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Applying an Ecobiodevelopmental Framework to Food Insecurity: More Than Simply Food for Thought

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For decades, astute observers of the life course have noted strong associations between various types of early childhood adversity (e.g., poverty, abuse, neglect, witnessing violence) and a wide array of less than optimal developmental outcomes (e.g., school failure, depression, violence, substance abuse, divorce, poverty). The Adverse Childhood Experiences Study is foremost in a long and growing evidence base that links significant trauma in childhood with adult difficulties in behavior, health, and prosperity.[1-3]

Although the data is more limited, the converse also appears to be true: enriching the early childhood environment can improve important outcomes like educational achievement, marriage, economic prosperity, and health decades later.[4-9] That said, not all childhood interventions yield long term successes. Developing, implementing, and following a childhood intervention that improves an adult outcome is a difficult task, particularly when the underlying mechanisms that link childhood adversity with poor adult outcomes are ill-defined.

Fortunately, recent advances in developmental science are revealing biological mechanisms that may underlie these well-established associations between early childhood ecology and lifelong developmental outcomes.[10] In particular, epigenetics and developmental neuroscience demonstrate that early childhood ecology is biologically embedded within the body and continues to influence learning, behavior and health for years, even decades.

Epigenetics means "above the genome" and refers to the molecular mechanisms, like DNA methylation and histone acetylation, that determine which genes get turned on, when, and where. Epigenetics is critical because inheriting a gene that makes one more susceptible to being an alcoholic (or violent or depressed) isn't much of a risk if that gene is never turned on. Most importantly, many epigenetic mechanisms are driven by stressful experiences.[11-14] Epigenetics provides a biological link between early childhood ecology and the way the developmental blueprint is read. Hence, epigenetics underlies the aphorism, “The genes may load the gun, but the environment pulls the trigger.” Advances in epigenetics demonstrate that the ecology literally alters the way the genetic program is utilized, not only in the current generation, but in the next as well. Advances in developmental neuroscience also provide a biological link between early childhood ecology and lifelong learning, behavior and health. Experiences in the early childhood environment are translated into neuronal activity, which, in turn, influences which synapses and circuits in the developing brain are strengthened and kept (versus those that are weakened and eventually eliminated). The childhood ecology literally

sculpts the foundational architecture of the developing brain. Because the brain's cellular plasticity declines over time, it is progressively harder to change these foundational circuits. Most importantly, significant or prolonged exposure to the mediators of the physiologic stress response (cortisol, adrenaline) can be toxic to the developing brain, rendering it more susceptible to excessive or prolonged stress in the future.[10, 15, 16] Toxic stress in childhood can therefore become a vicious cycle of stress, impairing the development of critical cognitive, social and emotional skills, and prompting behavioral and physiological adaptations in an ongoing attempt to cope. The American Academy of Pediatrics (AAP) recently released a technical report that proposes an ecobiodevelopmental (EBD) framework for understanding the ongoing evolution of an individual's strengths and risks for health over the lifespan.[17] The EBD framework argues that childhood ecology is biologically embedded into the way the genetic program is read and in the way the foundational architecture of the brain is formed, resulting in a cumulative but dynamic dance (between the ecology and one's biological program) that drives developmental outcomes across the lifespan. An accompanying policy statement from the AAP encourages the use of this EBD framework as a means of understanding and addressing the biological basis for disparities in education, poverty, and health.[18]

The article by Chilton and Rabinowich provides important qualitative data about the role that childhood adversity plays in the intergenerational transmission of food scarcity. The three case studies are poignant and compelling as they reflect the complex causes and consequences of childhood trauma and food insecurity. A key insight from the central figures is their recognition that childhood trauma and food insecurity are linked with both their current condition and that of their children. This reinforces the authors' assertions that an ecological approach is needed to understand the complex causes of food insecurity, and that a life course analysis is needed to assess the lifelong and varied consequences. The conclusions of their qualitative analysis are entirely congruent with the EBD framework. The EBD framework argues that food insecurity is about much more than hunger or caloric requirements. Like domestic violence, parental mental illness or substance abuse, food insecurity is a marker for household dysfunction and a risk factor for childhood toxic stress, altered brain development, and sub-optimal life courses, both in this generation and the next.

A recently published prospective study from Jamaica underscores this point.[9] Walker et al followed 129 growth-retarded children who, at age 9-24 months, were randomized to two years' worth of nutritional

supplementation and/or psychosocial stimulation. While food supplementation yielded no significant improvement 20 years later, weekly play sessions to promote mother-child interaction improved academic and psychological functioning and reduced self-reported violent behavior. Simply providing additional calories is insufficient, but promoting parent-child interactions and nurturing emerging skills promotes healthier life course trajectories. To optimize brain development and life course trajectories, all professionals that interact with children should 1) understand the EBD framework as a means of understanding and addressing disparities in health, education, and welfare, 2) work to identify and address risks for childhood toxic stress, and 3) advocate for—and collaborate on— innovative projects that promote healthy parent-child interactions and nurture the critical social-emotional and language skills that buffer toxic stress.[18]

In the past, child advocates have argued that investments in early childhood were the right thing to do ethically or morally. More recently, economists like James Heckman have argued that significant and sustained investments in families with children are the right thing to do economically, yielding significant returns on the initial investment.[19, 20] The EBD framework argues that investments in families with children are the right thing to do scientifically, as the biological mechanisms underlying the well-established associations between early childhood adversity and lifelong disparities in learning, behavior, and health are becoming increasingly clear. The only question now is whether policy makers and legislators have the foresight, courage, and political will to invest in families with children as a means of addressing many of our society's most recalcitrant and vexing problems. That's more than simply food for thought; it's a call to action.

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