

# How Poverty Alters the Young Brain

New research reveals a strong connection between income and the surface area of several key neural regions.

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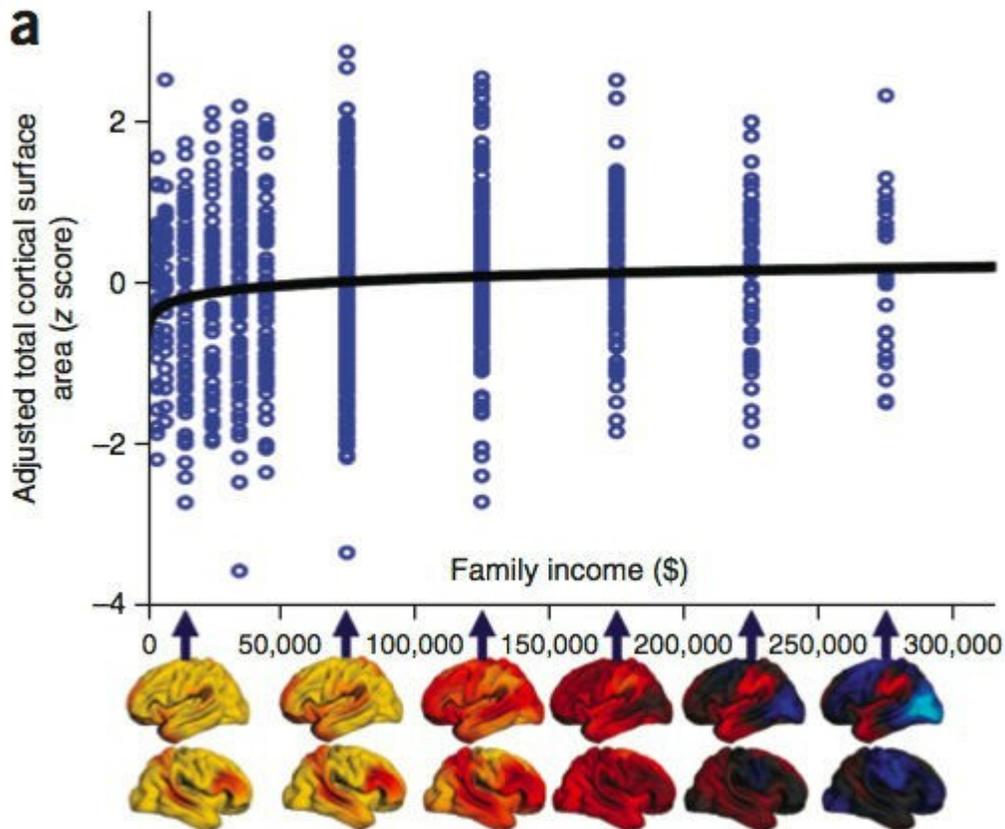
Behavioral scientists have made some truly groundbreaking insights into the cognitive costs of poverty in recent years. We now know, for instance, that [scarcity puts a huge strain](#) on our mental resources—the equivalent of stripping 13 points off our IQ, or losing a night’s sleep—making it that much tougher to handle daily tasks or decisions. That’s just one of [many findings](#) pointing to the same conclusion: poverty literally alters the way you process the world.

Some notable new work further explores how poverty disrupts the brain from a very early age. The study ([spotted by](#) Madeline Ostrander in the *New Yorker*) comes from a huge research team led by the developmental neuroscientist and pediatrician [Kimberly Noble](#) of Columbia University. In the journal *Nature Neuroscience*, Noble and company [call this work](#) “the largest study to date to characterize associations between socioeconomic factors and children’s brain structure.”

What they found doesn't bode well for disadvantaged youths. The researchers first analyzed brain scans of nearly 1,100 children for possible associations with socioeconomic factors, such as income—controlling for things like age, sex, and most critically, genetic background. What they found is a strong connection between income and the surface area of brain regions related to language and executive functioning, with these variations “steepest” at the low end of the income ladder.

As Noble and collaborators put it, “for every dollar in increased income, the increase in children’s brain surface area was proportionally greater at the lower end of the family income spectrum.” Ostrander sums it up in yet [clearer terms](#):

At the lowest end of the income spectrum, little increases in family earnings could mean larger differences in the brain. At the middle and upper income levels, though, the money-brain curve flattened. In other words, wealth can't necessarily buy a better brain, but deprivation can result in a weakened one.



The researchers found that family income was “logarithmically” related to neural surface area—with steep variation at the poor end of the spectrum. (*Nature Neuroscience*)

These structural differences matter far outside the brain scanner. As a follow-up, the researchers gave some of the study participants a battery of cognitive tests. They found that income, via its impacts on brain surface area, had a partial effect on performance for two assessments of executive function. One test (known as the flanker) requires participants to focus attention; the other (a working memory task) asks them to remember a series of items.

The researchers suspect what's happening is that wealthier parents simply have more tools to nurture a developing brain. They can afford healthier foods or educational games and videos or better child care. They can also move to safer neighborhoods less exposed to environmental pollutants or toxins.

Noble et al. recognize that all sorts of factors, over and above poverty, account for variations in brain structure—hence the huge diversity of brain structures found at every income level in the study, including the disadvantaged end. So it's not quite right to draw a straight line from low socioeconomic status to poor cognitive development. But insofar as policies that target poverty might also benefit young brains, they'll help the starting line stay much less crooked.

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