

Deprivation and neglect found to age children's chromosomes

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Studies in institutionalized Romanian children have found that the length of time spent in conditions of social deprivation and neglect correlates with lower IQ and behavioral problems. A new study, led by researchers at Children's Hospital Boston and Tulane University, shows that early adversity even affects children's chromosomes – prematurely shortening the chromosome tips, known as telomeres, and hastening how quickly their cells "age."

The study, published online this week in *Molecular Psychiatry*, is the first to find an association between adversity and telomere length in children. It is part of the Bucharest Early Intervention Project (BEIP), which is conducting a long-term clinical trial tracking two groups of institutionalized children: those who remained in the institution and those who were removed to high-quality foster care at varying ages.

Laboratory studies, conducted by Stacy Drury and colleagues at Tulane University, examined DNA samples collected from mouth swabs of the Romanian children (62 boys and 47 girls). The studies found that children exposed longer to institutional care before age 5 had significantly shorter relative telomere length (compared to that expected for their age) when they reached age 6-10.

"The telomere is designed to protect the chromosome, so accelerating how early in life telomeres lose length correlates with shortened life span," says Charles Nelson, PhD, director of the Laboratories of Cognitive Neuroscience at Children's and principal investigator of BEIP.

"Children institutionalized early in life have shortened telomeres, which may lead to health consequences downstream, including premature aging."

The actual biological significance of these findings is unknown, but the researchers note that studies in adults have associated shorter telomere length with cognitive defects and with increased rates of cardiovascular disease and cancer.

The BEIP study contributes to a growing body of research linking early adversity with early shortening of telomeres. In 2004, Elizabeth Blackburn (who received a Nobel prize in 2009 for co-discovering telomeres) and Elisa Epel, both at the University of California at San Francisco, reported that women who took care of children with chronic illnesses had shorter telomeres – the equivalent of having lost 9 to 17 years of life. Other studies have found shorter telomere length in adults who experienced [adversity](#), abuse or serious illness in childhood.

The BEIP study also found a gender difference. In girls, the amount of time spent in the institution before the baseline assessment (done at an average of 22 months of age) was the strongest predictor of telomere shortening during middle childhood; in boys, the cumulative amount of institutional care at the 54-month assessment was the stronger predictor.

"One question we are currently studying is whether telomere length can recover as a child spends more time in foster care, or whether the shortening we observed reflects a permanent change," says Nelson.

The Romanian orphanages, which mostly house children who were abandoned, not orphaned, are infamous for severe child [neglect](#). They are a legacy of the 1960s, when Romania's Communist dictator Nicolae Ceausescu taxed all families that had fewer than five children. When families began having children they could not afford, Ceausescu built

child placement centers. By 1989, when Ceausescu's government fell, more than 170,000 Romanian children were living in state-run institutions.

By the time BEIP was begun in 2000, the Romanian government had begun reuniting children with their birth families, cutting Romania's institutionalized population in half. Spurred by BEIP findings, the government has banned institutionalization for [children](#) younger than 2, unless they are profoundly handicapped; they have also started a network of [foster care](#) families.

Provided by Children's Hospital Boston

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