

How severe, ongoing stress can affect a child's brain

July 12 2017, by Lindsey Tanner



Amy Band, top, shows children items on a lightbox at the Verner Center in Asheville, N.C., on March 23, 2017. Safe spaces, quiet times and breathing exercises for the preschoolers are designed to help kids cope with intense stress so they can learn. (AP Photo/Chuck Burton)

A quiet, unsmiling little girl with big brown eyes crawls inside a carpeted cubicle, hugs a stuffed teddy bear tight, and turns her head away from the noisy classroom.

The safe spaces, quiet times and breathing exercises for her and the other preschoolers at the Verner Center for Early Learning are designed to help [kids](#) cope with intense [stress](#) so they can learn. But experts hope there's an even bigger benefit—protecting young bodies and brains from stress so persistent that it becomes toxic.

It's no secret that growing up in tough circumstances can be hard on kids and lead to behavior and learning problems. But researchers are discovering something different. Many believe that ongoing stress during early childhood—from grinding poverty, neglect, parents' substance abuse and other adversity—can smolder beneath the skin, harming kids' brains and other body systems. And research suggests that can lead to some of the major causes of death and disease in adulthood, including heart attacks and diabetes.

"The damage that happens to kids from the infectious disease of [toxic stress](#) is as severe as the damage from meningitis or polio or pertussis," says Dr. Tina Hahn, a pediatrician in rural Caro, Michigan. She says her No. 1 goal as a physician is to prevent toxic stress. Hahn routinely questions families about stresses at home, educates them about the risks and helps them find ways to manage.

Mounting research on potential biological dangers of toxic stress is prompting a new public health approach to identifying and treating the effects of poverty, neglect, abuse and other adversity. While some in the medical community dispute that research, pediatricians, mental health specialists, educators and community leaders are increasingly adopting what is called "trauma-informed" care.

The approach starts with the premise that extreme stress or trauma can cause brain changes that may interfere with learning, explain troubling behavior, and endanger health. The goal is to identify affected children and families and provide services to treat or prevent continued stress.

This can include parenting classes, addiction treatment for parents, school and police-based programs and psychotherapy.



Amy Band, center, teaches children how to handle confrontations at the Verner Center in Asheville, N.C., on Thursday, March 23, 2017. Safe spaces, quiet times and breathing exercises for the preschoolers are designed to help kids cope with intense stress so they can learn. (AP Photo/Chuck Burton)

Many preschoolers who mental health specialist Laura Martin works with at the Verner Center have been in and out of foster homes or they live with parents struggling to make ends meet or dealing with drug and alcohol problems, depression or domestic violence.

They come to school in "fight or flight" mode, unfocused and withdrawn or aggressive, sometimes kicking and screaming at their classmates. Instead of adding to that stress with aggressive discipline, the goal is to take stress away.

"We know that if they don't feel safe then they can't learn," Martin said. By creating a safe space, one goal of programs like Verner's is to make kids' bodies more resilient to biological damage from toxic stress, she said.

Many of these kids "never know what's going to come next" at home. But at school, square cards taped at kids' eye level remind them in words and pictures that lunch is followed by quiet time, then a snack, then hand-washing and a nap. Breathing exercises have kids roar like a lion or hiss like a snake to calm them. A peace table helps angry kids work out conflicts with their classmates.

The brain and disease-fighting immune system are not fully formed at birth and are potentially vulnerable to damage from childhood adversity, recent studies have shown. The first three years are thought to be the most critical, and children lacking nurturing parents or other close relatives to help them cope with adversity are most at risk.

Under normal stress situations—for a young child that could be getting a shot or hearing a loud thunderstorm—the stress response kicks in, briefly raising heart rate and levels of cortisol and other [stress hormones](#). When stress is severe and ongoing, those levels may remain elevated, putting kids in a persistent "fight or flight" mode, said Harvard University neuroscientist Charles Nelson.



A single white rose rests on the "peace table" at the Verner Center in Asheville, N.C., on Thursday, March 23, 2017. The spot is designated to help angry kids work out conflicts with their classmates. (AP Photo/Chuck Burton)

Recent studies suggest that kind of stress changes the body's metabolism and contributes to internal inflammation, which can raise risk for developing diabetes and heart disease. In 2015, Brown University researchers reported finding elevated levels of inflammatory markers in saliva of children who had experienced abuse or other adversity.

Experiments in animals and humans also suggest persistent stress may alter brain structure in regions affecting emotions and regulating behavior. Nelson and others have done imaging studies showing these regions are smaller than usual in severely traumatized children.

Nelson's research on neglected children in Romanian orphanages suggests that early intervention might reverse damage from toxic stress.

Orphans sent to live with nurturing foster families before age 2 had imaging scans several years later showing their brains looked similar to those of kids who were never institutionalized. By contrast, children sent to foster care at later ages had less gray matter and their brains looked more like those of children still in orphanages.

Toxic stress is not the same as [post-traumatic stress disorder](#). PTSD is a distinct mental condition that can result from an extremely traumatic event, including combat, violence or sexual abuse. Experts say it can occur in adults and children who live with persistent toxic stress, including children in war-torn countries, urban kids who've been shot or live in violence-plagued neighborhoods, and those who have been physically or sexually abused.

The toxic stress theory has become mainstream, but there are skeptics, including Tulane University psychiatrist Dr. Michael Scheeringa, an expert in childhood PTSD. Scheeringa says studies supporting the idea are weak, based mostly on observations, without evidence of how the brain looked before the trauma.

The American Academy of Pediatrics supports the theory and in 2012 issued recommendations urging pediatricians to educate parents and the public about the long-term consequences of toxic stress and to push for new policies and treatments to prevent it or reduce its effects.



Laura Martin speaks during an interview at the Verner Center in Asheville, N.C., on Thursday, March 23, 2017. Martin says one goal of programs like Verner's is to make kids' bodies more resilient to biological damage from toxic stress. (AP Photo/Chuck Burton)

In a 2016 policy noting a link between poverty and toxic stress, the academy urged pediatricians to routinely screen families for poverty and to help those affected find food pantries, homeless shelters and other resources.

"The science of how poverty actually gets under kids' skin and impacts a child has really been exploding," said Dr. Benard Dreyer, a former president of the academy.

Some pediatricians and schools routinely screen children and families

for toxic stress, but it is not universal, said John Fairbank, co-director of the National Center for Child Traumatic Stress. "That's certainly an aspiration. It would be a big step forward," said Fairbank, a Duke University psychiatry professor.

Much of the recent interest stems from landmark U.S. government-led research published in 1998 called the Adverse Childhood Experiences study. It found that adults exposed to neglect, poverty, violence, substance abuse, parents' mental illness and other domestic dysfunction were more likely than others to have heart problems, diabetes, depression and asthma.

A follow-up 2009 study found that adults with six or more adverse childhood experiences died nearly 20 years earlier than those with none.

Some children seem resistant to effects from toxic stress. Harvard's Nelson works with a research network based at Harvard's Center on the Developing Child that is seeking to find telltale biomarkers in kids who are affected—in saliva, blood or hair—that could perhaps be targets for drugs or other treatment to prevent or reduce stress-related damage.



Amy Band talks to a group of children at the Verner Center in Asheville, N.C., on Thursday, March 23, 2017. Safe spaces, quiet times and breathing exercises for the preschoolers are designed to help kids cope with intense stress so they can learn. (AP Photo/Chuck Burton)

That research is promising but results are likely years off, says Dr. Jack Shonkoff, the center's director.

Alvin and Natalie Clarke brought their young grandchildren into their Cass City, Michigan home after their parents jailed on drug charges. The 6-year-old grandson hits, yells, breaks toys, misbehaves in school. His 4-year-old sister used to have nightmares and recoil in fear when her baby doll was left alone on the floor—signs her therapists say suggest memories of neglect.

The Clarkes had never heard the term "toxic stress" when they were granted guardianship in 2015. Now it's a frequent topic in a support group they've formed for other grandparent-guardians.

Their grandson's therapists say he has PTSD and behavior problems likely stemming from toxic stress. Around strangers he's sometimes quiet and polite but the Clarkes say he has frequent tantrums at home and school and threatens his sister. He gets frightened at night and worries people are coming to hurt him, Natalie Clarke said.

Weekly sessions with a trauma-focused therapist have led to small improvements in the boy. The Clarkes say he needs more help but that treatment is costly and his school isn't equipped to offer it.

The little girl has flourished with help from Early Head Start behavior specialists who have worked with her and the Clarkes at home and school.

"Thank God she doesn't remember much of it," Natalie Clarke said. "She's a happy, loving little girl now."

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