

An experiment in zero parenting

A controversial study of Romanian orphans reveals long-term harm to the intellect

By Eliot Marshall

An unnerving sight greeted U.S. scientists a decade ago at an orphanage in Bucharest. The institution housed “many children rocking back and forth while sitting or on all fours, turning their head from side to side, or repeatedly bringing their hand to their face, often slapping themselves,” write neuroscientists Charles Nelson and Nathan Fox and psychiatrist Charles Zeanah in their book *Romania’s Abandoned Children*, published in January. The children’s empty motions, or “stereotypies,” are like the pacing of a tiger or elephant in the zoo. They are one of the abnormalities under scrutiny in a study of child neglect Nelson and his team launched in 2000.

What the researchers saw was the legacy of a tragic scheme to boost Romania’s population. Former dictator Nicolae Ceaușescu decided in the late 1960s that Romania needed to grow; the government taxed women who had fewer than five children, regardless of what they could afford. To care for thousands of unwanted children, the government filled orphanages. They weren’t designed or funded to mimic family life, but they were busy.

At their peak in the late 1980s, the orphanages housed nearly 170,000 children. Most grew up in a stunningly blank and unresponsive environment. Caregivers came and went in three shifts, and a single staffer might watch over 10 to 15 children. Infants spent time staring at the walls and ceiling, and a child might come in contact with 17 different caregivers in a single week. Nelson, a professor of pediatrics and neuroscience at Harvard Medical School in Boston, calls it an experiment in zero parenting.

After Ceaușescu’s fall and execution in 1989, people from around the world adopted thousands of the orphans. (Romania later put a brake on this.) Researchers have studied these early international adoptees—some with serious emotional problems—for



2 decades now, examining how child rearing can go wrong, how it alters behavior, and how foster parenting can rescue lives. The Nelson group, known as the Bucharest Early Intervention Project (BEIP), saw a chance to answer an additional, specific question: How does neglect in early childhood change neurological development?

The researchers launched a radical and, at the time, controversial study. Using U.S.

and private foundation funding, they teamed with Romanian officials to run a controlled study comparing a group left in orphanages with a group randomly selected for high-quality foster care in Romania. In a stream of reports since 2003, they have shown that children reared in institutions suffer an array of setbacks, some reflecting long-term changes in the brain (*Science*, 21 December 2007, p. 1937). The team is now analyzing data from the 12th year, measuring things like disparities in brain structure.

Findings from the Bucharest project have buttressed those from smaller and

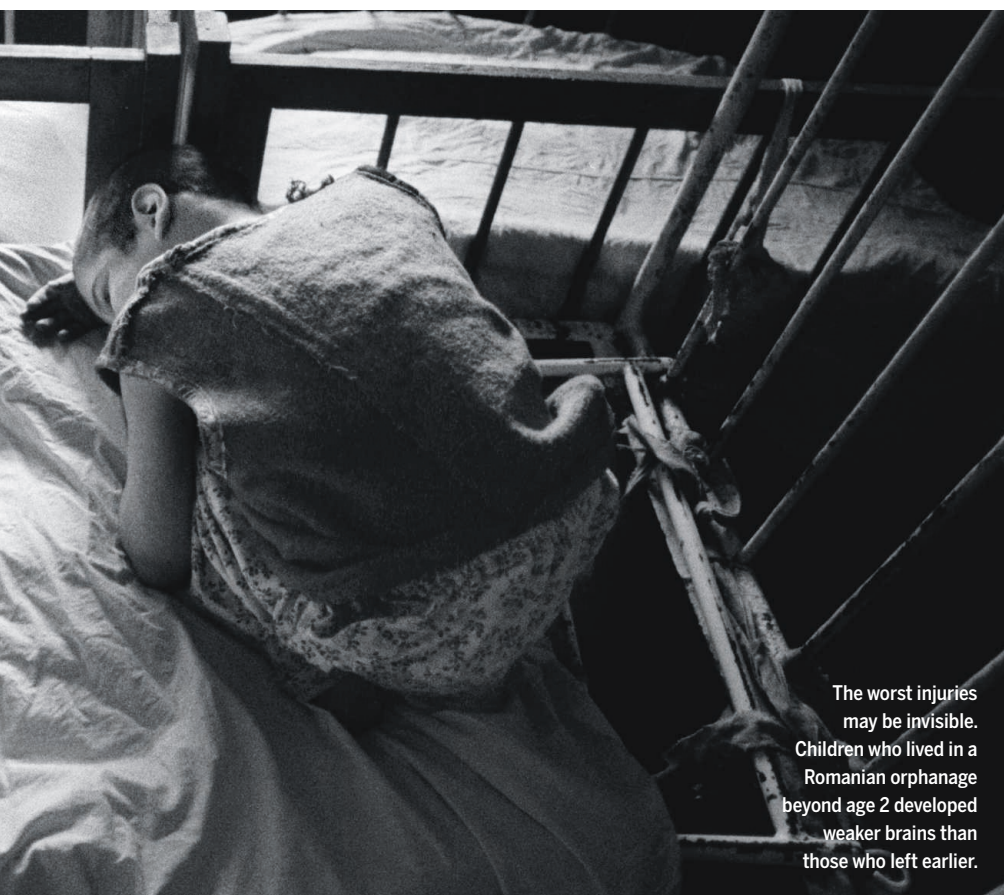
less controlled studies, many based on U.S. children in troubled homes. “We are all reporting the same effects,” says Megan Gunnar, a clinical psychologist at the University of Minnesota (UMN), Twin Cities, who is not part of BEIP. “The brain needs stimulation to develop,” and when it doesn’t get it, cognitive and emotional growth are stunted.

Today, Nelson is convinced that early life without parenting can be “more disastrous for brain development” than living with an abusive caregiver. But the Romanian work also confirms that many children can bounce back to something like normality, if placed in a supportive environment. No country should be complacent, Nelson adds, noting that what he saw in Romania is “not all that different from the kind of neglect that many kids in the United States experience.”

CHILD NEGLECT IS “A HUGE PROBLEM” and probably “the most common form of child maltreatment in the world,” says Seth Pollak, a clinical psychologist at the

“Children are learning: ‘Why should I cry, or gesture, or make eye contact if no one is responding?’”

Seth Pollak,
University of Wisconsin, Madison



The worst injuries may be invisible. Children who lived in a Romanian orphanage beyond age 2 developed weaker brains than those who left earlier.

University of Wisconsin, Madison. Each year, the U.S. National Child Abuse and Neglect Data System tracks about 3 million case reports of maltreatment. These data suggest that neglect is nearly three times as prevalent as physical and sexual abuse combined. And the numbers may understate the problem because it's so difficult to see: "It's the absence of something happening between a parent and child when nobody else is around," Pollak says. "How do you measure it?"

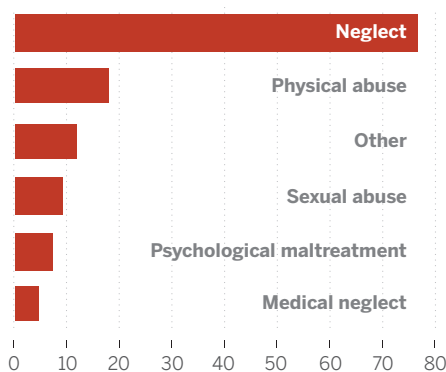
Yet the consequences are haunting. The "creepiest thing" about the Romanian orphanages and other places where young children suffer chronic neglect is that "they're quiet," Pollak says. In most U.S. elementary schools or child care centers, he says, "you hear talking and screaming and crying ... it's just raucous." But in "an environment where children are not being attended to, there is this kind of dead silence. ... Children are learning: 'Why should I cry, or gesture, or make eye contact if no one is responding?'"

The problem is insidious because neglected children often don't have injuries and don't get the attention that victims of physical or sexual abuse receive. "They wind up coming to the emergency room when they're 5 years old and weigh 20 pounds," Nelson says, long after the damage is critical.

Neglect is difficult to study. Researchers normally can't control a child's environment, and they usually don't know what harm a child has experienced before he or she appears in the clinic. This is especially true for children living in poverty, says Gunnar, who sees many of them. "We can use fancy statistics to try to isolate the early effects from continuing and ongoing adversity," but the results are uncertain.

Types of maltreatment

Percent of U.S. child-harm reports in 2010



Source: U.S. Dept. of Health and Human Services

The opening of Romanian orphanages after Ceaușescu provided a rare chance to do well-controlled studies. A U.K. group then led by pediatric psychologist Michael Rutter at King's College London undertook the first, a large observational study. The English and Romanian Adoptee (ERA) project, as it was known, spent 2 decades comparing the development of children adopted by U.K. families with children who had not been institutionalized.

The BEIP group chose a more direct approach: It partnered with Romanian officials to conduct research within the orphanage network. BEIP offered to finance foster care for a small group of children who would exit the institutions; in return, Romania opened the doors and helped with a testing program.

BEIP came under fire in Europe for including *any* children still in an institution. Such vulnerable kids were incapable of giving consent, critics argued. Zeanah, a pediatrician and psychiatrist at Tulane University in New Orleans, Louisiana, involved in designing BEIP protocols, claims that the furor was based on "a misunderstanding" about the project's link to international adoption efforts, and European Commission officials ultimately dismissed concerns. BEIP investigators still hear from critics who "just cannot accept randomization" of children to a group that may not benefit, Zeanah says, but it was essential to make the trial work.

After screening to exclude children with genetic or neurological abnormalities, study leaders selected 136 children for the trial, ranging in age from 6 to 31 months. By random assignment, 68 went into a group that received BEIP-funded foster care and 68 were left to continue with "usual" care—that is, they lived in an institution. Foster caregivers were screened, trained, and paid a "living wage," Nelson says. It was deluxe care even by U.S. standards. BEIP experts monitored and consulted with the caregivers, who also had 24-hour pediatric medical backup. As controls, BEIP included a group of 72 children from Romanian communities who had never lived in an institution. Researchers gathered test results at 30 months, 42 months, 54 months, 8 years, and 12 years. They have been funded to return at 15 years.

Children in the institutional care group showed dramatic deficits on a variety of measures when compared with the community group. In an age-adjusted system that converts test results from young children into IQ-comparable scores, known as the developmental quotient (DQ) scale, the institutionalized kids at the outset earned an average DQ score of 74 compared with

103 for the community group. This was “two standard deviations below the mean” for children of that age, according to BEIP, suggesting “profound intellectual delay.”

In time, the kids placed into foster care advanced toward the normal DQ and IQ ranges, though they continued to lag behind the community group. When BEIP tested children at 42 months, researchers found that the older a child was when placed into foster care, the lower the cognitive score was likely to be. Those who left the institution by 18 months scored above 90 on the DQ scale, whereas those who left at 24 to 30 months scored just over 80. Those who remained in institutions up to age 8 exhibited a “progressive decrease in IQ with age,” the BEIP authors wrote.

Strangely, as they reached 8 years of age, the foster care children began to slow

The good news is that IQ does seem to rebound in children who leave institutional care—the sooner they leave, the better, according to Nelson’s group. BEIP found that children who left an institution by 24 months seemed to recover best. Other researchers agree about the need to get out early, but differ about timing. For example, the United Kingdom’s ERA study found that children adopted into British families seemed to score just as well as community kids if they left the institution by 6 months of age. Both BEIP and ERA have found that certain behavioral problems, such as poor attention and hyperactivity, persist among kids who were in institutions for any period.

BEIP also showed that the longer children lived in an institution before going into foster care, the more likely

immaturity, persisted into the eighth year. Children placed in foster care before 24 months of age, however, developed EEG patterns with elevated alpha signals by 8 years of age that were “indistinguishable” from those of community children.

Institutional care also seems to have left a mark on the children’s brain structure. In a 2012 paper in the *Proceedings of the National Academy of Sciences*, members of the BEIP group reported on an imaging study of Romanian children 8 to 11 years old. Using magnetic resonance imaging, Margaret Sheridan of Boston Children’s Hospital and others found that Romanian kids raised in an institution had significantly less brain tissue, especially gray matter (a mix of various cell bodies), than those who had never lived in an institution. But children who had been placed in foster care showed a smaller deficit. “These reflect profound effects on the brain,” Nelson says.

Like other studies, the BEIP project suggests that brain development passes through critical periods. The first 24 months of life seem especially important for cognitive development, and Nelson says that the critical period for healthy attachment to a parent lasts through the first 20 to 22 months. For language, the window appears to be up to 16 months. But there are no sharp lines, says UMN’s Gunnar. “The general story seems to be that the brain is remarkably plastic” and can find many ways around obstacles. But neglect makes things harder.

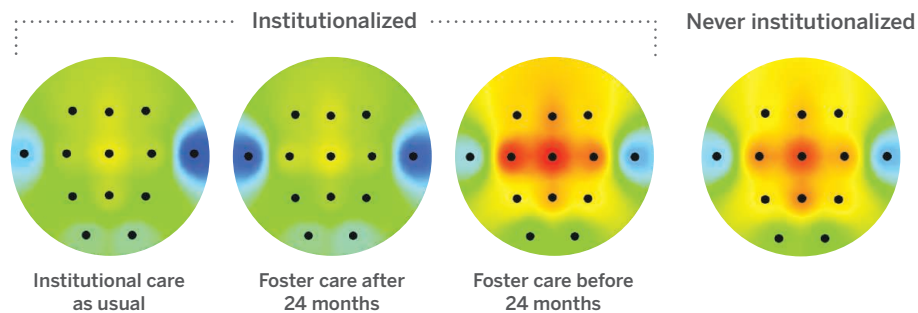
The BEIP team is likely to retain its status as the only randomized controlled study of child neglect and its effects. Back when the trial began, some Romanian leaders were arguing that foster care would be worse than institutional care. But now that BEIP has demonstrated the opposite, the study most likely will never be repeated.

Romania has changed its own policies, according to Zeanah. It began a foster care system when BEIP’s results started coming out. Later, he says, it banned the placement of children younger than 2 in institutions. The number of children in Romanian institutions today has dropped to below 20,000; many, according to Zeanah, are severely handicapped children in group homes.

Nelson says that his work and other Romanian studies have had global impact by, for instance, helping the United Nations Children’s Fund in its efforts “to convince governments around the world to stop putting kids in institutions.” There’s plenty of convincing to be done: Orphanages around the globe still house an estimated 8 million children. ■

Early foster care linked to stronger brain development

EEG readings from Romanian 8-year-olds



Source: Charles A. Nelson III

Scalp EEG readings from 8-year-olds reveal big differences in the alpha (high-frequency) range. The institutionalized group (far left) and those assigned to foster care after 24 months had statistically similar, weak results (cool colors). Those assigned to foster care before 24 months (third from left) or never in an institution had strong alpha results. The two leftmost groups appear to have significant delays in brain development.

their climb into higher DQ and IQ scores and came to rest on a par with the children in the institutionalized group, with IQ scores hovering near 80. Both ranked “far below” children who had never lived in an institution, according to BEIP, perhaps because their recovery from the effects of early neglect had reached a ceiling.

Meanwhile, the gradual dissolution of study categories and the start of regular schooling may have helped boost scores in the institutionalized group. By 8 years of age, only 14 of the 68 kids originally assigned to institutional care remained in place; most had settled with relatives or foster families. Yet, as planned, the analysis treated them as belonging to their initial group. As children bailed out of orphanages, their experience of family life may have boosted DQ and IQ scores.

specific neurological changes would appear. The thesis underlying all of this work is that a baby’s brain “expects” regular stimulation, the kind that comes from an attentive caregiver. If this doesn’t occur, neurons don’t grow properly. This leads to abnormalities that show up in neural activity and brain structure.

BEIP researchers used small, sensor-laden caps to take snapshots of brain electrical activity, known as electroencephalography (EEG) readings, when children first joined the trial and at several intervals over the years. At the start, children living in institutions had lower EEG output than did children living in the community in the high-frequency alpha and beta EEG ranges, and larger output in the low-frequency theta range. This pattern, considered a sign of brain