



ARREST DEVELOPMENT



Poverty impacts brain function and student behavior, often spurring unconscious biases from educators

BY HORACIO SANCHEZ

It's emerging as a scientific fact that poverty impedes brain development. More alarming, the effects of poverty on the brain can produce poor performance and behavior that, in turn, create biases and an expectation of poor performance among educators.

A 2015 study published in *JAMA Pediatrics* found that children living just above the federal poverty line had 3 to 4 percent less gray matter than what should be expected, and children living below the poverty line had 8 to 10 percent less gray matter. And how much gray matter—a phrase for unmyelinated neurons and other cells in the central nervous system—a person has determines how effectively a particular region of their brain functions.

In the prefrontal cortex, low levels of gray matter correlate to poor performance on standardized tests—and the more severe the poverty, the greater the reduction in gray matter. But the ramifications of such deficits are more significant than educational testing results: Lower levels of gray matter in the prefrontal cortex affect a student's ability to be successful in life.

The prefrontal cortex is the most highly evolved area of the human brain and oversees cognitive behavior, personality expression, decision-making, social behavior, and executive function. The primary role of the prefrontal cortex is to exercise control over the more primitive regions of the brain; it enables students to control their thoughts, emotions, and actions. And self-control and self-regulation are the greatest predictors of life success.

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AFFECTING EMOTIONS

Not only is poverty associated with a reduction in gray matter, but it also correlates with lower levels of white matter. White matter enables the different regions of the brain to communicate efficiently. Efficient communication among brain regions is vital because most of the things people do require the brain to operate in concert.

The white matter connecting the prefrontal cortex to the amygdala is what enables us to maintain emotional control. Known as “the emotional brain,” the amygdala produces emotional expression and helps interpret the emotions of others. Reduced connectivity between the cortex and the amygdala lowers emotional control and the ability to interpret emotional expressions accurately.

Research has found that impoverished students are less sensitive to positive social cues such as a warm smile, a pleasant tone of voice, or an accepting gesture, while being more sensitive to social threat cues such as a glare, an aggressive posture, or an angry tone of voice. High sensitivity to negative expressions and poor self-control can be a volatile mix—such a combination produces students who respond to negative expressions aggressively.

A 2007 study published in *Social Cognitive and Affective Neuroscience* found that perceptions of social standing also affect brain morphology. Poor adolescents who believe that they are looked down on because of social status experience a thinning of the anterior cingulate cortex, a region of the brain that connects the “emotional” limbic system and the “cognitive” prefrontal cortex. The result is a decrease in the ability to express empathy, experience remorse, and regulate one’s own behavior.

THE POVERTY BIAS

These issues are further complicated for students of color because of their overrepresentation among students living in poverty. This creates a bias that places the expectations of behaviors commonly associated with the poor—



Test Your Implicit Bias

A crucial part of countering bias is being aware of where it exists—however subtly—in ourselves and society at large. In the framework of the NAESP National Task Force on Race and Equity, NAESP produced a customized Implicit Association Test that focuses on racial bias in schools to help educators decrease its influence and grow their practice. Take the test and access all of NAESP’s resources on implicit bias at <https://bit.ly/3v7yXXG>.

Multiple brain structures and functions are altered by the experience of poverty.

low academic performance, bad decision-making, lack of self-control, and a propensity for high-risk behavior—on Black students. Schools continue to focus on the achievement gap between white and Black students, while the economic gap continues to grow.

Most Black middle-class students excel academically, showing that the achievement gap has nothing to do with race. But so many Black students are affected by the income gap that when teachers see students of color, they subconsciously associate them with behaviors that correlate with poverty. Maintaining the focus on the achievement gap between whites and Blacks has inadvertently made academic performance an issue of race, ignoring the fact that problems related to poverty affect everyone.

Using sophisticated eye-tracking technology, the Yale Child Study Center found that educators tend to more closely observe Black male students due to subconscious expectations of negative behavior. The “poverty bias” becomes more pronounced when teachers are dealing with middle-income or affluent Black students, leading to incidents in which expectations associated with low socioeconomic status are assumed and produce false accusations or mistreatment.

Most teachers are consciously aware that not all Black students struggle academically or have behavior problems, but the disproportionate representation of Blacks in poverty has created a subconscious expectation. While subconscious thoughts are not intentional, they still influence cognitive processing and behaviors, resulting in discriminatory actions. The poverty bias related to students of color leaves many competent minority pupils feeling as if the education system expects them to fail. What can educators do to counter this?

1. Build gray matter. Promote skills that have been found to increase gray matter in the prefrontal cortex. For example, systematic music training enhances cognitive structures and functions in the prefrontal cortex, and the improvements correlate to nonmusical cognitive and academic skills. Note that this outcome requires persistent practice over a period of years.

In addition, there is an added benefit from persistent music training: Research shows that musicians develop a larger corpus callosum. A larger corpus callosum increases the speed of communication between the brain’s hemispheres, improving complex left-to-right

processing. Improved communication between the brain's hemispheres has also been found to improve language performance and reading.

Meditation has also been found to increase gray matter in the prefrontal cortex. Sara Lazar's neuroimaging research study showed that mindful meditation programs produced a thickening of the cerebral cortex areas associated with attention and emotional integration. The increase in gray matter associated with meditation produced greater emotional control.

2. Teach emotional control. A growing body of research says that improving working memory helps improve self-control and addresses a range of impulse control issues and disorders. Schools used to teach students memorization strategies and set aside times for students to practice them; it is a strategy worth revisiting to improve working memory.

Poverty is also associated with the reduction of hippocampus size and the connections to the prefrontal cortex. The hippocampus is in charge of working and short-term memory. By improving working memory, schools help low-income students address two deficits: poor emotional control and poor memory.

Another strategy for improving self-regulation is teaching mindfulness skills to help students develop strategies for calming their minds and bodies. For example, the "mental shift" teaches students to focus their attention on something other than the issue causing emotional distress.

One technique is to have students focus the brain on tasks such as making lists. Try having a distressed student list as many things as they can under rubrics such as sports teams, recording artists, cities, or TV shows within a specified time frame. When they finish, ask the student if they still feel as upset as they had before doing the exercise. The self-assessment helps students realize that a simple exercise can enable them to regain some level of emotional control. Remember that mindfulness skills require frequent practice for students to apply them independently.

3. Teach how the brain produces implicit bias. The problem with implicit bias is that it lives in the subconscious, and nobody attempts to correct an issue of which they are unaware. The solution, according to recent studies, is to learn how bias arises in the brain to better recognize implicit bias when it occurs. It's like buying an automobile: Once you are driving a particular model, you notice how frequently you see the identical vehicle on the road.

Addressing the issue of implicit bias without an understanding of how it occurs is the main reason individuals don't often perceive themselves as biased. For example, when we process the sound of the human voice, we might apply a bias instantaneously. Within 200 milliseconds (one-fifth of a second) and completely subconsciously, the amygdala assesses the tone to determine emotion. At around 300 milliseconds, the brain engages in identity matching—determining gender, age, health, and race, just

Core Concepts: Awareness

- Poverty causes a reduction of gray matter in the prefrontal cortex, which oversees cognitive behavior, personality expression, decision-making, social behavior, and executive function.
- Similar reductions in white matter mean that impoverished students are less able to regulate emotions, making them highly sensitive to negative expressions.
- Students of color are over-represented among the ranks of the impoverished, often creating an implicit bias that associates them with low academic performance.
- Strategies that build gray matter, teach emotional control, and address implicit bias can work to help students overcome the deficits in brain function that poverty produces.

to mention a few of the identifiers. After 400 milliseconds, the brain begins to interpret the words and their meaning.

The result is that the tone or identifiers can produce bias before a person is able to accurately evaluate what's being said. People who are trained to recognize how bias occurs can, at times, recognize that their gut reaction to what was said might be because of the tone of voice or another aspect of the person who said it.

Multiple brain structures and functions are altered by the experience of poverty. These changes to the brain can impact cognitive function, self-control, and social capacity. The United States has lots of schools that serve a high concentration of socioeconomically disadvantaged students, so it is vitally important for educators to become aware of how poverty affects the brains of these students.

Nobody addresses a problem of which they are unaware. But when we become aware, we are better able to become part of the solution. ●

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