

Why Genes Don't Count (for Racial Differences in Health)

Alan H. Goodman, PhD

ABSTRACT

There is a paradoxical relationship between “race” and genetics. Whereas genetic data were first used to prove the validity of race, since the early 1970s they have been used to illustrate the invalidity of biological races. Indeed, race does not account for human genetic variation, which is continuous, complexly structured, constantly changing, and predominantly within “races.”

Despite the disproof of race-as-biology, genetic variation continues to be used to explain racial differences. Such explanations require the acceptance of 2 disproved assumptions: that genetic variation explains variation in disease and that genetic variation explains racial variation in disease. While the former is a form of geneticization, the notion that genes are the primary determinants of biology and behavior, the latter represents a form of racialization, an exaggeration of the salience of race.

Using race as a proxy for genetic differences limits understandings of the complex interactions among political-economic processes, lived experiences, and human biologies. By moving beyond studies of racialized genetics, we can clarify the processes by which varied and interwoven forms of racialization and racism affect individuals “under the skin.” (*Am J Public Health*. 2000;90:1699–1702)

In 1973, I took a course titled “Introduction to Physical Anthropology” with Professor George Armelagos. In the course, he taught that “race” was once a core worldview in anthropology and that it had spread to other sciences and practices such as medicine and public health. Natural historians in the 18th and 19th centuries thought in terms of idealized and unchanging types of objects, including human beings. The big question of the time concerned the degree and significance of racial differences. The church’s monogenetic position held that the “races” were created together as a species with clear subspecies. Men of science such as Philadelphia physician George Morton and Cambridge natural historian Louis Agassiz supported a polygenetic position, asserting that the races were separately created species.

Professor Armelagos explained that human biological variation is continuous, complex, and ever changing. As a static and typological concept, race is inherently unable to explain the complex and changing structure of human biological variation. As in the decennial census, individuals will always fail to fit neatly into racial boxes. Moreover, the placement of an individual in a given box says little about his or her biology: the racial mean is meaningless. To begin to comprehend the human biological variation, one needed an evolutionary theory that focused on gradual change and populations rather than on race. Professor Armelagos went on to say that although race is still real, it is not biologically based; rather, it is social with biological consequences.

Students’ responses ranged from disbelief to transformation. After having long assumed the biological basis of race, many in the room could not accept his claims. Others misunderstood his message, thinking he was denying the reality of biological variation itself. Still others were transformed forever by this new idea.

I recollect that it made almost instant sense to me that human races are social constructions. Although I saw Professor Armelagos as a White man, his birth certificate stated that he was Greek. I had grown up in a working-class family in a town composed mostly of second-generation immigrants from Italy and Ireland, and as a boy I was aware of being perceived as Jewish and different from my Irish and Italian friends in some fundamental way. Yet when I began attending a more diverse university, something striking happened: I became “White.” I was no longer perceived as very distinct from other students of European descent.

It was then that I learned about the fluidity of race and how social and political-economic processes were constantly changing color lines.

Professor Armelagos hinted at a powerful lesson: that scientific ideas can endure and be made to seem real if they have social and political-economic utility. An evolutionary framework that explained human variation had been established for more than a century, ever since the publication of Darwin’s *Origin of Species*.¹ In the 1940s, Montagu used the “new evolutionary synthesis” to explain clearly why race was a biological myth.^{2,3} Yet the idea of race as biology persists today in science and society.⁴

I was aware of the power of race as a worldview in 1973. But what I understood less was the idea’s ability to persist after it had been proven unscientific. If I had been asked in the 1970s whether race would survive as a way to think about human biological variation in 2000, I would have answered emphatically, “No!” I was naive to the durability of an economically useful idea.

Acceptance of the notion of race-as-biology declined in anthropology throughout the late 1970s and early 1980s.^{5,6} Yet, during the past decade, racialized notions of biology have made a comeback.^{4,7} This is especially true in human genetics, a field that, paradoxically, once drove the last nail into the coffin of race-as-biology.

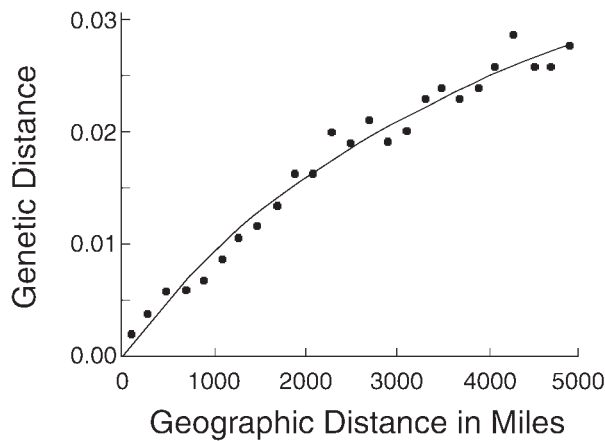
In this commentary, I explain why race should not be used as a proxy for genetic or biological variation. I then explain and illustrate the 2 unfounded assumptions that are needed for an acceptance that racial differences in disease are due to genetic differences among races.

The Myth of Race as Biology

The first of 6 reasons why race is an inadequate and even harmful way to think about human biological differences is based on the history and theoretical underpinnings of the idea of race. The next 3 have to do with the structure of human biological variation. The last 2 pertain to the use of race in practice.

Requests for reprints should be sent to Alan H. Goodman, PhD, US Southwest and Mexico Program, School of Natural Science, Hampshire College, Amherst, MA 01002 (e-mail: agoodman@hampshire.edu).

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Note. Global human genetic distances (the ordinate) are plotted against geographic distances in miles (the abscissa). Closed circles indicate the observed values, and the curved line is the theoretical expectation under an isolation-by-distance model. The graph is redrawn from Templeton.¹²

FIGURE 1—Genetic distances and isolation, by geographic distance.

1. *The concept of race is based on the idea of fixed, ideal, and unchanging types.* Race was first a European folk concept from an era in which the world was seen as fixed and unchanging.^{8,9} Such an idea, however, is completely incompatible with evolutionary theory. In response, some who still adhere to the concept of race might say that as it is now used in science, it is dynamic, flexible, and even evolutionary.^{10,11} But the new race is the old race, typological and ideal. Like a chameleon changing its color to better hide in a chromatically different environment, race changes superficially to fit into a new intellectual environment.

2. *Human variation is continuous.* Allele frequencies tend to vary gradually. Therefore, there is no clear place to designate where one race begins and another ends. Skin color, for example, slowly changes from place to place. Templeton has shown that most human variation is explained by geographic distance¹²: individuals tend to be most similar to those who live nearby and least similar to those who live farthest away (Figure 1).

3. *Human variation is nonconcordant.* Traits tend to vary independently of other traits. Race classifications vary, therefore, by the traits used in the classification. A classification based on sickle cell trait might include equatorial Africans, Greeks, and Turks, while another based on lactase enzyme deficiency might include eastern and southern Africans along with southern Europeans, Japanese, and Native Americans. There is no possibility for consistency. Because skin color correlates with only a few other phenotypic traits such as hair and eye color, it is true that “race is only skin deep.”

4. *Within-group genetic variation is much greater than variation among “races.”* Starting with Lewontin,¹³ studies have statistically apportioned variation in different genetic systems to different levels, among “races” and within “races” and smaller populations such as the Hopi, the Ainu, and the Irish.¹⁴ Lewontin collected data on blood group polymorphisms in different groups and races.¹³ He found that blood group variation among races statistically explained about 6% of the total variation.¹³ The implication of Lewontin’s results is that if one is to adopt a racial paradigm, one must acknowledge that race will statistically explain only a small proportion of variations. These variations are better explained by geographic distance.¹²

5. *There is no way to consistently classify by race.* Race is impossible to define in a stable and universal way because race-as-biology varies with place and time, and the socially determined color line is even more dynamic. A problem with race classification is that there is no agreed-upon “race scale” as there are hat and shoe size scales. Ideas about race are fluid and based on different phenotypic cues; the salient cues change over time, place, and circumstance. One study of infants who died in their first year showed that 37% of infants classified as Native American on their birth certificates were classified as some other race on their death certificates.¹⁵ If race “changes” so quickly in less than a year, one can only imagine the degree of misclassification that could occur over decades and across regions.

6. *There is no clarity as to what race is and what it is not.* Other key methods of classification involve inconsistencies as well. For

example, definitions of socioeconomic class vary widely. Although always imperfect, they begin to provide a glimpse of the underlying processes by which social and economic positions affect lived experiences and health. Race differs critically from other classification methods in the breadth of potential interpretations of the underlying processes. Some individuals view racial differences in disease as owing to genes, while others see race differences as the consequence of the lived experience of “racing”—the taxonomic practice of assigning individuals to races—and of racism. Obviously, this confusion has serious implications for theory and practice: One cannot practice predictive science on the basis of a changing and undefinable cause.

Probably none of these reasons is by itself sufficient to throw race onto the scrap heap of surpassed scientific ideas. But considered together, they clearly suggest that race-as-biology is obsolete. Just as we have moved beyond thinking that the sun revolves around the moon and that a fully-formed, tiny human lives in sperm, so too it is time to move beyond believing that race is a valid method for classifying human biological differences.

The Double Error Inherent in Genetic Explanations of Racial Differences

Two errors—2 leaps of illogic—are necessary for acceptance of the idea that racial differences in disease are due to genetic differences among races. The first leap is a form of geneticization, the belief that most biology and behavior are located “in the genes.”

Genes, of course, are often a part of the complex web of disease causality, but they are almost always a minor, unstable, and insufficient cause. The presence of Gm allotype, for example, might correlate to increased rates of diabetes in Native Americans,¹⁶ but the causal link is unknown. In other cases, the gene is not expressed without some environmental context, and it may interact with environments and other genes in nonadditive and unpredictable ways.

The second necessary leap of illogic is a form of scientific racialism, the belief that races are real and useful constructs. Importantly, this leap propels one from explaining disease variation as caused by genetic variation to explaining that racial differences in disease are caused by genetic variation among races. To accept this logic, one needs to also accept that genetic variation occurs along racial divides: that is, most variation occurs among races. However, we know from Lewontin’s work that this assumption is false for simple genetic systems.¹³ For a disease of complex etiology, genetics is an illogical explanation for racial differences.

Why Race-as-Genes Fails in Practice

Scientifically, race-as-biology has been and is still used both as a means of identification and classification and as a means of explanation. As the former, it is often applied in the forensic sciences. As the latter, it requires the former and, depending on what is to be explained, may be used in many fields, including biological anthropology, exercise physiology, psychology, and public health.

Identification of humans from skeletal remains provides a clear example of the poor performance of a racial model of human variation.⁴ The most widely referenced method for identifying race from the skeleton is Giles and Elliot's discriminant function for determining race from cranial remains.¹⁷ In the original study of crania of individuals of known "race" and sex, Giles and Elliot were able to correctly classify about 85% of individuals as members of 1 of 3 races—Native American, White, or Black. This rate of correct racial classification is often cited in texts and popular articles.^{18,19} However, in 4 retests of the method's ability to correctly classify Native Americans, the rate dropped to an average of approximately 33%.⁴ In other words, the retest performance was about what one would expect by random assignment. Failure to extend the method to other times and places illustrates the nature of temporally and geographically changing color lines and biologies.

The attribution of racial differences in disease to genetic differences illustrates both geneticization and scientific racialism. For example, the rise in diabetes among some Native Americans is often thought to be caused by a genetic variation that separates Native Americans from European Americans.^{17,20,21} Type II diabetes, along with obesity, gallstones, and heart disease, is part of what has been called "New World Syndrome."²¹ The designation of a panracial syndrome may fix in one's mind the idea of homogeneity within race and the notion that the syndrome is innate.

Contemporary variation in diabetes rates among Native North American groups is tremendous, however, and the rise in diabetes rates is a relatively recent phenomenon.²² Other groups experiencing shifts from complex carbohydrates to colas, from fast-moving foods to fast foods, and from exercise to underemployment have experienced very similar increases in diabetes rates. Rather than accept that diabetes is "in our blood," as articulated by the Pima,²³ it might be more productive to locate diabetes in changeable lifestyles.

From Studies of Race-as-Genetics to Studies of Racialism and Racism

As the 19th century turned into the 20th century, anthropology was united in viewing race as a powerful explanation for biology, culture, and behavior. As the 20th century turns to the 21st, anthropologists have begun to reach a consensus on the limits and significance of race. As is illustrated in the recently ratified American Anthropological Association statement on race, the new consensus maintains that

- Human biological variation should not be reduced to race. It is too complex and does not fit this outdated idea.
- Race is real. Rather than being based on biology, it is a social and political process that provides insights into how we read deeper meaning into phenotypes.
- Racialization and racism come about because, in a racialized culture, we read meaning into skin color and other phenotypic variants. Rather than biology affecting behavior, ideology and behavior affect individuals "under the skin."

The 20th century was a highly racialized century. All signs suggest that the 21st may be, too. A central confusion about race—one that is reflected in census debates and the use of census data—is that we use the concept differently. Although the Office of Management and Budget Directive 15 makes no claim that race is a scientific term or is biological in meaning, this disclaimer is hidden in the small type of an official document.

Until there are no racial distinctions in aspects of life such as access to employment and health care, a society that purports to be just, such as our own, needs to track racial differences and the political-economic consequences of a racial system. Professor Armelagos and others like him, extending back to Montagu, Franz Boas, W.E.B. Du Bois, and Frederick Douglass, paved the way toward rejecting race-as-biology. The symposium that follows will help us move beyond simply rejecting an outworn perspective and toward clarity about the ways in which being racialized and experiencing racism can affect health. □

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References

1. Darwin C. *On the Origin of Species by Means of Natural Selection or the Preservation of Favored*

Races in the Struggle for Life. London, England: John Murray; 1859.

2. Montagu MFA. The concept of race in the human species in light of genetics. *J Hered*. 1941;32:243–247.
3. Montagu MFA. *Man's Most Dangerous Myth: The Fallacy of Race*. New York, NY: Columbia University Press; 1942.
4. Goodman AH. Bred in the bone? *The Sciences*. March/April 1997:20–25.
5. Lieberman L, Stevenson BW, Reynolds LT. Race and anthropology: core concept without consensus. *Anthropol Educ Q*. 1989;20(2):67–73.
6. Barkan E. *The Retreat of Scientific Racism*. New York, NY: Cambridge University Press; 1992.
7. Goodman AH, Armelagos GJ. Race, racism and the new physical anthropology. In: Reynolds LT, Lieberman L, eds. *Race and Other Misadventures: Essays in Honor of Ashley Montagu in His Ninetieth Year*. Dix Hills, NY: General Hall Inc; 1996:174–186.
8. Smedley A. *Race in North America: Origin and Evolution of a World View*. 2nd ed. Boulder, Colo: Westview Press; 1999.
9. Stepan N. *The Idea of Race in Science: Great Britain, 1800–1960*. London, England: Macmillan Press; 1982.
10. Gill GW. A forensic anthropologist's view of the race concept. In: Abstracts of the 46th Annual Meeting of the American Academy of Forensic Sciences, 1996.
11. Brues AM. The objective view of race. In: Gordon CC, ed. *Race, Ethnicity and Applied Bioanthropology*. Richmond, Va: American Anthropological Association; 1993:74–78. NAPA bulletin 13.
12. Templeton A. Human races: a genetic and evolutionary perspective. *Am Anthropologist*. 1998;100:632–650.
13. Lewontin RC. The apportionment of human diversity. *Evol Biol*. 1972;6:381–398.
14. Nei M, Roychoudhury AK. Genetic relationship and evolution of human races. In: Hecht M, Wallace B, Prance G, eds. *Evolutionary Biology*. Vol 14. New York, NY: Plenum Press; 1982:1–59.
15. Hahn R, Mulinare J, Teutsch S. Inconsistencies in coding race and ethnicity between birth and death in US infants. *JAMA*. 1992;267:259–263.
16. Knowler WC, Williams RC, Pettitt DJ, Steinberg AG. Gm and type 2 diabetes mellitus: an association in American Indians with genetic admixture. *Am J Hum Genet*. 1988;43:520–526.
17. Giles E, Elliot O. Race identification from cranial measurements. *J Forensic Sci*. 1962;7:247–257.
18. St. Hoyme LE, Iscan MY. Determination of sex and race: accuracy and assumptions. In: Iscan MY, Kennedy KAR, eds. *Reconstruction of Life From the Skeleton*. New York, NY: Alan R Liss; 1989:53–93.
19. Sauer N. Forensic anthropology and the concept of race: if races don't exist, why are forensic anthropologists so good at identifying them? *Soc Sci Med*. 1992;34:107–111.
20. Weiss K. Transitional diabetes and gallstones in Amerindian peoples: genes or environment? In: Swedlund AC, Armelagos GJ, eds. *Disease in*

- Populations in Transition*. Hadley, Mass: Bergen & Garvey; 1992:105–123.
21. Weiss K, Ferrell R, Hanis CL. A new world syndrome of metabolic diseases with a genetic and evolutionary basis. *Yearbook Phys Anthropol*. 1984;27:153–178.
 22. Young TK. *The Health of Native Americans*. New York, NY: Oxford University Press Inc; 1994.
 23. Kozak D. Surrendering to diabetes: an embodied response to perceptions of diabetes and death in the Gila Indian community. *Omega J Death Dying*. 1996;35:347–359.