Early institutional care and the developing brain

Neuroscientist Nim Tottenham on the developmental impact of institutional caregiving on children

Interview by Meeri Kim
September 1, 2017

Meeri Kim: One form of early life stress that you focus on in your lab is growing up in institutional care. What are some features of these institutions that can lead to negative outcomes in children and later down the line?

Nim Tottenham: It’s difficult to characterize the typical institution or the typical child who emerges from institutional care, since there is a great deal of heterogeneity in both areas. But the one common denominator across institutional caregiving, even in the best-case scenario, is a lack of caregiving stability. Caregiving in an orphanage is done by staff members who rotate shifts, and the caregiver-to-child ratio can be very poor — sometimes as high as twenty children under a single caregiver. All of these factors result in an absence of stable caregiving, which is a potent stressor for the human infant.

MK: Do these negative effects tend to persist throughout adulthood, or is there a chance that the affected children will later recover?

NT: At the point of adoption when children first emerge from institutional care settings, they’re at risk for a number of developmental delays. They’re often physically small for their age and can have motor, language, cognitive, and emotional difficulties.

But the families who adopt internationally are a very special group in that they tend to come from higher socioeconomic backgrounds and have great desire to provide caregiving. Parents go through a lot to be able to adopt internationally and it’s not easy, so there’s already a great deal of parental investment there. So perhaps not surprisingly, children adopted from orphanages show tremendous rebound in many domains after being in a stable home.

MK: Many countries, particularly in Europe, maintain institutional child-rearing as a last resort for maladjusted children. Is there evidence that institutional caregiving is the worst solution for a child?

NT: Being in a stable and loving family is the best caregiving situation. That being said, in many situations, this option is not available. The St. Petersburg-USA Orphanage Research Team is an example of a research team that has worked to improve caregiving conditions within institutional care to significantly improve child outcome.
“Children with a typical caregiving background go through a prolonged period of immaturity with increased plasticity in this area, allowing them to learn from and benefit from their environment.”

MK: From a neuroscience perspective, in what ways do children with a history of institutional care differ from their typically-raised peers?

NT: The types of behaviors that may continue after adoption are broadly classified as difficulties with regulation — and this is the area that my lab has been focused on studying. These difficulties can include behavioral regulation, attentional regulation, and emotional regulation.

For instance, children who grew up in institutional care may have difficulty keeping their emotions in check when confronted with threatening or negative stimuli. What we’ve seen across a number of studies is a greater tendency for the amygdala to be hyperactive in response to emotionally arousing stimuli, like fear faces.

There’s also a difference between these children and their same-age peers in the way that the amygdala connects with areas of the prefrontal cortex and hippocampus. That triangle of the amygdala, hippocampus, and prefrontal cortex is the foundation of emotion regulation behaviors in adulthood, and we’ve been studying these connections during development.

“In children who’ve experienced extreme parental neglect, that period of plasticity seems to be cut short.”

MK: What did your research find about how the connections of these brain areas develop for previously institutionalized children?

NT: In this population, we see the pattern of functional connectivity among these three brain areas more closely resembles an adult than the typical child. In typically-raised children, this connectivity takes a long time to develop. In childhood, the phenotype is very immature and develops slowly over the course of adolescence, which really parallels what we know about the slow development of emotion regulation.

What we see in the previously institutionalized group are connectivity patterns that look more adult. That might sound incongruent with their difficulty in emotion regulation, but what we have been hypothesizing and testing is that there is perhaps an accelerated development in this circuitry. Children with a typical caregiving background go through a prolonged period of immaturity with increased plasticity in this area, allowing them to learn from and benefit from their environment. In children who’ve experienced extreme parental neglect, that period of plasticity seems to be cut short.

Nim Tottenham is an associate professor of Psychology at Columbia University and director of the Developmental Affective Neuroscience Laboratory. Her research examines the development of the neurobiology associated with mature emotional behavior in humans. Her research has highlighted fundamental changes in amygdala-prefrontal cortex circuitry across childhood and adolescence and the powerful role that early experiences, such as caregiving and stress, have on the developmental trajectories of these circuits. Her research uses fMRI, behavioral, and physiological methods to examine human limbic-cortical development in children and adolescents as well as their parents.
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