Population Research and Policy Review **14**: 277–282, 1995.

Biosocial models of demographic behavior: An introduction

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Abstract. A workshop on biosocial models of demographic behavior was organized to provide information to members of the Social Sciences and Population Study Section (SSP), the group entrusted by the National Institutes of Health (NIH) with the responsibility for conducting the first level of peer review of demographic applications submitted to NIH for possible funding. Some of the variables studies by demographers are biological, e.g., fertility, fecundity, morbidity, and mortality, so demographers are not unaware of biological variables. However, they tend to treat biological variables as something to be explained by social, economic, and psychological factors rather than to be integrated into an explanatory paradigm. This workshop contains papers that focus upon various stages of the life cycle and explore the importance of biosocial variables in explaining selected aspects of human behavior.

Key words: Biosocial models, Demographers, Human behavior

Introduction

The Division of Research Grants (DRG) is very committed to the peer review of research applications and is deeply dependent upon standing study sections as the mechanism through which this occurs. In particular, DRG is dependent upon the study section members' having appropriate expertise and dedication, largely from a sense of professional obligation, to review a large number of applications in a variety of areas.

Periodically, DRG sponsors workshops for study section members to help them become even better scientists and reviewers. Such workshops are designed to provide additional information to study section members about an area of scientific interest to them. Occasionally, the members are already engaged in active research in this area. More commonly, the members may be familiar with this area but lack actual expertise. In such situations, the workshop would provide additional knowledge so that the members will gain a deeper appreciation of the area's major paradigms, basic methodology, and ability to contribute to the advancement of scientific knowledge. By sponsoring such a workshop, NIH is not necessarily encouraging study section members to do research in that particular area or attaching priorities to such research. Rather, such workshops are offered in the hope that exposure to

This introduction presents an overview of the topics covered by the authors of the papers presented and the workshop, and is based upon opening remarks at the DRG Workshop on Biosocial Models of Demographic Behavior, Bethesda, MD, 12 October 1994.

other scholars will broaden their horizons and, perhaps, encourage reviewers to be more eclectic when evaluating possible paradigms. Likewise, DRG encourages the publication of workshop proceedings to broaden the exposure and horizons of general scientific community.

This workshop was held for the benefit of the Social Sciences and Population Study Section (SSP), a group of the country's leading social demographers. The topic of this workshop – biosocial models of demographic models – qualifies as an area with which many demographers may be somewhat familiar but lack actual research experience. Demographers are certainly aware of the importance of biological variables. Two of the three demographic variables – fertility and mortality – are biological, and a great deal of demographic research has treated them as dependent variables that can be predicted by a series of social, economic, and psychological variables. Several paradigms of intermediate or proximate variables have been constructed to assist in establishing those causal links, and these proximate variables have tended to be biological in nature (Davis & Blake 1956; Mosely & Chen 1984).

However, the primary emphasis of demographic research has been upon social and economic variables. The tendency has been to acknowledge biological variables as something either to be explained or controlled while researchers establish the relative impact of social and economic variables upon the demographic processes. In part, this is because most demographers have a strong background in the social sciences. As social scientists, they were taught that, although biological factors can operate as constraints, behavior is largely learned and the social and economic context in which this learning takes place greatly influences how much is learned and what is learned. Quite simply, social scientists are taught that nurture is more important than nature.

The more sophisticated researchers also realize that nature must be controlled when examining nurture. However, these controls are seldom explicit. Generally, the necessary information is not gathered. This means that statistical controls are not feasible unless a surrogate measure can be found. Because quasi-experimental (or even non-experimental) research designs are the rule rather than the exception in demographic research, randomization is seldom possible. Thus, generally the researcher is left with assuming that any biological variables not in the research model are randomly distributed with respect to the exogenous variables. The statistical effects of such randomness would be to dampen any relationships observed between the predictor and the predicted variables. To the extent that biological variables are not randomly distributed across predictor variables, the possibility of systematic error arises. Moreover, the research strategy of assuming randomness of biological variables negates the possibility of discovering interactions between social and biological variables.

Thus, one key issue is whether there are unmeasured variables, biological in nature, that are related to the social and economic variables demographers

use in their analytic models and to the outcome variables. Because they have largely been trained as social scientists, demographers tend to assume the assumption of biological or genetic randomness is valid. They have been taught that is the case, and they teach their students that is the case. Moreover, to state otherwise opens a pandora's box of issues and risks political incorrectness. Genetic variables are seen to change very slowly, much more slowly than social structural variables are perceived to change, and appear less amenable to intervention. Indeed, deliberately changing them conjures up images of Nazi Germany and the holocaust or of an Orwellian society in which everyone is programmed to be a perfect citizen and to maximize public well-being. Moreover, to admit that genetic variables may be important determinants of human behavior somehow diminishes the perceived importance of the social and economic variables as determinants of human behavior. This may be viewed by some as challenging the importance of the social science paradigm. This view is incorrect. Biological variables can be used as markers to identify situations in which early intervention – perhaps of a social nature – is appropriate. For instance, if the presence of a particular genetically determined predisposition to learning disabilities is present and if this genetic predisposition can be identified reliably early in infancy or childhood, perhaps appropriate, individually tailored interventions can avoid the learning disabilities altogether or at least ameliorate their effect. Moreover, to the extent that the social science paradigm is based upon faulty assumptions and denies the importance of omitted, largely biological variables, it needs to be modified. As Udry (1994) illustrates in his presidential address to the Population Association of America, the gender paradigm can be based on a theory that is inadequate and yield simplistic results.

In fairness to social scientists, often biological scientists fall into the opposite trap by examining the influence of biological variables on human behavior while either ignoring or holding constant the social and economic context in which this behavior occurs. The way out of both traps is to include both biological and social variables in analytic models. A group of people – behavioral geneticists – has been doing this for some time and their work has come to be identified as 'biosocial'. However, their influence on other behavioral scientists has spread only slowly.

DRG invited to this work shop a group of people who are involved in various aspects of biosocial research. At least one of them, David Fulker, could be labeled a behavioral geneticist. Another person – Richard Udry – could be labeled a demographer, while others are doing what could generally be labeled biosocial research. They addressed various aspects of the life cycle, beginning with David Fulker and Stacey S. Cherney of the University of Colorado, who focus upon genetic and environmental influences on cognition during childhood, paying particular attention to the intergenerational transmission of intelligence and other developmental traits. Studies of twins can differentiate between three sources of individual differences – genetic, shared environmental, and unique environmental. The relative importance

of each source may vary by behavioral phenotype and by the person's sociodemographic characteristics. Thus, apparently genetic variation is unimportant when considering receptive language but is as important as shared environmental influences in determining the development of expressive language. For IQ, genetic differences are relatively unimportant at young ages but become increasingly important in adulthood. Thus, studies based upon one age range may not be generalized properly to other age ranges, and studies based upon one developmental phenotype may not be generalized properly to other phenotypes. Clearly, however, for some age groups and developmental phenotypes, genetic influences are at least as important as environmental factors.

Next, David Rowe of the University of Arizona examines biosocial models of deviant behavior. He describes biological influences on criminality and presents data suggesting that sex difference in criminality are biologically based and that differences in this trait among individuals are heritable. This means that, because of genetic effects, genetic influences must be controlled in the estimation of environmental ones. Family studies that do not allow for genetic influences will produce ambiguous results. In his words, the study of socialization processes, 'a choice to use just one level of genetic relationship is scientifically bankrupt'. Yet behavioral genetics is 'user friendly' to environmental influences and such research designs can offer many avenues for analysis of environmental effects.

The three most important morbidity differentials are age, gender, and socioeconomic status. Kenneth Weiss of the Pennsylvania State University is an anthropologist studying biosocial models of health and behavior, paying particular attention to the relationship between ethnic group membership and disease. Demographers have long been aware of the strong relationship between ethnicity and demographic behavior, and the debate on whether the observed differences are due to ethnic differentials in socioeconomic status (the characteristics hypothesis) or minority status per se (the minority status hypothesis) is still being waged. Yet very few demographers are attempted to determine the extent to which genetic differences help explain this important differential in mortality, although much earlier there were several attempts to determine the extent to which the etiology of gender differences in mortality is biological in nature (Madigan 1957). Weiss points out that ethnic groups, even those based on race or national ancestry, are defined on the basis of social definitions as well as genetic differences. This, combined with individual variation, means that not everyone in a given group is the same. Within this context, genetic predispositions toward a particular disease must be interpreted. Likewise, when one examines the same gene in different populations, one often encounters a largely different set of mutations in that gene. Thus similar traits within or between populations can have different causes. As Weiss concludes, even when 'risks differ among socially (or even biologically) defined ethnic groups, each disease must be

studied on its own merits, in individuals rather than collective group membership'.

Next, Toni Miles and Christine Himes, also of the Pennsylvania State University, present a paper attempting to integrate the fields of population genetics and demography by focussing upon the determinants of body size across the life span. They believe the accuracy of demographic models to project future trends of population-level health and disease can be improved by incorporating biological data and present some strategies for incorporation of the biology of adult body size into demographic models of population aging in the USA. Their data show that biological data are characteristically time-dependent phenomena that behave in a nonlinear fashion and make a plea for the development of genetically informative samples, which will allow clarification of the degrees to which genetic and environmental factors influence demographic phenomena.

J. Richard Udry of the University of North Carolina discusses policy and ethical implications of biosocial research. Currently President of the Population Association of America, Udry is well known to members of the study section, partly because of his research linking androgen levels to gender behavior. In this workshop, he deals with the implications of biosocial research for policy formulation and treats some of the ethical and policy considerations in applications of results of biosocial research. According to Udry, admitting a behavior has biological foundations does not mean it does not also have social foundations. Often the most appropriate form through which to channel intervention is social in nature, as when individuals with a genetic predisposition for a particular disorder are identified and targeted for a preventive or ameliorative intervention that is nongenetic. Moreover, because of biological differences among individuals, different persons may respond differently to the same environmental stimulus, and such knowledge is necessary to maximize a planned intervention's effectiveness. Udry believes that some of the ethical concerns of social scientists about biological causes of behavior and social structure are at least partly a result of a misunderstanding by social scientists of what biology can and cannot explain. It is also partly a function of their world view. The problems with the ethics of biosocial models come from incorrectly drawing policy implications from them.

John Casterline of the Population Council and a member of the Social Sciences and Population Study Section provides a cogent overview of the workshop's proceedings.

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