

NATURE vs NURTURE

Nature vs. nurture is one of the oldest and most loaded debates in science: how much of who we are, especially our intelligence, comes from our genes versus our environment? It's a topic that's not just academically complex, but socially and politically charged, since the answers we settle on shape how we think about inequality, education policy, and opportunity.

It's also a field where caution is warranted. Psychology and neuroscience have a well-documented replication problem. The Open Science Collaboration group (1) found that only about **a third of psychology studies could be reproduced**. This refers especially to brain research linking brain measures to behavior or cognition because these studies often relied on samples that were far too small to detect the tiny effects involved.

It appears that a new study just published in Science (2) could be a milestone precisely because it was designed with these concerns in mind. It draws on thousands of children, splits the data into discovery and replication samples, and then re-tests its main findings in two completely independent datasets of tens of thousands of adults.

The researchers scanned the brains of thousands of 9–10-year-olds and tested 649 environmental, social and behavioral factors against brain structure and function. The single strongest, most reliable association with the brain wasn't IQ it was the socioeconomic status of the child's neighborhood. And here's the twist: once they accounted for socioeconomic status, the classic "brain-IQ" link that decades of neuroimaging research has reported, largely fell apart. **95% of those associations weakened, and 70% became statistically non-significant**. Brain models trained to "read" IQ from scans turned out to actually be picking up signatures of stress, sleep quality and arousal linked to socioeconomic conditions, not some intrinsic biological marker of intelligence. The pattern held up in adults too.

Does this settle nature vs. nurture? Not quite. Genes still clearly matter, and socioeconomic status explains at most ~16% of brain variability, leaving most of it unexplained. But it's a powerful reminder that the environment a child grows up in leaves deep, measurable marks on the developing brain, and that some of what looked like "the biology of intelligence" may really be the biology of inequality. As the authors put it: socioeconomic opportunity is not destiny, but it clearly shapes the starting line.

1. <https://www.science.org/doi/10.1126/science.aac4716>
2. <https://www.science.org/doi/10.1126/science.aee6213>