

**FEATURE**

# The lasting impact of neglect

Psychologists are studying how early deprivation harms children — and how best to help those who have suffered from neglect.

By Kirsten Weir

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The first time Nathan Fox, PhD, stepped into a Romanian orphanage, he was struck by the silence. "The most remarkable thing about the infant room was how quiet it was, probably because the infants had learned that their cries were not responded to," says Fox, who directs the Child Development Laboratory at the University of Maryland.

The babies laid in cribs all day, except when being fed, diapered or bathed on a set schedule. They weren't rocked or sung to. Many stared at their own hands, trying to derive whatever stimulation they could from the world around them. "Basically these kids were left on their own," Fox says.

Fox, along with colleagues Charles Nelson, PhD, at Harvard Medical School and Children's Hospital Boston, and Charles Zeanah, MD, at Tulane University, have followed those children for 14 years. They describe their Bucharest Early Intervention Project in a new book, "Romania's Abandoned Children: Deprivation, Brain Development, and the Struggle for Recovery" (2014).

Neglect isn't just a Romanian problem, of course. UNICEF estimates that as many as 8 million children are growing up in institutional settings around the world. In the United States, neglect is a less obvious — though very real — concern. According to a report by the U.S. Department of Health and Human Services, 676,569 U.S. children were reported to have experienced maltreatment in 2011. Of those, more than 78 percent suffered from neglect.

The list of problems that stem from neglect reads like the index of the DSM: poor impulse control, social withdrawal, problems with coping and regulating emotions, low self-esteem, pathological behaviors such as tics, tantrums, stealing and self-punishment, poor intellectual functioning and low academic achievement. Those are



just some of the problems that David A. Wolfe, PhD, a psychologist at the University of Toronto, and his former student Kathryn L. Hildyard, PhD, detailed in a 2002 review (*Child Abuse & Neglect*, 2002).

"Across the board, these are kids who have severe problems throughout their lifetime," says Wolfe, recent past editor-in-chief of *Child Abuse & Neglect*.

Now, researchers are beginning to understand some of the ways that early deprivation alters a person's brain and behavior — and whether that damage can be undone.

## The Bucharest project

In 1989 Romanian dictator Nicolae Ceaușescu was overthrown, and the world discovered that 170,000 children were being raised in Romania's impoverished institutions. As the children's plight became public, Fox, Nelson and Zeanah realized they had a unique opportunity to study the effects of early institutionalization.

The trio launched their project in 2000 and began by assessing 136 children who had been living in Bucharest's institutions from birth. Then they randomly assigned half of the children to move into Romanian foster families, whom the researchers recruited and assisted financially. The other half remained in care as usual. The children ranged in age from 6 months to nearly 3 years, with an average age of 22 months.

Over the subsequent months and years, the researchers returned to assess the development of the children in both settings. They also evaluated a control group of local children who had never lived in an institution.

They found many profound problems among the children who had been born into neglect. Institutionalized children had delays in cognitive function, motor development and language. They showed deficits in socio-emotional behaviors and experienced more psychiatric disorders. They also showed changes in the patterns of electrical activity in their brains, as measured by EEG.

For kids who were moved into foster care, the picture was brighter. These children showed improvements in language, IQ and social-emotional functioning. They were able to form secure attachment relationships with their caregivers and made dramatic gains in their ability to express emotions.

While foster care produced notable improvements, though, children in foster homes still lagged behind the control group of children who had never been institutionalized. And some foster children fared much better than others. Those removed from the institutions before age 2 made the biggest gains. "There's a bit of plasticity in the system," Fox says. But to reverse the effects of neglect, he adds, "the earlier, the better."

In fact, when kids were moved into foster care before their second birthdays, by age 8 their brains' electrical activity looked no different from that of community controls. The researchers also used structural MRI to further understand the brain differences among the children. They found that institutionalized children had smaller brains, with a lower volume of both gray matter (which is made primarily of the cell bodies of neurons) and white matter (which is mainly the nerve fibers that transmit signals between neurons).

"A history of institutionalization significantly affected brain growth," Fox says.

The institutionalized children who were moved into foster homes recovered some of that missing white matter volume over time. Their gray matter volume, however, stayed low, whether or not they had been moved into stable homes (*PNAS* (<http://www.pnas.org/content/early/2012/07/17/1200041109.full.pdf>), 2012). Those brain changes, the researchers found, were associated with an increased risk of ADHD symptoms.

Many of the children remain with their foster families. (The researchers no longer support those families financially, but the Romanian government continues to provide stipends for the children's care.) Soon, Fox says, he

and his colleagues will begin the 16-year assessment. They expect that to be particularly telling, since the effects of adversity in early childhood can re-emerge during adolescence.

Regardless of future findings, Fox has seen enough evidence to draw hard conclusions. "Children need to be in socially responsive situations. I personally think that there aren't good institutions for young children," he says. With millions of children growing up in similar conditions, he adds, "this is a worldwide public health issue."

## Coming to America

In the United States, Megan Gunnar, PhD, director of the Institute of Child Development at the University of Minnesota, has helped fill in other pieces of the puzzle. In 1999, she and her colleagues launched the International Adoption Project, an extensive examination of children adopted from overseas. She now has nearly 6,000 names on her registry and her research is ongoing.

Gunnar has found certain brain changes are common among children who came to the United States from orphanages, including a reduction in brain volume and changes in the development of the prefrontal cortex.

"Neglect does a number on the brain. And we see behaviors that follow from that," she says.

She's found post-institutionalized kids tend to have difficulty with executive functions such as cognitive flexibility, inhibitory control and working memory. They are often delayed in the development of theory of mind, the ability to understand the mental states of others. Many struggle to regulate their emotions. Often, they suffer from high anxiety.

One of the most common behaviors she sees among post-institutionalized children is indiscriminate friendliness. "A child who doesn't know you from Adam will run up, put his arms around you and snuggle in like you're his long-lost aunt," Gunnar says. That friendliness was probably an important coping technique in their socially starved early lives, she says. "What's interesting is it just doesn't go away."

Fox and his colleagues had also noted such disarming friendliness in the Romanian orphanages. Initially, children with indiscriminate friendliness were thought to have an attachment disorder that prevented them from forming healthy connections with adult caregivers. But findings from the Bucharest Project as well as Gunnar's own research have demonstrated otherwise, she says.

In a study of 65 toddlers who had been adopted from institutions, Gunnar found that most attached to their new parents relatively quickly, and by nine months post-adoption, 90 percent of the children had formed strong attachments to their adoptive parents. Yet that attachment was often "disorganized," marked by contradictory behaviors (*Development and Psychopathology*, in press). A child might appear confused in the presence of a caregiver, for instance, sometimes approaching the caregiver for comfort, and other times showing resistance.

"There were things that happened in terms of early development, when they lacked that responsive caregiver, that they're carrying forward," Gunnar says.

One of those things may be a disrupted cortisol pattern. Cortisol, commonly known as the "stress hormone," typically peaks shortly after waking, then drops throughout the day to a low point at bedtime. But Gunnar found that children with a history of neglect typically have a less marked cortisol rhythm over the course of the day. Those abnormal cortisol patterns were correlated with both stunted physical growth and with indiscriminate friendliness (*Development and Psychopathology* (<http://www.ncbi.nlm.nih.gov/pubmed/21756437>), 2011).

Indiscriminate friendliness may also be tied to the amygdala. In a study using fMRI, Aviva Olsavsky, MD, at the University of California, Los Angeles, and colleagues found that when typical children viewed photos of their mothers versus photos of strangers, the amygdala showed distinctly different responses. In children who had been institutionalized, however, the amygdala responded similarly whether the children viewed mothers or

strangers. That response was particularly notable among kids who exhibited more friendliness toward strangers (*Biological Psychiatry* ([http://www.biologicalpsychiatryjournal.com/article/S0006-3223\(13\)00499-X/abstract](http://www.biologicalpsychiatryjournal.com/article/S0006-3223(13)00499-X/abstract)), 2013).

## Closer to home

Other researchers are also exploring physiological differences in children who have experienced neglect. Around the time Gunnar was launching her adoption study, Philip Fisher, PhD, a psychologist and research scientist at the University of Oregon, was working with American foster children. Initially, he suspected the behavioral and developmental difficulties they experienced stemmed from physical abuse. But as he shared data with Gunnar and others, he realized they looked a lot like post-institutionalized children.

Though cortisol tends to follow a daily cycle, it also spikes during times of stress. Fisher expected that his foster children, who had clearly experienced stressful situations, might show high levels, too. Instead, he discovered something quite different. "Their levels were low in the morning and stayed low throughout the day," he says.

Combing through the case records of the children in his sample, he discovered that dysregulated cortisol was not associated with physical or sexual abuse, but with early neglect. "This blunted daily pattern with low morning cortisol seemed to be a hallmark of neglect," he says. "That was a pretty powerful picture."

In fact, abnormal cortisol cycles have previously been noted in a variety of psychological disorders, Fisher says, including anxiety, mood disorders, behavior problems and post-traumatic stress disorder. But the good news: Cortisol patterns appear to be changeable.

Fisher found that foster kids living with more responsive caregivers were more likely to develop more normal cortisol patterns over time. Kids living with caregivers who were stressed out themselves didn't show that recovery (*Psychoneuroendocrinology* (<http://www.ncbi.nlm.nih.gov/pubmed/17656028>), 2007). "We're more likely to see that blunted pattern when they don't get that support, and there's a lot of stress in the family," he says.

Helping caregivers manage their own stress and develop more positive interactions with their children may help reset the kids' stress responses. Fisher is now developing and testing video coaching programs that aim to identify and reinforce the positive interactions foster parents are already having with their young children. "We can show people very precisely the things we know are at the core of promoting healthy development," he says.

Meanwhile, he's also looking for other physiological systems affected by early adverse experience — particularly those that are malleable. "If we can impact those systems, especially without pharmacology, we have great tools we can leverage," he says.

For instance, kids with a history of neglect are known to have trouble with executive functioning. One way that presents itself is that the kids don't show much brain response to corrective feedback; instead, they often make the same mistakes over and over. Targeted interventions may help those children learn to tune in to the important cues they're missing, Fisher says. Though more research is needed, he adds, computer-based brain-training games and other novel interventions might prove to be useful complements to more traditional therapy.

Despite progress, child neglect remains underfunded and understudied, says Wolfe. Politically, it's a prickly subject. "Neglect is not a disease. It's entwined with the delivery of proper social and medical services. It's embedded in socioeconomic disadvantage," he says.

Politics aside, science is making strides toward erasing the stamp that early neglect leaves on a child. New understanding of the ways that neglect changes a person's physiology is helping to push the field forward, Wolfe says.

That progress is sorely needed, but the most important first step is to remove neglected children to a safe, loving environment, he adds. "The brain will often recover, if it's allowed to."

Kirsten Weir is a journalist in Minneapolis.

### Further reading

Bruce, J., Gunnar, M. R., Pears, K. C., and Fisher, P. A. (2013). Early adverse care, stress neurobiology, and prevention science: Lessons learned. *Prevention Science*, 14(3), 247–256.

Nelson, C. A., Fox, N. A., and Zeanah, C. H. (2014). *Romania's abandoned children: Deprivation, brain development, and the struggle for recovery*. Cambridge, MA, and London, England: Harvard University Press.

Nelson III, C. A., Zeanah, C. H., Fox, N. A., Marshall, P. J., Smyke, A. T., and Guthrie, D. (2007). Cognitive recovery in socially deprived young children: the Bucharest Early Intervention Project. *Science*, 318(5858), 1937–2940.

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Video: Izidor Ruckel is a Romanian orphan who has made it his life's work to help other orphans.

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
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