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Early Life Stress Affects Cognitive Functioning in Low-Income Children

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Tracing Differential Pathways of Risk: Associations Among Family Adversity, Cortisol, and Cognitive Functioning in Childhood

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About a fifth of all U.S. children live in poverty. These children are more likely to experience learning and cognitive delays. Researchers have tried to determine causes for this disparity, with recent work identifying the hormone cortisol as a possible reason because of its ability to pass the blood-brain barrier. Cortisol is one of the most influential hormones in the human body, often referred to as the stress hormone because it's secreted into the bloodstream at higher levels as part of the body's flightor-fight response. Now a new study has identified how specific patterns of cortisol activity may relate to the cognitive abilities of children in poverty. The study also outlines how greater instability in family environments and harsh and insensitive caregiving in the context of poverty may predict these different types of cortisol activity in children.

The study was conducted at the University of Rochester, the University of Minnesota, and Mt. Hope Family Center, and appears in the journal *Child Development*.

Researchers examined children's cortisol levels over three consecutive years in 201 lowincome mother-child pairs. When children were 2 years old, the researchers observed them playing with their mothers and collected extensive information about families' experiences, such as how stable the family home was and whether children had been exposed to domestic violence. They collected cortisol through children's saliva when they were 2, 3, and 4 years old. When children were 4 years old, researchers measured their cognitive abilities.

"Overall, we found three cortisol profiles among the children, which were categorized as elevated, moderate, and low," explains Jennifer H. Suor, doctoral student in clinical psychology at the University of Rochester, who is the study's first author. "We found that children's cortisol levels remained relatively stable across the three years. And we discovered that exposure to specific forms of family adversity when children were 2 years old predicted their cortisol profile, which in turn was linked with notable differences in children's cognitive functioning at age 4."

The study found that about 30% of the children observed maintained relatively higher cortisol levels over the three years, 40% of the children maintained lower cortisol levels, and the remainder had moderate levels. Children with both higher and lower levels had experienced family instability. In addition, children with the higher cortisol pattern had experienced harsher and more insensitive interactions with caregivers (e.g. mothers who had difficulty being attuned to their children's needs). The study also found that children with relatively higher and lower cortisol profiles had significantly lower levels of cognitive functioning at age 4. Children with a moderate cortisol profile were exposed to relatively less family adversity at age 2 and had the highest cognitive abilities at age 4.

"Low-income children are at increased risk for developing cognitive delays, but the specific environmental and biological factors that influence these outcomes are less understood," explains Melissa L. Sturge-Apple, assistant professor of psychology at the University of Rochester, who was part of the research team. "Our study shows that children's cortisol activity and the experience of specific family adversities may be key processes that predict cognitive development for children from low-income backgrounds. The findings can inform preventive interventions, especially those that can reduce family stress and strengthen parent-child relationships, because these may promote healthy cortisol levels in children and, in turn, may result in positive cognitive outcomes.

"The exact mechanisms through which too much or too little cortisol affects cognitive functioning aren't fully understood. Researchers hypothesize that too much cortisol can have toxic effects on parts of the brain that are important for cognitive functioning, and too little might hinder the body's ability to recruit the biological resources necessary for optimal cognitive functioning."

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Summarized from *Child Development*, Tracing Differential Pathways of Risk: Associations Among Family Adversity, Cortisol, and Cognitive Functioning in Childhood by Suor, JH, Sturge-Apple, ML, Davies, PT (University of Rochester and Mt. Hope Family Center), Cicchetti, D (University of Minnesota and Mt. Hope Family Center), and Manning, LG (University of Rochester).