How chronic stress in early childhood shapes the brain

Interview by Meeri Kim
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Developmental psychologist Seth Pollak explains how the young brain adapts in order to better cope with a stressful environment.

Meeri Kim: Much of your research looks at the degree to which biological biases in brain development depend upon and can be modified by characteristics of a child’s environment. In particular, your lab has studied the effects of early childhood stress. What are some examples of the kinds of stress that have a lasting impact?

Seth Pollak: In my lab, we’re looking at more chronic and pervasive stress rather than a one-time trauma. So these are children living in an environment that is unstable, insecure, and one where they may not feel protected. Some of the experiences that we’ve been trying to better understand include really extreme situations like physical abuse and neglect. Or children who have been raised in orphanage settings around the world where their basic food, shelter, and medical needs are addressed at a rudimentary level but not their psychological needs.

We’ve also studied children whose parents are attempting to care for them, but they’re growing up in extreme poverty. The problem with poverty is that it’s not just one thing — it includes a bad neighborhood, inconsistent healthcare, stressed-out parents, crowded living conditions, and poor nutrition. Any one of those things by itself probably would not have a huge effect on a developing child, but the combination of all those things certainly does.

MK: What makes children particularly vulnerable to stressors in their environment?

SP: In many ways, children are not overly vulnerable. We don’t want to undersell how robust human biology is, and we have likely evolved to take quite a bit. It wouldn’t be ideal if our brain development and hormonal systems would be perturbed by the littlest things happening. We wouldn’t expect that to throw off our biology — and it doesn’t.

Biology does respond in children for those situations where multiple, prolonged, or chronic stressors exist without the stability of an adult. An adult can help buffer the child by providing protection, security, or some kind of explanation. In instances without appropriate buffering, we may see long-term effects on development.

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MK: Could you describe some of your findings on how early childhood stress shapes brain development? For instance, your study on physically abused children showing a response bias for angry

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Facial expressions.

SP: Decades ago, when I started doing this work, almost every paper written about child maltreatment in general was a laundry list of all the problems these kids have: They don’t do well in school, they don’t have friends, they have temper tantrums, they’re at risk for drug abuse and depression. Most published work simply correlated child adversity with negative outcomes.

Those findings are all true, but what some of our data suggests is that these children’s brains are doing what you would want a brain to do. They are adapting to their environment, probably in ways that allow them to better cope with adversity and survive.

For example, we found that children who grow up in abusive environments start to shift their categories of what they consider to be threat and anger. They tend to be better at recognizing these emotions, identifying them faster and more accurately when a stimulus is ambiguous. In many ways, this shows an extraordinary early learning ability.

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But once they start effortlessly picking up these threat cues, I don’t think they can say, “Let’s only do that at home when my abusive parent is around; I don’t need to do that on the playground.” That’s where problems start to happen. Kids develop these skills that allow them to cope and survive in one environment, but they generalize them. So when they’re in different contexts with other adults or peers that are not harming them, they can easily misinterpret social cues and behavior.

MK: Is that where some of the negative outcomes in these kids can stem from?

SP: Yes. Even in situations where harm is not present, this early learning leads them to respond as if they need to protect themselves. That is what can result in some of these cascading social problems. It’s a story of risk and vulnerability, but I also see it as a story about incredibly powerful early learning and adaptation.

We want to respect how these individuals and their biological systems are actually picking up on cues in their environment and using them. It’s a shift from pathologizing to a developmental understanding of what’s actually happening to an individual in a particular context. We need to pull that context in, understand the relationship between social context and brain/behavior, and really take a fuller view of why and how an individual child is developing a set of responses.

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MK: Some of your more recent work has looked at how hormonal systems can be shaped by early childhood stress. What were your findings in this area?

SP: One study found that, in physically abused girls, the functioning of the oxytocin and cortisol
systems had switched. When they were threatened, they started to release a hormone that they shouldn’t be releasing — oxytocin, a hormone that we tend to release in a very safe and comforting situation. Cortisol, part of our stress response system, was not being released. It’s a great example of how biology requires a certain kind of patternning and consistency from the environment for things to look the way they would in a normal state.

Seth Pollak is the College of Letters and Science Distinguished Professor of Psychology and Professor of Pediatrics, Anthropology, Neuroscience, and Public Affairs at the University of Wisconsin – Madison and an investigator at the University’s Waisman Center for Human Development. He has published widely on topics including the influences of social risk factors on children’s brain and behavioral development, as well as children’s emotions, early learning, and health. His most recent projects focus on the effects of family poverty on children’s brain development, the effects of stress on children’s learning abilities, and the epigenetics of children’s stress regulation.

The Society for Research in Child Development, a membership association whose mission is to advance developmental science and promote its use to improve human lives, held their 2017 Biennial Meeting in Austin, Texas, April 6 – 8, 2017. The overall theme of the invited program was Developmental Science and Society, although many other areas of research in the field of child development were presented in the general program. For a full list of invited program speakers, visit Invited Program Information or view the entire program using this link: Online Program.

Seth Pollak joined the Biennial Meeting as a panelist.

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