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Julie Cohen

Nature Versus Nurture

Scientists have long agreed that we humans are a complex combination of our inherited traits and the environments in which we are raised. How the scales tip in one direction or the other, however, is still the subject of much debate.

To better understand the nature versus nurture question, UC Santa Barbara psychologist John Protzko analyzed an existing study to determine whether and how environmental interventions impacted the intelligence levels of low birth weight children.

The key finding: Interventions did raise intelligence levels, but not permanently. When the interventions ended, their effects diminished over time in what psychologists describe as “the fadeout effect.” The research is highlighted in the journal Intelligence.

“Certain environmental interventions can raise general intelligence,” said Protzko, a postdoctoral scholar in the META (Memory, Emotion, Thought, Awareness) Lab in the Department of Psychological & Brain Sciences. “It’s not just pushing scores around on a test; it’s deep changes to underlying general intelligence. The fadeout effect, however, applies the same way.” Scientists make a distinction between IQ scores, a quantitative measure of intelligence, and general intelligence, which reflects underlying cognitive abilities.

Protzko reviewed the results of the Infant Health and Development Program involving 985 children, all of whom experienced an intense and cognitively

demanding environment during the first three years of their lives. Three main interventions had been employed to ameliorate the negative effects of being born at low birth weight.

At age 3, the children were given the Stanford-Binet Intelligence Scales as a baseline measure of their intelligence. At ages 5 and 8 — at least two years after the interventions had ended — they were again given intelligence tests.

The results showed that the interventions had raised the children's general intelligence at age 3. However, by age 5 the increases were no longer evident. According to Protzko, this demonstrates that the fadeout effect applies to general intelligence.

He also noted that this difference in intelligence at ages 3 and 5 underscored another issue: causality. One theory regarding the development of intelligence suggests that the trait can be correlated between two ages because there is a causal connection: Intelligence at one age causes intelligence at another age.

"However, my analysis starts to bring evidence to the idea that intelligence may not be the causal factor we suppose it to be from the correlation work — at least not in children," Protzko explained. "It's unlikely that given an increase in intelligence, I would live my life any differently than I do right now. This work will have to be done in adults to really pull that apart, but I think that this analysis starts to bring evidence against that idea of causality."

This is the second of two papers Protzko has published on the fadeout effect. Both highlight the unidirectional reaction model, which suggests that intelligence can adapt to meet increased environmental demands but when those demands are no longer present, it returns to its previous level.

"Raising IQ is not an instance of raising test scores with no concomitant effects on the latent underlying intelligence," Protzko said. "While both IQ scores and general intelligence can be raised through targeted environmental interventions, any gains are not permanent and fade over time.

Nonetheless, he noted, his analysis doesn't indicate that interventions aimed at enhancing intellectual development are useless or doomed to fail. "I believe it is still a good thing to intervene and try to change the trajectory for these children," he said.

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