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Research Traces Impacts of Childhood Adversity

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The stress of a spelling bee or a challenging science project can enhance a student's focus and promote learning. But the stress of a dysfunctional or unstable home life can poison a child's cognitive ability for a lifetime, according to new research.

While educators and psychologists have said for decades that the effects of poverty interfere with students' academic achievement, new evidence from cognitive and neuroscience is showing exactly how adversity in childhood damages students' long-term learning and health.

Those studies show that stress forms the link between childhood adversity and poor academic achievement, but that not all adversity—or all stress—is bad for students.

"Children from their earliest life need to learn how to manage adversity," such as dealing with the first day of school, said Dr. Jack P. Shonkoff, the director of Harvard University's Center on the Developing Child, in Cambridge, Mass.

Research from Dr. Shonkoff's center and from other experts finds that positive stress—the kind that comes from telling a toddler he can't have a cookie or a teenager that she's about to take a pop quiz—causes a brief rise in heart rate and stress hormones. A jolt can focus a student's attention and is generally considered healthy.

Similarly, a child can tolerate stress that is severe but may be relatively short-term—from the death of a loved one, for example—as long as he or she has support.

"Adults help children develop strategies to help cope with these stressors," Dr. Shonkoff said. "Whether it's reading or managing stress, adults provide the scaffolding for children to build those skills themselves."

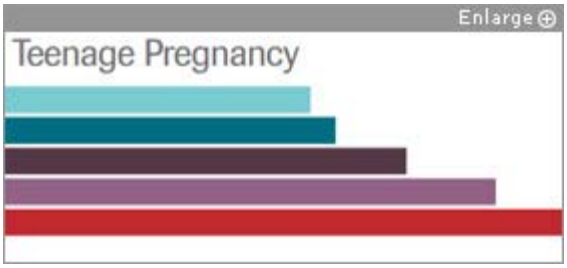
'Toxic' Recipe

By contrast, so-called "toxic stress" is severe, sustained, and not buffered by supportive relationships.

The same brain flexibility, called plasticity, that makes children **open to learning** in their early years also makes them particularly vulnerable to damage from the toxic stressors that often accompany poverty: high mobility and homelessness; hunger and food instability; parents who are in jail or absent; domestic violence; drug abuse; and other problems, according to Pat Levitt, a developmental neuroscientist at the University of Southern California and the director of the neuroscience graduate program at the Keck School of Medicine in Los Angeles. Both Mr. Levitt and Dr. Shonkoff are part of the National Scientific Council on the Developing Child, which is studying the effects of environment on children's health and cognitive development.

Compounding Risks

As part of the Adverse Childhood Experiences Study, more than 17,400 adults in San Diego County were assigned scores based on the number of risk factors each experienced as a child, including abuse or neglect, or growing up in homes with domestic violence, drug abuse or mental illness, or absent parents. Researchers found that people with higher ACE scores were more likely to experience underage sex or pregnancy, among other health risks.



SOURCE: Adverse Child Experiences Study

Videos: Early Development

Good experiences, like nurturing parents and rich early-child-care environments, help build and reinforce neural connections in areas such as language development and self-control, while adversity weakens those connections.

Over time, the connections, good or bad, stabilize, "and you can't go back and rewire; you have to adapt," Dr. Shonkoff said. "If you've built on strong foundations, that's good, and if you have weak foundations, the brain has to work harder, and it costs more to the brain and society."

For example, a study in the October issue of the peer-reviewed journal *Child Development* found that out of more than 26,000 students in the Minneapolis public schools, those who moved more than three times a year had significantly lower mathematics achievement and academic growth than students with more stable homes.

In a separate study, Richard P. Barth, the dean and a professor of social work at the University of Maryland College Park, **found** children with six or more adverse experiences before age 3 were overwhelmingly likely to be identified as needing special education for developmental delay.

Self-Control or Trust?

Moreover, a child's ability to delay gratification and control him- or herself—often seen as a personality trait critical for academic success—can be hugely dependent on the child's sense of stability in the environment and trust in surrounding adults.

In a twist on the classic Stanford University "marshmallow experiment," in which young children's ability to resist eating a marshmallow was tested to show their self-control, researchers led by Celeste Kidd, a professor of brain and cognitive sciences at the University of Rochester in New York recently found children who trusted the word of the adult tester and felt their environment was more stable waited four times as long for a treat as those who felt more insecure.

The effects of early stress can linger for decades and go well beyond learning difficulties.

"What happens in childhood, like a child's footprint in wet cement, leaves its mark forever," said Dr. Vincent J. Felitti, the director of the Adverse Childhood Experiences Study at the health -care provider Kaiser Permanente's department of preventive medicine in San Diego.

The exponential brain growth of infancy and early childhood also makes children more vulnerable to chronic stress during those years than at other developmental periods, according to the National Scientific Council on the Developing Child, an interdisciplinary group of neuroscientists, psychologists, economists, and education researchers. In a series of easy-to-understand, peer-reviewed videos, the group explains how early cognitive connections form—and break down.

Experiences Build Brain Architecture

Serve & Return Interaction Shapes Brain Circuitry

Toxic Stress Derails Healthy Development

SOURCE: **Center on the Developing Child, Harvard University**

Known as the ACE study and done in collaboration with Dr. Robert F. Anda at the federal Centers for Disease Control and Prevention in Atlanta, the project analyzed longitudinal data on more than 17,400 middle-class adults in the Kaiser Permanente system.

Participants reported whether, as children, they had experienced repeated physical, sexual, or severe emotional abuse, and whether they had grown up with any of five types of "household dysfunction": a family member in prison; domestic violence; an alcoholic or drug abuser in the home; someone in the home who was depressed, mentally ill, or suicidal; or loss of at least one biological parent during childhood for any reason.

Adversity, Decades Later

As it turned out, more than half the adults had had at least one type of severe abuse or home dysfunction in childhood, and one in 16 had experienced four or more. The number of traumatic childhood experiences, Dr. Felitti found, was directly proportional to a person's risk of a wide variety of major medical and social problems, from teenage pregnancy and drug abuse to adult heart disease and hepatitis.

"These results are almost unique in their magnitude," Dr. Felitti said. A boy with six indicators of abuse and home dysfunction was 4,600 percent more likely than a boy with no risk factors to become an intravenous-drug user, according to the study.

Such findings mean that teachers and doctors are left trying to fix late symptoms, like poor reading skills or **boredom** in school, rather than underlying issues that occur much earlier in life.

"The science [on the effects of poverty and stress] has exploded in the last 25 years, but the policy on the delivery of child care has stalled, without anything close to similar progress," Dr. Shonkoff said.

While federal and state education programs typically focus on academic remediation and nutrition for disadvantaged students, "for some kids, no matter how well you do that, it's not enough, because the amount of adversity in their lives overwhelms," he said.

"It's asking too much," Dr. Shonkoff said, "to require parent education and an enriched preschool program to counteract the effects of the level of adversity in some kids' lives that is whipping up their stress-response systems."

Researchers, including Mr. Levitt of USC and Dr. Felitti, are starting to explore new interventions, both medical and cognitive, that might protect children's developing brains from damage caused by stress and improve their ability to cope.

So far, there are no classroom-ready techniques beyond developing supportive relationships between teachers and parents and their children, Mr. Levitt said. "Helping people after the fact is really nibbling at the edges of the problems," Dr. Felitti said during a presentation on the research at the Society for Neuroscience conference in New Orleans last month. "We need a polio vaccine, as opposed to buying bigger and better iron lungs."

"Stress is not something you get a lot of sympathy for," Dr. Shonkoff said in a separate interview at the Society for Research in Educational Effectiveness meeting in Washington. "This is a culture that says suck it up and get over it."

But in reality, Dr. Felitti concluded, "the [ACE] study makes it clear that time does not heal some of the adverse experiences we found so common. ... One does not 'just get over' some things, not even 50 years later."

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