Beyond Dummy Variables and Sample Selection: What Health Services Researchers Ought To Know about Race as a Variable

Thomas A. LaVeist

Objective. This article addresses the definitional and methodological problems associated with the most common uses of race as a variable in health research.
Principal Findings. Although often used in health services research, race is a poorly understood concept because it lacks conceptual clarity. Moreover, the measurement problems with race have not yet been adequately addressed. As a result, many quantitative models that attempt to explain race differences are inadequate to inform health or social policy.
Conclusions. Researchers should treat the race variable with the same degree of caution and skepticism with which it treats any other variable.

Keywords. Race, quantitative methods, regression analysis, research methods

The analysis of race has a long history among health scientists in America (Jones, LaVeist, and Lillie-Blanton 1991; Krieger 1987). Decades of research have revealed substantial race differences in morbidity, mortality, health and illness behavior, access and utilization of health services, and other issues of interest to health services researchers (U.S. Department of Health and Human Services 1985; Braithwaite and Taylor 1992). Due partly to these persistent research findings and partly to social convention, it has become standard practice to publish health and vital statistics stratified by race, to statistically control for race in multivariate analysis, and to exclude individuals from analysis on the basis of their race (Jones, LaVeist, and Lillie-Blanton 1991). These conventions are routinely taught in graduate programs in health services research, medical sociology, biostatistics, epidemiology, and other allied health fields. However, rarely is the appropriateness of these conventions questioned. Moreover, it is only in the rare case that an investigator will provide an explicit justification for these practices. Yet there are serious problems with the operational definition, measurement, and conceptualization of race. These problems have gone largely ignored.

This article is an attempt to initiate a dialogue regarding the analysis of race in health services research. How is race defined? How might it best be measured? How should race be conceptualized? Similar dialogues have taken place in other disciplines (Jones, LaVeist, and Lillie-Blanton 1991; Leiberman 1968; Davis 1992; Cooper and David 1986; Zuckerman 1990). There is growing interest in understanding the proper use of race in health research (Cooper et al. 1982; Byrd 1990; Nelson 1970); however, this literature has been developing without input from health services researchers. An understanding of the definition, measurement, and conceptualization of race is a prerequisite to the proper interpretation of research results regarding race. Such a dialogue is particularly appropriate for health services researchers because of the close ties between health services research and health policy development.

WHAT IS RACE?

Race is a social category, not a biological category. It is a concept that has changed over time and is variable across societies. Illustrative of this point is a comparison of the policies regarding the assignment of racial status in three societies: the United States, Japan, and Brazil. Table 1 displays a condensed version of the protocol, issued by the U.S. National Center for Health Statistics, used to assign racial status on birth certificates. The table shows that a child can be assigned "white" only if both parents had been designated "white." However, in every other case, the race of the father determines the race of the child. Thus, the offspring of a Japanese male and a black female results in the designation "Japanese" on the child's birth certificate, and a union of a black male and a Japanese female results in a designation as a "black" child. However, the result of the mating between a white person and a person of any other racial/ethnic group results in a child who is a member of the nonwhite group, regardless of which parent is white. This policy was changed in 1989 so that children

---

An earlier version of this article was delivered at the annual meetings of the Association of Health Services Research, Chicago, IL, June 1992. Address correspondence and requests for reprints to Dr. Thomas A. LaVeist, Ph.D., Johns Hopkins School of Hygiene and Public Health, 624 North Broadway, Baltimore, MD 21205. This article, submitted to *Health Services Research* on October 5, 1992, was revised and accepted for publication on July 30, 1993.

are now assigned the race of the mother regardless of the race group the father claims.

Table 2 shows the racial classification scheme used in Japan until 1985. In that country a child was designated Japanese only if his or her father was Japanese. The official policy was that this scheme was to be followed without regard to the race or nationality of the mother. In 1985, the Japanese national legislature amended the constitution so that a person would be considered Japanese if either parent was Japanese.

The Brazilian classification scheme is outlined in Table 3. In that country interracial mating is handled by assigning the offspring to a third racial category, mulatto (a classification formerly used in the United States; see Lee 1993). The Brazilians then divide mulattos into a set of subcategories on the basis of the relative lightness or darkness of the person's skin complexion.

These three countries over less than a decade produced five different policies for assigning racial status. What, then, is the biological relevance of race? Race is a concept that is determined fundamentally by political

Table 1: U.S. Policy for Assigning Racial Status on Birth Certificates prior to 1989

Father	*Mother*	*Child*
White	White	White
White	Black	Black
White	Japanese	Japanese
Black	White	Black
Black	Black	Black
Black	Japanese	Black
Japanese	White	Japanese
Japanese	Black	Japanese
Japanese	Japanese	Japanese

Source: National Center for Health Statistics.

Table 2: Japanese Policy for Assigning Racial Status on Birth Certificates prior to 1985

Father	*Mother*	*Child*
White	Japanese	White
Black	Japanese	Black
Japanese	White	Japanese
Japanese	Black	Japanese

Source: University of Michigan, Center for Japanese Studies.

Table 3: Brazilian Policy for Assigning Racial Status on Birth Certificates

Father	*Mother*	*Child*
White	White	White
White	Black	Mulatto*
Black	White	Mulatto
Black	Black	Black

Source: Degler 1971.

* Mulatto is then broken into fine distinctions based on physical characteristics: *Pretos* (black), *Preto Retinto* (dark black), *Cabra* (slightly less black), *Cabo Verde* (slightly less black), *Escuro* (lighter still), *Mulato Esuro* (dark mulatto), *Mulato Claro* (light mulatto), *Sararas, Moreno, Blanco de terra, Blanco.*

and social forces without regard to biogenetics or scientific rigor. It can be argued that the sociopolitical nature of race is not problematic for health research if what is being measured by a race dummy variable is commonly understood. There is a generally held notion that consensus exists regarding the meaning of race. But is this notion based in reality?

In examining representative medical and allied health dictionaries for definitions of race, I found significant variability among their definitions. Some dictionaries defined race in entirely biological terms while others recognized the social and political aspects of race. *A Dictionary of Epidemiology* (Last 1988) provides a terse definition that embraces the biological concept without providing rigorous biological guidelines for identifying individual races. This dictionary also does not acknowledge the social or political aspects of race. Race is defined as: "persons who are relatively homogeneous with respect to biological inheritance."

In *A Dictionary of Genetics* (King and Stansfield 1990) race is defined as a scientific, biogenetic concept, "a phenotypically and/or geographically distinctive subspecific group, composed of individuals inhabiting a defined geographic and/or ecological region, and possessing characteristic phenotypic and gene frequencies that distinguish it from other such groups." The dictionary then adds a curious sentence that contradicts the implied scientific rigor of the first part of the definition. "The number of racial groups that one wishes to recognize within a species is usually arbitrary but suitable for the purposes under investigation."

The *International Dictionary of Medicine and Biology* (Becker and Landav 1986) views race as a biological concept that defies discrete categorization:

> A subspecies or other division or subdivision of a species. Human races are generally defined in terms of original geographic range and common

> hereditary traits which may be morphological, serological, hematological, immunological, or biochemical. The traditional division of mankind into several well-recognized racial types such as Caucasoid (White), Negroid (Black), and Mongoloid (Yellow) leaves a residue of populations that are of problematical classification, and its focus on a limited range of visible characteristics tends to oversimplify and distort the picture of human variation.

Psychiatric Dictionary (Campbell 1981) is in fundamental agreement with the *International Dictionary of Medicine and Biology:* "[T]he term race implies a blood related group with characteristic and common hereditary traits. . . " Likewise, this dictionary does not embrace the most commonly accepted categories of human races: "Primary race or subspecies—the Caucasian, the Mongoloid, and the Negroid—are generalized racial types, hypothetical stocks, rather than living races." The *Psychiatric Dictionary* then goes on to advance the biological concept of "race disease": "Group of individuals susceptible to the same disease. . . . One might conceive, therefore, as well of a gastric ulcer race, a manic depressive race, a meningococcus susceptible race, or gall-bladder race, as of the present customarily accepted black, yellow or white divisions of mankind."

The Dictionary of Modern Medicine (Segen 1992) provides the most interesting but least informative definition of race I found among the dictionaries. This definition illustrates an attempt to incorporate the biological, political, and social conceptions of race, however unsuccessfully:

> An ethnic classification, subdivided in the U.S. into five categories, according to origin: (1) White, not Hispanic (Europe, North Africa, Middle East); (2) Black not Hispanic (Africa); (3) Hispanic; (4) American Native (Indians, Eskimos); (5) Asian and Pacific Islanders; stratification by race is of interest in several areas of medicine for a number of specific reasons. *Clinical Medicine:* Some HLAs are more common in certain racial groups and may be associated with particular diseases, thus helping to diagnose and manage difficult cases. *Public Policy:* The Civil Rights Act of 1964 mandated equality in employment and educational policy and knowledge or race favors minority candidates. *Transfusion Medicine:* Certain red cell antigens may be relatively uncommon in a particular race and knowledge of race reduces the labor required to find a suitable unit for transfusion. *Transplantation:* Human leukocyte antigens (HLA) differ somewhat according to race and may be used to identify potential recipients for organ transplantation.

The first part of this definition is tautological in that it defines race as merely the sum of its categories as they are currently officially recognized by the United States government. The examples that are provided to demonstrate the relevance of race in medicine are also problematic. The explanations for clinical medicine, transfusion medicine, and transplantation refer to race differences in certain HLAs (and are addressed in the next section of this article). The explanation for public policy, however, addresses a politically charged issue, affirmative action. It is not clear how this example clarifies the meaning of race at either the theoretical or the practical level.

Dorland's Illustrated Medical Dictionary (Taylor 1988) defines race more broadly:

> 1. an ethnic stock, or division of mankind; in a narrower sense, a national or tribal stock; in a still narrower sense, a genealogic line of descent; a class of persons of a common lineage. In genetics, races are considered as populations having different distributions of gene frequencies. 2. a class or breed of animals; a group of individuals having certain characteristics in common, owing to a common inheritance; a subspecies.

The *Dorland's* definition attempts to incorporate ethnicity, nationality, tribe, and geneological lineage under race. In doing so, this definition exposes the most serious problem faced by American health researchers who are interested in conducting research on race. That is, in the United States the fine distinctions of ethnic tribal or national variations within race groups is obscured in favor of physical appearance. For example, ethnicity refers to cultural commonality; yet, the descendants of Africans, Spaniards, and Indians share a common ethnic identity in the Dominican Republic. Are they all members of the same race group? Officially, in the United States they are all regarded as Hispanic. However, in daily social interaction in the United States, they would be regarded as black or white based on their appearance and their degree of acculturation into American society. Mexican, Cuban, and El Salvadoran immigrants to America are all categorized as Hispanic, obscuring their nationality and cultural differences.

Europeans from Southern Italy, Northern Ireland, and Southern France come from distinctly different cultural traditions, yet upon arrival in the United States they are categorized as white. Rarely is this source of variation considered in health research. The same can be said for Native Americans and Southeast Asians. The Yoruba of Brazil and Nigeria share a common ethnic/cultural heritage, yet they differ in nationality. Within the American cultural context they both would be regarded as black, thus adopting the health risks associated with that group.

In health services research, the race dummy variable (the most common method of measuring and conceptualizing race) is used to measure all of these: ethnicity, skin color, and nationality. This results in some degree of measurement error, but more importantly, the lack of conceptual clarity leaves a great deal of room for erroneous interpretations of research findings and consequently for ineffective public policy.

USES OF RACE IN HEALTH RESEARCH

Williams (1992) found that race is a frequently used variable in health services research. In his analysis of the uses of race in *HSR: Health Services Research* he found that 64 percent of articles included race in their analysis. The most common use of race was as a binary (dummy) variable used as a control in regression analysis. This finding is consistent with analysis of practices in related fields, such as medical sociology (LaVeist et al. 1992) and epidemiology (Jones, LaVeist, and Lillie-Blanton 1991).

Race is often conceptualized as a proxy for other (not measured) variables that are known or believed to correlate with race (e.g., socioeconomic status, discrimination, cultural factors, unspecified biological differences among race groups, etc.). But it seems logical that if race is a proxy for other factors such as biology or culture, then a need exists to find more creative ways to measure these other factors. If we are to learn how best to intervene in the various problems of concern to health services researchers (the impact of health services on the disease process, access to and utilization of health services, etc.), greater conceptual precision is necessary.

An example taken from the entry on race in *The Dictionary of Modern Medicine* (Segen 1992) serves to illustrate this point. It is suggested in that dictionary that some "human leukocyte antigens (HLAs) are more commonly found in certain racial groups." Knowledge of HLA type is helpful in predicting rejection of transplanted organs. A researcher who is interested in specifying a regression model that would predict rejection of transplanted organs might specify the outcome of organ transplantation (rejected or not rejected) as the dependent variable and a race dummy variable as the independent variable. The researcher would find that, although this model explained some proportion of the variance in transplantation outcome, it did not fully explain the variance.

If the researcher would, next, specify a second model with the same variables and the addition of a second independent variable—HLA match between the organ donor and the organ recipient (good match or not good match)—the significant effect of the race dummy variable would reduce to nonsignificance and the HLA match variable alone would explain a very high proportion of the variance in rejection of organ transplantation. Thus, the relevant determinant of which organ transplantations are likely to be successful is HLA match. Race, then, as a less than fully satisfactory proxy for this biogenetic factor (HLA), is less than fully satisfactory. Consequently, any policy that used race as the primary screen to determine who gains access to organs would be misguided (Kasiske et al. 1991).

Moreover, from a statistical standpoint the simple inclusion of a race dummy variable in a regression model is inadequate if the objective is to develop interventions to affect race differences in a dependent variable. This approach merely allows the researcher to report on differences in the intercept without providing any information about the potential for differences in the effects of the independent variables on the dependent variable (the regression slopes). This approach simply produces adjusted means for the dependent variable for each race group. So a regression model that attempts to predict number of prenatal care visits as a function of health insurance status, age, and race (black or white) results in information on black-white differences in mean number of prenatal care visits adjusting for insurance status and age. A statistically significant coefficient for the race binary variable in such a model specification without further analysis often leads to such illogical, yet commonly published conclusions as, "race is a significant determinant of prenatal care utilization." Such a conclusion eventually filters into medical and public health practice. Clearly, a person's skin color does not determine prenatal care utilization.

To explore more fully the effects of race in the analysis, it would be necessary to specify models separately for the groups being compared and to conduct a test for a statistically significant difference in the parameter estimates for the same variable across the two models. This has the equivalent effect of specifying a multiplicative interaction term between the race binary variable and each of the other independent variables. Thus, one could determine whether black-white differences existed in the effect of insurance status and age on number of prenatal care visits. Such knowledge is a minimum requirement if one is interested in the development of public health programs or policy to reduce race disparities in prenatal care utilization. This is but one example. There are many others.

A second common practice for dealing with race, among health services researchers and other health scientists, is to eliminate one race group in sample selection. At times there may be conceptual justification in doing this. From a practical standpoint the use of a racially homogeneous data set in secondary analysis may be unavoidable. But one should be careful not to attempt to generalize findings for such a data set as if it were representative.

In practice, justified examples for using race as a criterion in sample selection are rare. It is, however, common to find studies that examine, for example, the relationship between smoking and heart disease among white men. If it is the case that the physiological mechanisms that link smoking to heart disease differ by race, then it would be helpful to outline what those differences are. Otherwise, neither the use of race as a criterion in sample selection nor as a "control" variable in such a study is justified.

Definitional and conceptual problems aside, there are measurement problems with race that have not been adequately addressed. There are different methods of measuring race that are associated with the various sources of data typically used in health services research (Hahn et al. 1992, Frost and Shy 1980). Race is assigned on the birth certificate based on a visual assessment of the birth mother (and there is reason to suspect that even this varies by hospital). Race is typically assigned on death certificates based on the visual inspection of the body by the funeral director. Telephone and mail surveys are respondent self-reports, and in face-to-face surveys race is typically assigned by the interviewer upon visually inspecting the respondent. Race assignment on patient discharge records is sometimes based on the respondent's self-report and at other times is assigned by the admitting intake receptionist; in medical records abstracts, race is usually obtained from the hospital admitting records. Each of these methods has an associated measurement error that has gone ignored.

A CONCEPTUAL MODEL OF RACE

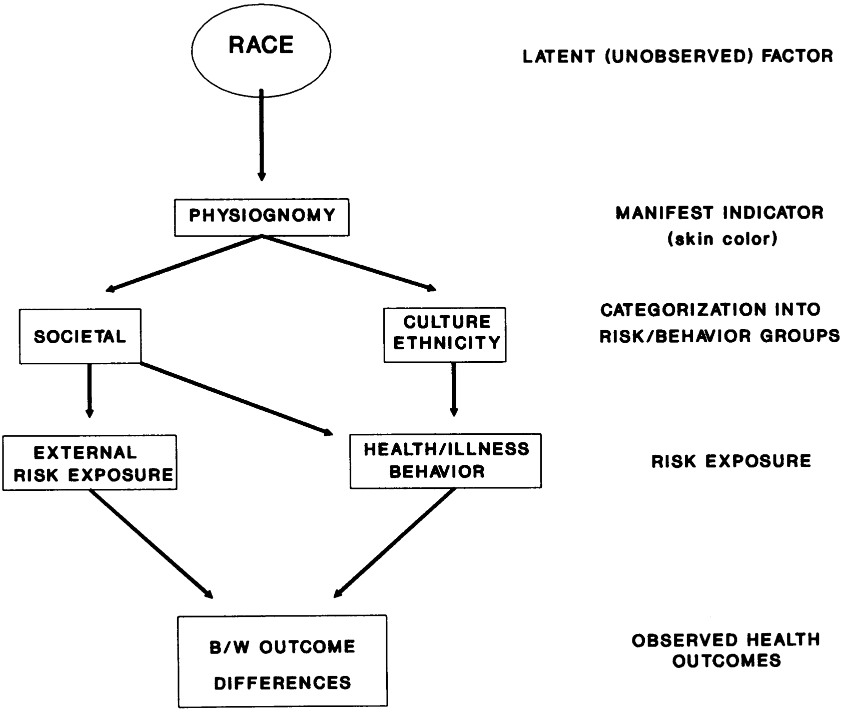
What is race and how should one use it in research on health and health services? This question can be answered in two ways, theoretically and practically. The theoretical will be addressed in this section; the practical will be addressed in the next.

Traditionally, race is viewed as a combination of biological, cultural, and social (usually meaning socioeconomic status) characteristics of individuals. Researchers have traditionally made the implicit assumption of within-group homogeneity among these characteristics. I argue that rather than encompassing three *homogeneous* underlying factors (biology, culture, and social factors), the race dummy variable covers two *heterogeneous* underlying factors (societal factors and cultural/ethnic factors). Societal factors refer to factors that are external to the individual, for example, poor sanitation and other city services in many African American communities (LaVeist 1989, 1992, 1993; Bullard 1983; U.S. General Accounting Office 1983) or race differences in receiving quality medical care (Ford et al. 1989; Yergen et al. 1987; Gittelsohn, Halpern, and Sanchez 1991). Cultural/ethnic factors refer to individual-level behavior—such as dietary practices, tobacco and alcohol use, or responses to stressful events—that can be linked to cultural norms. Thus, in the present formulation, race as it relates to health research is viewed as a complex multidimensional construct. Individuals are allowed to vary among the several components of the construct; thus, homogeneity is not assumed within groups. This construct is schematically represented in Figure 1.

The conceptual model specifies race as a latent factor of which the manifest indicator is most frequently color of skin. Skin color is a continuous variable (varying between light and dark skin). However, it is typically dichotomized. No specific guidelines exist for determining the point in the continuum at which the line of demarcation is drawn. Rather, this critical decision is typically left to societal interpretation. (This is certainly the case in most face-to-face surveys, as it is in daily interpersonal interactions.)

The process by which individuals assign racial status to others is called physiognomy (defined literally as the art of judging on the basis of appearance). As individuals are judged, they are assigned to categories that determine their level of exposure to external health risks. Thus, although black and white Hispanics share a common ethnicity, black Hispanics have fewer opportunities for access to mainstream societal resources than white

Figure 1: Conceptual Model of Race



Hispanics (Denton and Massey 1989). Therefore, black Hispanics have a societal health risk exposure profile that more closely resembles that of non-Hispanic blacks. However, one would expect the health and illness behaviors of black Hispanics to resemble more closely those of white Hispanics than of non-Hispanic blacks.

Individuals, too, identify themselves within a racial group (as is the case in mail or telephone surveys). Along with self-identification comes the acceptance of cultural norms and practices that have implications for health and illness behavior. Moreover, societal factors may also have an impact on health and illness behavior. For example, low socioeconomic status may constrain the dietary options of an individual or the nature of his or her employment, or travel distances may make it difficult to keep medical appointments or comply with medical regimens.

Finally, the consequences of these various factors—societally determined level of health risk exposure, culturally determined health and illness behavior, and the interaction between societal factors and health and illness behavior—combine to produce observed morbidity and mortality differentials across race groups.

SOME PRACTICAL CONSIDERATIONS IN THE USE OF RACE

Consideration of this multidimensional construct leads naturally to practical implications for health services researchers. First, we must acknowledge that what is measured by the race dummy variable is not culture, biology, values, or behavior. What is actually measured by the race variable is skin color. And, since this is the case, it is more productive to measure skin color more accurately. Where possible, color of skin should be measured as a continuous variable. In studies in which race is regarded as a measure of culture (e.g., health services utilization, or health and illness behavior), it may be less useful to specify race as a continuous variable. However, there is evidence to support the hypothesis that the degree of lightness or darkness of a person's skin may affect that person's level of exposure to health risks (Keith and Herring 1991). Klag et al. (1991) used a light meter to measure the relative lightness or darkness of his respondents' skin color. However, this may be impractical in some data collections. Alternatively, one might code skin color as light, medium, or dark, based on the evaluation of a trained interviewer. In the case of nonblack groups, such as Asian Americans, the measurement of skin color is less relevant. It may be more relevant in this case to measure degree of acculturation into American culture.

Measuring race as a continuous variable may not be possible when using certain types of data (e.g., hospital discharge data). However, it would be possible to indicate how race was measured in the data set. Was it measured by the interviewer's visual assessment of the respondent? Was it measured by the respondent's self-report? This is useful because as the model displayed in Figure 1 shows, societal health risk exposure is determined not by the respondent's self-identified race, but rather by the health risk group to which he or she is assigned—most frequently by others. On the other hand, the culturally determined health and illness behavior risks are determined by the respondent's self-identity. Ideally, one would have dual measures of race in the data set (one of them assigned by the interviewer and the second the respondent's self-report).

It would also be ideal to measure ethnic identifiers in addition to race. Differences in morbidity, mortality, and health and illness behavior within race groups are greatly understudied. Federal data sets routinely collect ethnic identification with regard to Hispanics; however, it would be beneficial to extend this practice to other groups by collecting country of origin, for instance, among whites, Asians, blacks, and Hispanics.

Researchers should consider carefully the appropriateness of statistically "controlling" for race in analysis. Scholars should consider, explicitly, how they are conceptualizing race before including the race dummy variable in a regression model to "control for race." In many cases this control is unnecessary, for example in a study of the relationship between smoking and heart disease; it is unnecessary to "control" for race unless there is a reason to expect that the physiological link between smoking and heart disease is different among racial groups. Moreover, any race differences in the frequency of underlying confounding factors (such as HLAs) would be better addressed by directly measuring the factor for which race is a proxy. If this is not possible, it would be important to clearly indicate the factor for which race is serving as a proxy, and any policy or practice implications to be derived from the research should be developed with this in mind.

Moreover, there is a need to develop more creative and precise measures of factors for which race is believed to be a proxy—such as culture.

When race is included in analysis as a control variable (justifiably or not), it is important to provide an interpretation of the findings. It is not sufficient to include race in a regression analysis as a control variable, obtain a statistically significant effect, and then not provide an interpretation of that finding.

When race differences are observed, it is necessary that investigators examine both the within-group and between-group variation to determine whether true race differences exist or if the observed differences are caused by variation within race groups. For example, it is likely that differences in dietary practices and in access to health care among African Americans living in rural South Carolina are more like those of whites living in rural Arkansas than they are like those of African Americans living in Detroit.

It is also necessary that investigators provide a theoretically grounded rationale for excluding respondents from their analysis because of their race. One recent study actually found an *increase* in this practice among epidemiologists (Jones, LaVeist, and Lillie-Blanton 1991). Such findings emphasize the importance of the recent policy changes at the National Institutes of Health. Investigators are now required to include women and minorities as study subjects in clinical research unless "compelling scientific or other justification" (not to include them) exists.

Health and public policy implications are particularly important for health services research. Ways in which one conceptualizes race have much to do with the development of policy and the eventual success of the policy. Biological determinism suggests that few of the interventions at the disposal of health services can be effective in reducing race-associated health differentials. A purely behavioral conceptualization suggests that all interventions should focus on modifying individuals' behaviors. A societal conceptualization of race differences suggests that all necessary changes are external to the individual.

In practice it seems most likely that some contributions of behavioral and social factors account for race differences in health status, health services utilization, and so forth. The multidimensional construct presented in this article allows for a case-specific conceptualization of race. In some cases the behavioral aspects of race (actually ethnicity) will be most important. In other cases the importance will fall to societal factors (factors external to the individual). Consequently, policy designed to improve race differentials in health status, health services utilization, access, and other issues of interest to health services researchers must also be case specific.

In short, health services researchers should treat the race variable with the same degree of caution and skepticism they bring to any other variable.

ACKNOWLEDGMENTS

I am grateful for helpful comments from Dr. Marsha Lillie-Blanton and Dr. Suzanne Orr, and from two anonymous reviewers on earlier drafts of this article.

REFERENCES

Becker, E. L., and S. I. Landav. *International Dictionary of Medicine and Biology.* New York: Oxford University Press, 1986.

Braithwaite, R. L., and S. E. Taylor. *Health Issues in the Black Community.* San Francisco: Jossey-Bass Publishers, 1992.

Bullard, R. D. "Solid Waste Sites and the Black Houston Community." *Sociological Inquiry* 53 (Spring 1983):273–88.

Byrd, W. M. "Race, Biology and Health Care: Reassessing a Relationship." *Journal of Health Care for the Poor and Underserved* 1, no. 3 (1990): 278–96.

Campbell, R. J. *Psychiatric Dictionary.* 5th edition. London: Oxford University Press, 1981.

Cooper, R., and R. David. "The Biological Concept of Race and Its Application to Public Health and Epidemiology." *Journal of Health Politics, Policy and Law* 11, no. 1 (1986): 97–116.

Cooper, R., M. Steinhauer, W. Miller, R. David, and A. Schatzkin. "Racism, Society and Disease: An Exploration of the Social and Biological Mechanisms of Differential Mortality." *International Journal of Health Services* 11, no. 3 (1982): 389–414.

Davis, J. E. "Reconsidering the Use of Race as an Explanatory Variable in Program Evaluation." *New Directions for Program Evaluation* 53 (Spring 1992): 55–67.

Degler, C. N. *Neither Black nor White: Slavery and Race Relations in Brazil and the United States.* New York: Macmillan Publishing Co., 1971.

Denton, N. A., and D. S. Massey. "Racial Identity among Caribbean Hispanics: The Effects of Double Minority Status on Residential Segregation." *American Sociological Review* 54, no. 5 (1989): 790–808.

Ford, E., R. Cooper, A. Castaner, B. Simmons, and M. Mar. "Coronary Arteriography and Coronary Bypass Survey Among Whites and Other Racial Groups Relative to Hospital-based Incidence Rates for Coronary Artery Disease: Findings from NHDS." *American Journal of Public Health* 79, no. 4 (1989): 437–39.

Frost, F., and K. K. Shy. "Racial Differences between Linked Birth and Infant Death Records in Washington State." *American Journal of Public Health* 70, no. 9 (1980): 974–76.

Gittelsohn, A. M., J. Halpern, and R. L. Sanchez. "Income, Race and Surgery in Maryland." *American Journal of Public Health* 81, no. 11 (1991): 1435–40.

Hahn, R. A., J. Mulinare, and S. M. Teutsch. "Inconsistencies in Coding of Race and Ethnicity between Birth and Death in U.S. Infants." *Journal of the American Medical Association* 267, no. 2 (1992): 259–63.

Jones, C. P., T. A. LaVeist, and M. Lillie-Blanton. "'Race' in the Epidemiologic Literature: An Examination of the *American Journal of Epidemiology,* 1921–1990." *American Journal of Epidemiology* 134, no. 10 (1991): 1079—84.

Kasiske, B. L., J. F. Neylan, R. R. Riggio, G. M. Danovitch, L. Kahana, S. R. Alexander, and M. G. White. "The Effect of Race on Access and Outcome in Transplantation." *The New England Journal of Medicine* 324, no. 5 (1991): 302–307.

Keith, V. M., and C. Herring. "Skin Tone and Stratification in the Black Community." *American Journal of Sociology* 97, No. 3 (1991): 760–78.

King, R. C., and W. D. Stansfield. *A Dictionary of Genetics.* London: Oxford University Press, 1990.

Klag, M. J., P. K. Whelton, J. Coresh, C. E. Grim, and L. H. Kuller. "The Association of Skin Color with Blood Pressure in U.S. Blacks with Low Socioeconomic Status." *Journal of the American Medical Association* 265, no. 5 (1991): 599–602.

Krieger, N. "Shades of Difference: Theoretical Underpinnings of the Medical Controversy on Black/White Differences in the United States, 1830—1870." *International Journal of Health Services* 17, no. 2 (1987): 259—78.

Last, J. M. *A Dictionary of Epidemiology.* 2nd ed. New York: Oxford University Press, 1988.

LaVeist, T. A. "Linking Residential Segregation to the Infant Mortality Race Disparity." *Sociology and Social Research* 73, no. 2 (1989): 90—94.

———. A. "The Political Empowerment and Health Status of African Americans: Mapping a New Territory." *American Journal of Sociology* 97, no. 4 (1992): 1080–95.

———. "Segregation, Poverty and Empowerment: Health Consequences for African Americans." *The Milbank Quarterly* 71, no. 1 (1993): 41—64.

LaVeist, T. A., D. R. Williams, M. Lillie-Blanton, and C. Jones. "The Uses of Race in Medical Sociology: An Analysis of the *Journal of Health and Social Behavior.*" Delivered at the annual meetings of the American Sociological Association, Pittsburgh, PA, August 13–17, 1992.

Lee, S. M. "Racial Classification in the U.S. Census: 1890–1990." *Ethnic and Racial Studies* 16, no. 1 (1993): 75–94.

Leiberman, L. "The Debate over Race: A Study in the Sociology of Knowledge." *Phylon* 39, no. 4 (1968): 127–41.

Nelson, N. M. "On Racism in Science." *The New England Journal of Medicine* 283, no. 11 (1970): 594–95.

Segen, J. C. *The Dictionary of Modern Medicine.* Park Ridge, NJ: The Parthenon Publishing Group, 1992.

Taylor, E. J. *Dorland's Illustrated Medical Dictionary.* 27th ed. Philadelphia: W. S. Sanders Company, 1988.

U.S. General Accounting Office. *Citing of Hazardous Waste Landfills and Their Correlation with Racial and Economic Status of Surrounding Communities.* RCED-83-168. Washington, DC: Government Printing Office, 1983.

U.S. Department of Health and Human Services. *Report of the Secretary's Task Force on Black and Minority Health.* #0-487-637. Washington, DC: Government Printing Office, 1985.

Williams, D. R. "The Concept of Race in Health Services Research: 1966–1990." Delivered at the Annual Meetings of the Association for Health Services Research, Chicago, June 1992.

Yergen, J., A. B. Flood, J. P. LoGerfo, and P. Diehr. "Relationship between Patient Race and the Intensity of Hospital Services." *Medical Care* 25, no. 7 (1987): 592–603.

Zuckerman, M. "Some Dubious Premises in Research and Theory on Racial Differences: Scientific, Social and Ethical Issues." *American Psychologist* 45, no. 12 (1990): 1297–1303.