

How early-life challenges affect how children focus, face the day

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Credit: University of Washington

Adversity early in life tends to affect a child's executive function skills—their ability to focus, for example, or organize tasks.

Experiences such as poverty, residential instability, or parental divorce or substance abuse, also can lead to changes in a child's brain chemistry, muting the effects of stress hormones. These hormones rise to help us face challenges, stress or to simply "get up and go."

Together, these impacts to executive function and stress hormones create a snowball effect, adding to social and emotional challenges that can continue through childhood. A new University of Washington study examines how adversity can change the ways children develop.

"This study shows how adversity is affecting multiple systems inside a child," said the study's lead author, Liliana Lengua, a UW professor of psychology and director of the Center for Child and Family Well-Being. "The disruption of multiple systems of [self-control](#), both intentional planning efforts and automatic stress-hormone responses, sets off a cascade of neurobiological effects that starts early and continues through childhood."

The study, published May 10 in *Development and Psychopathology*, evaluated 306 children at intervals over more than two years, starting when participants were around 3 years old, up to age 5 ½. Children were from a range of racial, ethnic and socioeconomic backgrounds, with 57 percent considered [lower income](#) or near poverty.

Income was a key marker for adversity. In addition, the children's mothers were surveyed about other [risk factors](#) that have been linked to poor health and behavior outcomes in children, including family transitions, residential instability, and negative life events such as abuse or the incarceration of a parent.

Against these data, Lengua's team tested children's executive function skills with a series of activities, and, through saliva samples, a stress-response hormone called diurnal cortisol.

The hormone that "helps us rise to a challenge," Lengua said, cortisol tends to follow a daily, or diurnal, pattern: It increases early in the morning, helping us to wake up. It is highest in the morning—think of it as the energy to face the day—and then starts to fall throughout the day. But the pattern is different among children and adults who face constant stress, Lengua said.

"What we see in individuals experiencing chronic adversity is that their morning levels are quite low and flat through the day, every day. When someone is faced with high levels of stress all the time, the cortisol response becomes immune, and the system stops responding. That means they're not having the cortisol levels they need to be alert and awake and emotionally ready to meet the challenges of the day," she said.

To assess executive function, researchers chose preschool-friendly activities that measured each child's ability to follow directions, pay attention and take actions contrary to impulse. For instance, in a game called "Head-Toes-Knees-Shoulders," children are told to do the opposite of what a researcher tells them to do—if the researcher says, "touch your head," the child is supposed to touch their toes. In another activity, children interact with two puppets—a monkey and a dragon—but are supposed to follow only the instructions given by the monkey.

When children are better at following instructions in these and similar activities, they tend to have better social skills and manage their emotions when stressed. Children who did well on these tasks also tended to have more typical patterns of diurnal cortisol.

But children who were in families that had lower income and higher adversity tended to have both lower executive function and an atypical diurnal cortisol pattern. Each of those contributed to more behavior problems and lower social-emotional competence in children when they

were about to start kindergarten.

The study shows that not only do low income and adversity affect children's adjustment, but they also impact these self-regulation systems that then add to children's adjustment problems. "Taken all together, it's like a snowball effect, with adverse effects adding together," Lengua said.

While past research has pointed to the effects of adversity on executive function, and to the specific relationship between cortisol and [executive function](#), this new study shows the additive effects over time, Lengua said.

"Executive function is an indicator that shows the functioning of cognitive regulation. Cortisol is the neuroendocrine response, an automatic response, and the two consistently emerge as being related to each other and impacting behavior in children," she said.

The research could be used to inform parenting programs, early childhood and school-based interventions, Lengua said. Safe, stable environments and communities, and positive, nurturing parenting practices support child development, while a focus on relationships and healthy behaviors in preschool settings can support [children](#) of all backgrounds—those with high as well as low [adversity](#).

More information: Liliana J. Lengua et al. Pathways from early adversity to later adjustment: Tests of the additive and bidirectional effects of executive control and diurnal cortisol in early childhood, *Development and Psychopathology* (2019). [DOI: 10.1017/S0954579419000373](#)

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