felitti, 'was the missing piece as to what was causing so much of our unspoken suffering as human beings'.

The number of adverse childhood experiences a patient had suffered could by and large predict the amount of medical care she would require in adulthood: the higher the ACE score, the

higher the number of doctor's appointments she'd had in the past year, and the more unexplained physical symptoms she'd reported.

People with an ACE score of 4 were twice as likely to be diagnosed with cancer than people who hadn't faced any form of childhood adversity. For each point an individual had, her chance of being hospitalised with an autoimmune disease in adulthood rose 20 per cent. Someone with an ACE score of 4 was 460 per cent more likely to face depression than someone with a score of 0.

An ACE score of 6 or higher shortened an individual's lifespan by almost 20 years.

Researchers wondered if those who encountered childhood adversity were also more likely to smoke, drink and overeat as a sort of coping strategy, and while that was sometimes the case, unhealthy habits didn't wholly account for the correlation Felitti and Anda saw between adverse childhood experiences and later illness. For instance, those with ACE scores greater than or equal to 7 who didn't drink or smoke, weren't overweight or diabetic, and didn't have high cholesterol *still* had a 360 per cent higher risk of heart disease than those with ACE scores of 0.

'Time,' says Felitti, 'does not heal all wounds. One does not "just get over" something – not even 50 years later.' Instead, he says: 'Time conceals. And human beings convert traumatic emotional experiences in childhood into organic disease later in life.'

Often, these illnesses can be chronic and lifelong. Autoimmune disease. Heart disease. Chronic bowel disorders. Migraines. Persistent depression. Even today, doctors puzzle over these very conditions: why are they so prevalent; why are some patients more prone to them than others; and why are they so difficult to treat?

The more research that's done, the more granular details emerge about the profound link between adverse experiences and adult disease. Scientists at Duke University in North Carolina, the University of California, San Francisco, and Brown University in Rhode Island have shown that childhood adversity damages us on a cellular level in ways that prematurely age our cells and affect our longevity. Adults who faced early life stress show greater erosion in what are known as telomeres – protective caps that sit on the ends of DNA strands to keep the DNA healthy and intact. As telomeres erode, we're more likely to develop disease, and we age faster; as our telomeres age and expire, our cells expire and so, eventually, do we.

Researchers have also seen a correlation between specific types of adverse childhood experiences and a range of diseases. For instance, children whose parents die, or who face emotional or physical abuse, or experience childhood neglect, or witness marital discord between their parents are more likely to develop cardiovascular disease, lung disease, diabetes, headaches, multiple sclerosis and lupus as adults. Facing difficult circumstances in childhood increases six-fold your chances of having myalgic encephalomyelitis (chronic fatigue syndrome) as an adult. Kids who lose a parent have triple the

risk of depression in their lifetimes. Children whose parents divorce are twice as likely to suffer a stroke later down the line.

Laura and John's stories illustrate that the past can tick away inside us for decades like a silent time bomb, until it sets off a cellular message that lets us know the body does not forget its history.

> *Something that happened to you when you were five or 15 can land you in the hospital 30 years later*

John's ACE score would be a 3: a parent often put him down; he witnessed his mother being harmed; and, clearly, his father suffered from an undiagnosed behaviour health disorder, perhaps narcissism or depression, or both.

Laura had an ACE score of 4.

Laura and John are hardly alone. Two-thirds of American adults are carrying wounds from childhood quietly into adulthood, with little or no idea of the extent to which these wounds affect their daily health and wellbeing. Something that happened to you when you were five or 15 can land you in the hospital 30 years later, whether that something was headline news, or happened quietly, without anyone else knowing it, in the living room of your childhood home.

The adversity a child faces doesn't have to be severe abuse in order to create deep biophysical changes that can lead to chronic health conditions in adulthood.

‘Our findings showed that the 10 different types of adversity we examined were almost equal in their damage,’ says Felitti. He and Anda found that no single ACE significantly trumped another. This was true even though some types, such as being sexually abused, are far worse in that society regards them as particularly shameful, and others, such as physical abuse, are more overt in their violence.

This makes sense if you think about how the stress response functions on an optimal level. You meet a bear in the woods, and your body floods with adrenaline and cortisol so that you can quickly decide whether to run in the opposite direction or stay and try to frighten the bear. After you deal with the crisis, you recover, your stress hormones abate, and you go home with a great story. For Laura and John, though, that feeling that the bear is still out there, somewhere, circling in the woods, stalking, and might strike again any day, anytime – that feeling never disappears.

There are a lot of bears out there. Chronic parental discord; enduring low-dose humiliation or blame and shame; chronic teasing; the quiet divorce between two secretly seething parents; a parent’s premature exit from a child’s life; the emotional scars of growing up with a hypercritical, unsteady, narcissistic, bipolar, alcoholic, addicted or depressed parent; physical or emotional abuse or neglect: these happen in all too many families. Although the details of individual adverse experiences differ from one home to another and from one neighbourhood to another, they are all precursors to the same organic chemical changes deep in the gray matter of the developing brain.

Every few decades, a groundbreaking psychosocial 'theory of everything' helps us to develop a new understanding of why we are the way we are – and how we got that way. In the early 20th century, the psychoanalyst Sigmund Freud transformed the landscape of psychology when he argued that the unconscious rules much of our waking life and dreams. Jungian theory taught, among other ideas, that we tend toward introversion or extroversion, which led the American educationalist Katharine Cook Briggs and her daughter Isabel Briggs Myers to develop a personality indicator. More recently, neuroscientists discovered that age 'zero to three' was a critical synaptic window for brain development, giving birth to Head Start and other preschool programmes. The correlation between childhood trauma, brain architecture and adult wellbeing is the newest, and perhaps our most important, psychobiological theory of everything.

Today's research on adverse childhood experiences revolutionises how we see ourselves, our understanding of how we came to be the way we are, why we love the way we do, how we can better nurture our children, and how we can work to realise our potential.

To date, more than 1,500 studies founded on Felitti and Anda's hallmark ACE research show that both physical and emotional suffering are rooted in the complex workings of the immune system, the body's master operating control centre – and what happens to the brain during childhood sets the programming for how our immune systems will respond for the rest of our lives.

The unifying principle of this new theory of everything is this:

your emotional biography becomes your physical biology, and together, they write much of the script for how you will live your life. Put another way: your early stories script your biology and your biology scripts the way your life will play out.

Unlike previous theories of everything, though, this one has been mind-bogglingly slow to change how we do medicine, according to Felitti. 'Very few internists or medical schools are interested in embracing the added responsibility that this understanding imposes on them.'

With the ACE research now available, we might hope that physicians will begin to see patients as a holistic sum of their experiences and embrace the understanding that a stressor from long ago can be a health-risk time bomb that has exploded. Such a medical paradigm, which sees adverse childhood experiences as one of many key factors that can play a role in disease, could save many patients years in the healing process.

But seeing that connection takes a little time. It means asking patients to fill out the ACE questionnaire and delving into that patient's history for insight into sources of both physical and emotional pain. As health-care budgets have become stretched, physicians spend less time interacting one-on-one with patients in their exam rooms; the average physician schedules patients back-to-back at 15-minute intervals.

Still, the cost of not intervening is far greater – not only in the loss of human health and wellbeing, but also in additional healthcare. According to the CDC, the total lifetime cost of child maltreatment in the US is $124 billion each year. The

lifetime healthcare cost for each individual who experiences childhood maltreatment is estimated at $210,012 – comparable to other costly health conditions, such as having a stroke, which has a lifetime estimated cost of $159,846 per person, or type-2 diabetes, which is estimated to cost between $181,000 and $253,000.

Further hindering change is the fact that adult physical medicine and psychological medicine remain in separate silos. Utilising ACE research requires breaking down these long-standing divisions in healthcare between what is 'physical' and what is 'mental' or 'emotional,' and that's hard to achieve. Physicians have been well-trained to deal only with what they can touch with their hands, see with their eyes, or view with microscopes or scans.

> *Just as physical wounds and bruises heal, just as we can regain our muscle tone, we can recover function in underconnected areas of the brain*

However, now that we have scientific evidence that the brain is genetically modified by childhood experience, we can no longer draw that line in the sand. With hundreds of studies showing that childhood adversity hurts our mental and physical health, putting us at greater risk for learning disorders, cardiovascular disease, autoimmune disease, depression, obesity, suicide, substance abuse, failed relationships, violence, poor parenting and early death, we just can't afford to make such distinctions.

Science tells us that biology does not have to be destiny. ACEs can last a lifetime, but they don't have to. Just as physical

wounds and bruises heal, just as we can regain our muscle tone, we can recover function in underconnected areas of the brain. If anything, that's the most important take-away from ACE research: the brain and body are never static; they are always in the process of becoming and changing.

Even if we have been set on high-reactive mode for decades or a lifetime, we can still dial it down. We can respond to life's inevitable stressors more appropriately and shift away from an overactive inflammatory response. We can become neurobiologically resilient. We can turn bad epigenetics into good epigenetics and rescue ourselves. We have the capacity, within ourselves, to create better health. We might call this brave undertaking 'the neurobiology of awakening'.

Today, scientists recognise a range of promising approaches to help create new neurons (known as neurogenesis), make new synaptic connections between those neurons (known as synaptogenesis), promote new patterns of thoughts and reactions, bring underconnected areas of the brain back online – and reset our stress response so that we decrease the inflammation that makes us ill.

You can find ways to start right where you are, no matter how deep your scars or how long ago they occurred. Many mind-body therapies not only help you to calm your thoughts and increase your emotional and physical wellbeing, but research suggests that they have the potential to reverse, on a biological level, the harmful impact of childhood adversity.

Recent studies indicate that individuals who practice mindfulness meditation and mindfulness-based stress

reduction (MBSR) show an increase in gray matter in parts of the brain associated with managing stress, and experience shifts in genes that regulate their stress response and their levels of inflammatory hormones. Other research suggests that a process known as neurofeedback can help to regrow connections in the brain that were lost to adverse childhood experiences.

Meditation, mindfulness, neurofeedback, cognitive therapy, EMDR (eye movement desensitisation and reprocessing) therapy: these promising new avenues to healing can be part of any patient's recovery plan, if only healthcare practitioners would begin to treat the whole patient – past, present and future, without making distinctions between physical and mental health – and encourage patients to explore all the treatment options available to them. The more we learn about the toxic impact of early stress, the better equipped we are to counter its effects, and help to uncover new strategies and modalities to come back to who it is we really are, and who it was we might have been had we not encountered childhood adversity in the first place.

This is an adapted and reprinted extract from 'Childhood Disrupted: How Your Biography Becomes Your Biology, and How You Can Heal' (Atria), by Donna Jackson Nakazawa.

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