



The Effects of Toxic Stress on Youth and the Economy

A Conversation with Andrew S. Garner

Summarized by Dionissi Aliprantis

“That's why this research is so important to me personally. It's not just about *those* kids, it's about biology. We all need relational health to reach our full potential.”

—Dr. Andrew S. Garner

The Program on Economic Inclusion was created to increase the Cleveland Fed’s understanding of the obstacles to economic inclusion for communities in our District, as well as approaches to overcome those obstacles. We hold Conversations on Economic Inclusion for this purpose, allowing researchers, practitioners, policy makers, and community members to learn from one another about economic inclusion.

We recently had a *Conversation on Economic Inclusion* with Andrew S. Garner, a practicing primary care pediatrician, a clinical professor of pediatrics at Case Western Reserve University, and a faculty associate at the Schubert Center for Child Studies at Case Western Reserve University. Dr. Garner completed a PhD in neuroscience and then an MD with distinction in neuroscience, and is active in the American Academy of Pediatrics (AAP), chairing their leadership work group on the early brain and child development. A leader in the field of Adverse Childhood Experiences (ACEs) and childhood toxic stress responses, Dr. Garner has co-authored the book *Thinking Developmentally* and two reports from the AAP on toxic stress and relational health.

We discussed with Dr. Garner a range of issues tied to supporting students dealing with toxic stress, trying to learn about his perspective on how to support positive youth development that will lead to labor market success in adulthood. What stuck with me after our conversation is how the same biological responses to stressors can lead to very different outcomes when set in different contexts. Understanding how our shared biology interacts with our environments makes me hopeful for our ability to create new paths to labor market success. The evidence emerging in developmental science indicates that while ACEs can set off toxic stress responses, such negative responses are not pre-ordained, and can be mitigated by safe, stable, nurturing relationships.

Dr. Garner’s comments have been condensed and edited for clarity.

What is toxic stress?

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Before discussing toxic stress, it is a good idea to define the term. Dr. Garner defined the term as follows:

Toxic stress refers to the ongoing, unmitigated biological responses to threats that happen in the absence of social, emotional buffers. So what it is important to note is that toxic stress is not about the precipitants or the triggers. Instead, toxic stress is really about the body's stress response to those events. That is an important distinction because we tend to think about different stressors or triggers, but those range from distinct catastrophic threats like violence or bullying to ongoing chronic conditions like poverty or exposure to racism. And the events or triggers can be very subjective. Where one child hears a dog barking and thinks, "Ooh, puppy let's play," another child reacts with, "Keep that beast away from me!" Some of that has to do with the children's previous experiences. In a similar vein, the same form of parental encouragement might be perceived as being very supportive or could be perceived as applying undue pressure.

The point here is that you are going to have a hard time getting an objective handle on a wide range of adversities unless you start looking at the response. Because the biological response is something we can begin to quantify and observe objectively. We adapt to chronic stress at the molecular, cellular, and behavioral levels. It can truly change who we are.

How is toxic stress related to the labor market?

Our conversation delved into various approaches to understanding the brain and how humans develop. This conversation is motivated by the association between ACEs and adult outcomes in the labor market. I asked Dr. Garner to describe how he sees the broad connection between ACEs and labor market outcomes.

The takeaway from the research is that unmitigated adversity in childhood has the potential to change who we are. We know that ACEs have the potential to alter learning, behavior, and health across lifespan. And all those affected features are clearly going to impact a person's economic productivity. The fact that the thinking and analyzing and emotion regulation part of the brain isn't completely mature until you're 24 suggests it's never too late for youth development. There's still plasticity in there and we can still make a change even after childhood. But the research also says that boy, if we want to improve outcomes decades down the line, we have to get things right the first time. We have to really invest in childhood and invest in the families that care for kids.

Research has made it clear that in utero or childhood events can impact outcomes decades later

What evidence forms the basis for Dr. Garner's perspective that childhood events can affect adult outcomes, including those in the labor market? Two key studies laid the groundwork for our understanding of ACEs and motivated researchers to study the developmental origins of adult health and disease. Both studies were population-based and retrospective, meaning that they were looking back at childhood or in utero experiences once adults were fully grown.

The two key early studies on ACEs were both dismissed as quackery, pretty much, by the scientific establishment because they didn't fit nicely into contemporary models of health and disease. A first key finding relates to the Barker hypothesis. David Barker was a British epidemiologist who in the late 1980s and early 1990s noted a correlation between fetal conditions—things like intrauterine growth retardation, low birth weight, and prematurity—and so-called metabolic

conditions later in life. Things like hypertension, coronary artery disease, and the non insulin dependent diabetes mellitus.

So this idea that in utero events could be impacting outcomes decades later was just really considered to be outlandish at the time. And **Barker was largely ridiculed and ignored, but his work laid the foundation for an entire field of study in saying that what happens in utero and in early childhood does not stay in utero and early childhood. There are ripple effects from in utero and childhood across the lifespan.** Barker's findings suggested that there must be some form of biological priming or embedding that allow these early experiences to be influencing outcomes decades later. Then in 1998, Dr. Vincent Felitti (who was an internist) and Dr. Robert Anda (who was another epidemiologist at the Centers for Disease Control and Prevention) published the Adverse Childhood Experiences Study.

Dr. Felitti was actually an internist who was running a Kaiser Permanente obesity clinic. And he had a real problem because all of his superstar patients, the ones who lost huge amounts of weight using his program, would invariably regain the weight back again. He was asking, "I don't understand, why are my superstars the ones that are rebounding back?" He felt he must be missing something. So he decided to use a standardized social work interview and he discovered that almost all of his superstar patients had traumatic experiences in childhood and early life adversity. And he was really astonished by how frequently this came up. So he asked his colleagues to look at the same survey data and they found similar results. This caused him to go to Robert Anda and ask, "Is it really possible that childhood adversity is this common and could this really be linked to poor outcomes down the line?" And that was the nexus for the Adverse Childhood Experiences Study.

The Adverse Childhood Experiences Study looked at over 17,000 middle-class, middle-aged Americans (most of them were in their 50s). The survey respondents were living in the San Diego area and they were asked if prior to their 18th birthday they had any of 10 different types of childhood adversities. The 10 different adversities were just things the researchers had noticed were common; there wasn't anything especially magic about these adversities. There are other adversities as well, but the ones they looked at were three forms of abuse (physical, sexual, and emotional abuse); two forms of neglect (physical and emotional neglect); and five measures of household dysfunction (parental mental illness, parental substance abuse, intimate partner violence, separation or divorce, and an incarcerated household member).

And what they found in this population that you think was pretty well-to-do was that about two thirds had at least one adverse childhood experience and about 20 percent had more than four adverse childhood experiences. They wanted to come up with a way to quantify this adversity. And what they came up with was this thing called an ACE score, for which you get one point for each of those 10 different categories of adversity. And now the ACE score is something that is used widely to try and identify adversity in childhood.

Do all stressful events lead to toxic stress?

Adversity is a part of life, and developing tools for overcoming adversity is a key part of healthy development. What is different about toxic stress relative to the kinds of adversity to which we might want kids to be exposed while growing up?

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Not all forms of stress are toxic; only those forms that are prolonged or frequent or extreme because there's no social, emotional buffering to turn the stress off and bring it back to the baseline. In fact, in the presence of safe, stable, nurturing relationships, stress responses can actually be positive and build resilience and skills to deal with future adversity in an adaptive manner. As examples, consider a 15-month-old who can't express themselves and therefore has a tantrum, to which we respond to the non-verbal cues. Likewise, we're going to offer consolation to a two-year-old who does a face plant while running.

And even a middle schooler who has an overwhelming project, we're going to help them break that down into little bits that seem a little more manageable. The point here is that positive stress is not the absence of stress. We don't want to put kids in a stress-free bubble, we actually want to give them the skills they need to adapt to adversity in a healthy manner moving forward. I think that's an important point because in society we tend to let kids know in a million different ways that strong emotions are bad. "You're not allowed to feel that way." "You're not allowed to have strong emotions, and if you do there's something wrong with you." And that's really not healthy!

Big emotions are okay, but they demand a distraction. And I think there's three different kinds of distractions: There are healthy distractions, there are escapes, and there are unhealthy distractions. The healthy distractions are the kids' passions. We want to tap into these, the drawing and the reading and the music and the dance and the sports and the Rubik's cube and the chess, because they build skills, often generalizable skills, which are going to help the kids down the line. But some distractions are escapes. Consider passive entertainment like YouTube or TV or video games. While they are potent distractions, they're not really helping you build new skills. So they're fine now and then; we all need ways to blow off steam now and then. But if they become a default mode of coping, then we're starting to cut into the skill-building time. And then of course we talked about unhealthy distractions. Those distractions result from the behavioral allostasis we talked about, where the distractions may be adaptive initially, but clearly they are health harming in the long run.

Why does toxic stress have lifelong effects?

Dr. Garner described details about human brain development that clarify why adversity in childhood can lead to negative adult outcomes in the absence of safe, stable, nurturing relationships to help those experiencing the adversity learn how to respond to it in healthy ways.

The problem is that, particularly when we're talking about stress, the on switch for the stress response develops relatively early in development. This is the limbic system, this little almond-sized thing called the amygdala. It develops relatively early in development, which makes sense. Evolutionarily, you want to shoot first and ask questions later, or there may not be a tomorrow. But as we get older, we want to be able to step back and begin to think about what our options are. And so the off switch for the stress response is this thing called the prefrontal cortex that is right behind our eyes. Some people have called this the seat of civilization, with the key feature that makes us human being our ability to think abstractly, to prioritize, to decide this is more important than that. The prefrontal cortex also allows us to regulate our emotions. And so that's the off switch for the stress response. But the problem is that off switch doesn't mature completely, at least structurally, until you're 24.

So the on switch for the stress response is screaming through most of development, while the off switch is finding its voice. So you can see, if there is some significant adversity in childhood, it may be a lot harder for those kids to turn off that stress in and of their own volition. In such scenarios, the kids need those safe, stable, nurturing relationships to help learn.

Really it comes down to this idea of affect regulation. At birth, the locus of affect regulation is the caregiver. But then as the child grows, even very early on—say by six weeks—they get a social smile and now there's a dance going on. And so now it's the dyad, it's the dance back and forth between the caregiver and the child. This dance is important when we think about how experiences in childhood can become biologically embedded. Because I would say not only adverse experiences matter, but also nurturing experiences matter. Those experiences can change who we are at the molecular, cellular, and behavioral levels. Examples are epigenetics for molecular changes, developmental neuroscience for cellular changes, and behavioral allostasis for how we adapt to change and stress.

Toxic stress defines the problem, but history is not destiny, and relational health is a clear solution

Producing positive adult outcomes is not just about reducing the negative experiences kids have growing up. It seems to be an even greater priority to create positive experiences for kids, and ensuring these positive experiences seems to matter in many ways. Negative experiences can be overcome by positive experiences—nurturing relationships are restorative and allow kids to have good outcomes even when facing adversity. Moreover, we may be better off to face adversity with the support of nurturing relationships than to lack both adversity and nurturing relationships.

Toxic stress really helps us define the problem. So many of our society's most intractable problems, including disparities in economic productivity, but also education and otherwise, are rooted in our shared biology being lived out across divergent experiences and opportunities. This is where relational health really helps us define the solution. The individual family and societal capacities to develop and maintain safe, stable, and nurturing relationships also buffer adversity and build the skills needed to be resilient, healthy, and productive citizens. These capacities also build the safe, stable, and nurturing caregivers for the next generation.

I would say that minimizing adversity is necessary, but it's not sufficient. And there's good data to support that. There was a study published by Christina Bethel on the flourishing of kids. She defined flourishing in terms of questions like, “Is the kid curious?”, “Do they complete tasks?”, and “Do they stay in control?” Let me be clear. That's a high bar, as I'm not sure I meet that bar most days. These questions are aimed at identifying executive function, which is the prefrontal cortex we were talking about. After defining this measure of flourishing, what Bethel's study showed was that there are more kids flourishing that have high adversity and high family resilience and connection than kids that have no adversity but little family resilience and connection. **This was a light bulb moment for me. I think what this really drives home is that we tend to think of adversity and nurturing experiences as being two ends of one axis. But the reality is adversity and family connection are two completely different axes that coexist in kids' everyday lives.**

So you could have a really adverse experience one moment, and then a couple moments later, you could have some really nurturing relationship or some really nurturing experience.

Absolutely. And it's that restorative thing that's so incredibly important. It's so incredibly important. You're the economist, I'm not the economist, but if I'm going to model this, I'm going to say there are two different axes and they both map into a third axis, which is wellness. So if you have obviously high ACEs, well, that's the negative side on that axis, whereas fewer ACEs is the positive. Then more positive child experiences, that's the positive on the second axis. And then wellness from low wellness to high wellness is going to map onto that. And I think that's important, because if we just consider an ACE score, you might predict a kid would do relatively poorly in terms of being well. And if you factor in that they've had few positive child experiences, you might predict that they would do even worse. But if you factor in the positive experiences, they may actually fare relatively well.

And that's what Christina Bethel's data shows. If you have adversity, but you have those nurturing relationships, you may actually do pretty well. And then this is the kicker for me: The reverse is also true. **So just because you have material wealth and you have these positive experiences does not necessarily mean you're in the clear. So if you have few adverse experiences and you have some great positive experiences, well then yeah, you're probably going to do pretty well. But if you have low adversity, but you have low relational health, you're going to not do as well. And that's clear from her data. And so that's why this research is so important to me personally. It's not just about *those* kids, it's about biology. We all need relational health to reach our full potential.**