Social Science & Medicine 73 (2011) 632–635

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Short report

Agency versus structure: Genetics, group membership, and a new twist on an old debate

Ronald J. Angel

Department of Sociology, University of Texas, Austin, United States

ARTICLE INFO

Article history:
Available online 23 July 2011

Keywords:
Genetics
Eugenics
Race
Ethnicity
Ethics

ABSTRACT

The decoding of the human genome and advances in genetic medicine promise great advances in the prevention and treatment of disease. These powerful methodologies, though, raise serious intellectual, ethical, and practical questions when they are employed in explanations of complex higher-order behavioral and social outcomes. There can be little doubt that all human behavior reflects complex gene/environment interactions, but isolating the unique contributions of genes and environment in the explanation of overdetermined behavioral and social outcomes may not in principle be possible. When dealing with groups that differ significantly in histories of discrimination and exclusion biological explanations must be employed with caution even as they promise great strides in dealing with specific diseases.

New methodologies in genetic research, such as genome-wide association studies, that can search through millions of individual genes to identify those potentially associated with specific pathologies promise great advances in disease prevention and treatment (Cichon et al., 2009; Psychiatric GWAS Consortium Coordinating Committee, 2009). Like all powerful technologies, though, these new techniques and approaches are not without risks, depending on their use. In the case of genetic and biological explanations of behavioral outcomes those include attributing to biological factors variance that is in fact due to social factors. Debates concerning the role of biology in the determination of human aptitudes and social traits are often rancorous given the racist and unscientific nature of much early work and the nefarious purposes to which biological explanations of group differences have been put. For example, during the 19th century Italian physician Cesare Lombroso proposed a theory that criminality is inherited and that criminals could be identified by specific "atavistic" physical characteristics (Lombroso, 2006). Lombroso also observed that criminals often have tattoos, a physical characteristic that today would place a huge number of individuals under suspicion.

In another example from the 19th Century sociologist Richard L. Dugdale published a study of the "Jukes", a pseudonym he used to refer to a New York hill family among whose members he documented generations of criminals, paupers, prostitutes and other social misfits descended from one female, again supposedly proving the heritability of complex behavioral predispositions (Dugdale, 1877). Even well into the 20th Century members of the eugenics movement who feared that the higher fertility of the inferior classes would debase the gene pool advocated forced sterilization and other procedures to limit their number (Kevles, 1987). Racist Nazi atrocities associated with the Holocaust and the racism that Black Americans have experienced, and racist practices in other countries assure that many observes will find biological explanations of group differences, especially when they might be construed as even implying group inferiority or superiority, to be morally reprehensible (Fraser, 1995).

Beyond the potential racist overtones, though, approaches such as those associated with sociobiology or evolutionary psychology are criticized on methodological grounds (Gould, 1981; Hagen, 2005; Lerner, 2006). For example, although twin studies clearly demonstrate the heritability of even complex traits, they have been criticized for the supposed inability of analysis of variance approaches to distinguish environmental from genetic effects (Lweontin, 2006; Richardson & Norgate, 2006; Rutter, Pickles, Murray, & Eaves, 2001; Wahlstein, 1990). To be sure, behavioral genetics has progressed well beyond the simplistic theories of Lombroso, Dugdale, and the early eugenics movement. Yet, race-based explanations of supposed group differences in complex outcomes continue to be published (e.g., Rushton, 2000), and there are still issues to be debated related to the various domains in which biology in general can be most fruitfully applied. Medical genetics will no doubt greatly advance our understanding of the

E-mail addresses: rangel@austin.utexas.edu, rangel@mail.la.utexas.edu.

0277-9536/$ – see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.socscimed.2011.06.039

complex interaction among genes and environment in disease expression. The understanding of complex cultural, political, and social behaviors, on the other hand, will in all likelihood benefit little from advances in genetic and genomic research.

In this discussion I identify what I see to be the domains in which an understanding of biology, and especially behavioral genetics, offers great promise in improving health levels, as well as areas in which an understanding of genetics will be far less useful, and potentially even harmful, from the perspective of a social scientist. First, though, let me be clear that reductionism is not confined to biological or genetic explanations of human behavior. It is a danger that potentially affects all intellectual approaches that privilege their own disciplinary perspective. Economic determinism is one clear example. In psychology, classical behaviorism and operant conditioning assumed an almost complete organismic plasticity and treated the social and physical environments as the major, if not the only determinants of personality and behavior (Watson, 1930).

From a theoretical perspective it is useful to relate the discussion of genetic and biological explanations of complex behaviors and social outcomes to the concepts of agency and structure. In social theory "agency" refers to the capacity of individuals to act as agents on their own behalf, either individually or collectively (Ritzer, 2008; Ritzer & Gindoff, 1994). Structure, on the other hand, refers to all those factors that limit humans' ability to act as autonomous agents. These include social class, education, religion, gender, ethnicity, customs, norms, geography, weather, and much more, including basic biological and genetic factors. The real intellectual challenge then is to ask whether it is possible to isolate the impact of various factors, especially those at very different levels of analysis, on complex behavioral and social outcomes. The question takes on particular salience when one's ability to control one's life is constrained by social class factors related to historical disadvantages associated with race and ethnicity.

Certain modern social theorists reject the notion that agency and structure are conceptually or practically distinct (Berger & Luckman, 1966; Bourdieu, 1977; Giddens, 1986). From this perspective agency cannot be conceived of except in relation to structure. Genetics provides evidence that this is the case with gene/environment interactions: The effects of agency and structure, or genes and environment, cannot be isolated. Behavioral genetics suggests that all behaviors reflect complex interactions of the genome and the environment in potentially hugely complex ways.

Environment/organism interactions have interested health researchers for decades, but more recently the mapping of the human genome has given rise to the possibility of a new depth of understanding into how individual genetic factors interact with environmental factors to affect physical and mental health (Asimit, Yoo, Waggott, Sun, & Bull, 2009; Bertram et al., 2008; Cichon et al., 2009; Craddock, O'Donovan, & Owen, 2008; Mahon et al., 2009; Psychiatric GWAS Consortium Coordinating Committee 2009; Treutlein et al., 2009). Such an understanding represents a major undertaking because of the inherent complexity of the systems involved (Burmeister, McInnis, & Zöllner, 2008; Richardson & Norgate, 2006; Rutter et al., 2001). Although twin studies have shown that almost all human characteristics are heritable, finding a single, or even a limited number of polymorphisms or genes that account for individual differences is usually impossible since in the determination of complex outcomes, including most diseases, multiple genes interact in complex ways (Burmeister et al., 2008; Lerner, 2006). Defining and delineating the environment in which organisms live is also a challenge. Although characterizing the environment of fruit flies might be simple, for humans the environment includes the social, cultural, political, and economic systems that immediately affect individuals' and groups' opportunity structures and the external forces that affect their behavior and life chances.

The potential utility of a genetic approach or genetic explanations clearly depends on the question of interest. Medical genetics will rapidly further our understanding of physical and mental illness. It is likely that we will see rapid progress in the understanding of how aspects of the environment, both physical and social, influence the expression of specific disease predispositions. But other questions related to the impact of race and ethnicity as social constructions, or questions related to the impact of group membership or characteristics, will not necessarily benefit from a discourse based on the language of genetics or biology more generally. Racial and ethnic identities or labels are social, psychological, and even political constructions rather than categories that reflect a specific genetic profile. Understanding reasons for the seriously high rate of high school dropout among Mexican-origin students, or the very low levels of wealth among African Americans, requires an appreciation of specific structural disadvantages.

It is clear that the health disparities related to race and ethnicity must be addressed from multiple levels of analysis. Approaches that focus solely on the individual or biological levels run the risk of failing to understand the impact of macro structural factors that determine group-specific educational and occupational opportunities and disadvantages, as well as the living and work conditions that expose individuals and communities to occupational and environmental pathogens. On the other hand, approaches that ignore biology fail to take advantage of opportunities to refine individual risk profiles.

Both theoretically and practically then it is imperative that we deal with the very real problems involved in the combination of different levels of analysis. The problems in explaining higher-order structures and outcomes on the basis of lower-order phenomena (the macro/micro problem) or the dangers inherent in employing collective characteristics in explanations of individual outcomes (the ecological fallacy) are today the same as those that have bedeviled theorists and researchers historically. We know, for example, that Mexican-Americans are, as a census category, at elevated risk of diabetes and its complications, even as they enjoy a mortality advantage over non-Hispanics (Markides & Coreil, 1986). Yet, like all human populations the Mexican-American population is highly differentiated genetically, and the ethnic label itself represents more of an administrative or political category than a meaningful genetic or medical classification. The racial and ethnic group labels that are commonly used in social, behavioral, and medical research reflect significant health-related socioeconomic differences; they are political categorizations that by definition and construction reflect group characteristics of social significance. Their relation to biological traits or predispositions is only approximate.

The promising contribution of genetics is its potential for more accurately identifying those Mexican-origin individuals at highest risk of specific diseases and their complications. But this objective applies to members of other racial and ethnic groups as well. It is doubtful that one would evolve group-specific screening procedures. Poor populations in general require constant screening for, and monitoring of, hypertension and diabetes, as well as other diseases associated with poverty. Refined risk profiles provide useful individual-level information that has little connection to ethnicity per se. Again, the racial and ethnic labels that are routinely used in research reflect politically significant macro-level collective characteristics that are of limited use in predicting individual-level (micro) outcomes. The demonstration that Mexican-origin individuals are, as a group at elevated risk of diabetes is a useful finding, but the explanation of that elevated group