

# Research demonstrates that enhanced instruction in genetics can reduce racist conceptions among students

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A recent article in the journal *STAT* (Molteni, April 7, 2026, “A star scientist showed that better genetics lessons could reduce racism. It was the death knell for his career”) brings to light one component of the Trump administration’s racism and assault on science and education.

It is well-established science that the concept of race is a social construct not a biological reality. Genetic variation within “racial” groups is greater than between them, thus refuting claims there is any scientific basis for claims that there are fundamental racial differences. Yet racism, in various forms, persists in the modern age under capitalism, as a weapon employed by the ruling class to divide and oppress the working class. What role does inadequate education in genetics play in perpetuating the concept of racial difference, and the superiority of one “race” over another, in the face of scientific knowledge to the contrary?

Scientist and educator Brian Donovan and associates undertook to study whether improvements in the teaching of genetics could reduce incorrect conceptions regarding supposed significant biological differences between “races” (Donovan, 22 Feb 2024, *Science*, “Humane genomics education can reduce racism”). Donovan describes supposed inherent racial differences as “genetic essentialism,” which he proposes to counter with “humane genomics education.” Genomics is the branch of biotechnology studying the entire set of DNA (the genome) in organisms, focusing on the structure, function, mapping and editing of genes collectively rather than studying genes individually. According to Donovan:

For as long as the concept of race has existed, racial prejudice has been justified on hereditary grounds. Justifications of prejudice often misappropriate the work of Mendel, who first expounded a scientific model of inheritance by breeding peas. Today, our understanding of inheritance has moved far beyond Mendel, and insights from genomics refute the prejudiced idea that racial inequality is determined by genes. Even so, many believe that inequality is genetic because they are biased by an inaccurate conception of race called “genetic essentialism.” We present data from a randomized trial to argue that if teachers move genetics instruction beyond Mendel and toward more complex genomics concepts—what we call “humane genomics education”—they can protect students from believing in unscientific notions of genetic essentialism and support their scientifically accurate understanding of race as a social construction.

Donovan’s formulation of essentialism focuses on in-classroom instruction without reference to the larger social context.

Genetic essentialism is a form of psychological essentialism, which is an

early-developing bias in humans. Psychological essentialism is observable across human cultures and refers to the belief that members of a social category share an unobservable and internal essence that determines their traits. People who endorse genetic essentialism believe that such essences are genetic, which leads them to believe that same-race individuals are genetically homogeneous, that races are nonoverlapping genetic groups, and that most racial differences are therefore determined by genes.

Essentialist beliefs are socially dangerous and a biological misconception. For example, genetic essentialist beliefs about race facilitate intergroup hostility, support for eugenic policies, discrimination and disinterest in cross-racial friendships.

He proposes that “exposure to genetic ideas through informal (e.g., media) or formal (e.g., school) learning is hypothesized to affect the development of genetic essentialism.” In his view, education in genetics focuses too narrowly on basic Mendelian laws of heredity (Gregor Mendel was an Austrian monk and scientist in the 19th century, who is known as the “father of modern genetics”), which emphasize a simple correlation between individual genes and specific phenotypic (i.e., physically expressed) traits. This obscures the reality of complex interactions between various genes in generating observable biological characteristics which, as a consequence, tends to emphasize differences between population groups.

“The problem is that the basic genetics education that the US public receives is a risk factor for the development of genetic essentialism during adolescence,” he writes. “Because basic genetics education does not discuss patterns of racial similarity in the human genome, and because it does not discuss the multifactorial basis of complex human traits, students are never exposed to information that explicitly counters genetic essentialist views about race.”

Donovan et al propose an alternate educational program, “humane genomics education,” based on three genomics concepts:

1) “Roughly 0.1% of the human genome varies between individuals, and when population geneticists partition this variable DNA, they find that most variation occurs within geographic populations (~95%) and much of the genetic variation that occurs across such populations (~5%) consists of common alleles that vary in frequency.”

2) “... social disparities between races involve differences in complex traits. Because complex traits are multifactorial and influenced by interactions between genes and environments, it is not scientifically accurate to claim that racial inequality is determined by genetic variation alone.”

3) “... humans inherit their genomes along with their environments, and scientists have not yet developed convincing or ethical methods to disentangle gene-environment covariance. Because racial differences in a trait can be environmentally determined even when intragroup differences

in that same trait are genetically influenced, there is good reason to be skeptical of the claim that racial disparities are genetic: Historical and present-day racism have made the environments of racialized populations different.”

To test the hypothesis that teaching a more complex view of genetics and inheritance could effect a reduction in genetic essentialism and, by consequence, racism, Donovan and his associates designed and carried out a series of scientifically controlled experiments with middle and high school students and teachers from six US states. “Participating teachers received 40 hours of professional development to learn how to implement the humane genomics intervention and how to align their Mendelian and molecular genetics curricula with basic genetics.”

To randomize the effects of teaching basic genetics versus humane genomics, half of each class was taught the two modules in that order (basic genetics first followed by genomics) and the other half in reverse order. The researchers took care to avoid any biasing factors which might imply a preferred result, such as implications that genetic essentialist beliefs are socially unacceptable.

At each stage of the program—before the start of instruction, after the first module, and at the end—students were tested to gauge their understanding of the subject. They were measured with regard to a number of parameters:

“... (a) basic genetics knowledge, (b) knowledge of genomics, (c) belief in the genetic discreteness of racial groups, (d) genetic attributions for complex human traits, (e) environmental attributions for complex human traits, (f ) belief in racial genetic essentialism, (g) belief in social constructionism, (h) colorblind racial beliefs, and (i) emotional response to instruction.”

The results were clear.:

The results of the first model fully supported each component of the humane genomics hypothesis. Relative to basic genetics, classrooms that received humane genomics instruction had greater knowledge of genomics and less belief in genetic essentialism. Humane genomics classrooms also had less belief in racial discreteness and lower genetic attributions for complex human traits. Furthermore, humane genomics classrooms had greater environmental attributions. All effects were reproduced in the second half of the crossover trial.

In the subsequent analysis, the resulting data “was explored [regarding] whether students gravitated toward racial colorblindness or social constructionism.” These are two alternative concepts of race. “People who believe in the former [racial colorblindness] contend that racial discrimination is no longer a problem or that it can be ignored because race is not socially important, or real. By contrast, constructionism contends that race is a social concept and that racial disparities are caused by prejudice, discrimination, and institutional racism.” According to the authors, colorblindness tends to be associated with genetic essentialism.

The study found that “[w]hereas there was no effect of genetics instruction on racial colorblindness, there was a positive effect of humane genomics instruction on belief in social constructionism after the first and second rounds of instruction.”

Based on this result, the researchers “... contend that the ideal instructional sequence to reduce genetic essentialism is to introduce students to the models of Mendelian genetics and then move beyond these models and highlight their limitations using a humane genomics curriculum.” Furthermore, they recommend that “[c]oherent learning experiences that are implemented repeatedly can create enduring changes in how people view the world. Several humane genomics learning

experiences spread over many years of biology instruction will be needed to reduce the prevalence of genetic essentialist beliefs.”

This study is a valuable contribution to our understanding of the role of education design in developing a correct, scientific view of how racist conceptions are, if inadvertently, reinforced by an insufficient course of study in genetics. Furthermore, it demonstrates that racist attitudes are learned and are not in any way innate. However, it does not, and did not attempt to address the underlying social, economic and political factors that promote racism, which is a tool of class oppression used to divide and subjugate the working class under capitalism.

Racism and other forms of discrimination, such as those based on religion or sex, did not begin with capitalism. They are inherent in class society as tools employed by the elite to divide and subjugate the oppressed classes. Education alone cannot overcome the ill effects which are products of the objective economic interests of the ruling class in defending its social position. It is precisely those interests that are driving the Trump administration’s assault on science and historical truth. Discrimination of all kinds can be definitively eradicated only with the elimination of class society.

It is in fact because of this study’s value that the lead author, Brian Donovan, is one of the many scientists targeted by the Trump administration and his scientific career destroyed. The study was initially supported by a grant to Donovan from the U.S. National Science Foundation (NSF). Based on this study, Donovan was awarded this year’s Elizabeth W. Jones Award for Excellence in Education by the Genetics Society of America, recognizing someone who has helped the public better understand the science of DNA. The article in *STAT* cited above chronicles the long struggle by Donovan to build his research team and carry out the investigation.

Despite the high praise the study received, last April, both of Donovan’s National Science Foundation grants were terminated, part of a mass cancellation of science education awards. The NSF’s justification was that the grants “no longer effectuate administration priorities.” Donovan and his team at the University of Colorado were left without jobs. They were not alone. The Trump administration massively slashed grants for science education, accounting for 40 percent of the agency’s terminations and 65 percent of funding cuts. In spite of his groundbreaking research and the high regard with which he is held by many in the field, his quest for an academic position has also been fruitless. He is now studying to become a nurse.

Both Democrats and Republicans are carrying out major assaults on education and science as part of their drive to increase the wealth of the super-rich oligarchy and to prepare for world war.



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