



Studying Biobehavioral Aspects of Health Disparities Among Older Adult Minorities

Keith E. Whitfield

ABSTRACT *Current projections suggest that by 2050, the total number of non-Hispanic Whites aged 65 and over will double, the number of Blacks aged 65 and over will more than triple, and the number of Hispanics will increase 11-fold. These significant increases in older minority adults in the United States are in direct contrast to the current limited knowledge about health behaviors like smoking, drinking, and drug use among older Americans. This represents a major area of opportunity for researchers to advance science on the long-term effects of substance abuse and HIV/AIDS. The provision of appropriate public health information for these populations depends, in part, on increased basic and social/behavioral research and particularly on integrative biobehavioral approaches in these understudied older groups. This article provides a brief overview of some of the challenges faced in studying older ethnic minority adults. These include issues such as recruitment, conceptualization, and methodology. Some potential areas for future research are offered.*

KEYWORDS *Biobehavioral approaches, Health disparities, Older ethnic minorities.*

INTRODUCTION

Demographers predict that over the next 50 years, the aging of the baby boomer generation will swell the number of older adults, defined as those over 65 years old. This growing population is more ethnically diverse than ever before. In the relatively near future, almost one in four elders will be older minorities.¹ This explosion has significant implications for research on drug and alcohol abuse. This article provides a brief overview of some of the challenges experienced in studying older ethnic minority adults, including issues related to recruitment, conceptualization, and methodology. Some potential areas for future research are also offered. In addition, a biobehavioral perspective (i.e., understanding the biological underpinnings and relationships with behavior) is suggested as the most advantageous means for understanding challenges in studying drug and alcohol abuse in older populations. Such study will enhance efforts to establish public health intervention programs. The potential contributions of genetically informed samples are presented as examples of opportunities to decipher the sources of health disparities.

ETHNICITY AND AGING

Changing demographics is only one of the reasons for the importance of increasing research that takes a gerontological perspective of the study of drug and alcohol

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abuse and HIV/AIDS among ethnic minorities. The National Institutes of Health have prescribed that all research will make a good faith effort to include minorities when appropriate. By requiring funded research to make appropriate accommodations for minority subject recruitment, the National Institutes of Health have encouraged scientists to begin to consider issues of race, ethnicity, and culture in research as never before. Still, some researchers who believe that race is not an issue, particularly in more biologically oriented research, resist the inclusion of these variables. There may be some justifiable exceptions for the omission of minority subjects in research such as research conducted in some foreign countries. Conversely, there are few research studies of importance to the general population that could not benefit from the inclusion of minorities in the studies. All of the basic processes that might be studied have implications for special populations.

However, many researchers interested in issues of ethnicity and aging do not have the formal background training to conceptually and methodologically design or adequately interpret the findings. Research on diverse older samples needs to incorporate theory-driven explanatory models.² There are some dimensions of aging for which minority groups arguably represent important models for understanding phenomena. For example, if one were interested in ways that stress is related to drug abuse, given the higher levels of chronic social stress experienced by African Americans from psychosocial sources such as racism and discrimination,³ an ethnically diverse sample would be of great benefit to drawing conclusions. Additionally, understanding how the accumulation of stressful experiences over a lifetime impacts the relationship between stress and drug abuse would provide important information.

The impact of this relationship has been demonstrated by Black and colleagues⁷ who found that although drinking behavior was not predictive of death in African American men, there was a high prevalence of alcohol disorder among African American women, which had a strong influence on mortality. This raises the question: Is this a gender socialization issue or a sex difference or some combination of both? This is an example of the benefit of considering biobehavioral perspectives.

RESEARCH WITH OLDER MINORITIES

Designing culturally relevant and appropriate research necessitates respecting and appreciating the differences that can be observed across and within groups, giving scientists an opportunity to examine phenomena that are embedded within or connected to context.² Although challenges to the creation of culturally appropriate research studies are associated with various aspects of research including participant recruitment, study design, procedures, analyses, and interpretations, the recruitment of minorities has received the most attention recently. Lack of attention to cultural issues in past research has led, in part, to difficulty in recruiting older minority participants, particularly into clinical research studies. Some of the current difficulty in recruitment efforts of minorities comes from past mistakes and lack of ethical treatment of human subjects. For example, difficulty in recruitment of African Americans is due, to some extent, to past research that was poorly designed and unethical, such as the Tuskegee Study.^{8,9}

Although there are now safeguards in place to protect subjects in human experimentation, these measures have not erased the concern and fear among many African Americans that they will be abused for the sake of medical research.⁸ This fear of medical research has contributed to the low participation rates and subsequent

underrepresentation of African Americans in clinical trials.¹⁰⁻¹² There have been advances in considering ethically appropriate methods for recruiting older minorities. For example, Unson et al.¹³ conducted a study that compared different recruitment strategies. They suggested that when scientists develop recruitment strategies and research protocols, they should have an appreciation of the cultural, historical, and social factors that influence older minority participants. Immigration patterns (age of immigration, familial patterns of support) and reasons for immigration might be important mediators for understanding possible relationships between stress and drug abuse.

Ethnic minority research subjects have also expressed concern about the conclusions drawn from some past research studies that do not reflect population strengths, but instead focus on their differences from Caucasians. These differences are portrayed as deviations from some norm or standard for behavior. The interpretation of findings and the a priori hypotheses upon which the studies are based are often not theory driven. Moreover, they do not accurately or sufficiently encompass the complex interrelationships among social, psychological, and biological factors that reflect the human conditions experienced by older ethnic minority subjects. The Unson et al.¹³ examined the perceptions and attitudes of minorities toward research. They illuminated the cost/benefit thinking in which subjects engaged to make a decision to participate in clinical research. In addition, they identified the factors that motivated potential subjects to participate and summarized information to be provided that would aid in developing trust between researchers and minority subjects.

In addition to participants' concerns, there are scientific issues related to the methodological approaches used. These issues must be addressed so that there can be advancement in the research on older minorities. Furthermore, the examinations of racial differences between African Americans and Caucasians are often studied in a manner that burdens rather than benefits African Americans.

King¹⁰ observes that as a result of racism in American society, scientific writing promotes a superior status of Caucasians and an inherent inferiority of African Americans. The conceptualizations of culture, race, and ethnicity have been framed as conceptual models by researchers in the investigations of culture, race, and ethnicity. Cauce et al.¹⁴ describe three models typically used in conceptualizing and interpreting results from cross-cultural research which exemplify the issue of misinterpretation. These models are (1) the cultural deviance model; (2) the cultural equivalence model; and (3) the cultural variant model. The cultural deviant model characterizes differences or deviations between groups as deviant and inferior. The cultural equivalence model is an improvement over the cultural deviance model in that it proposes that superior socioeconomic status provides advantages which create superior performance. The cultural deviance model attributes advantages or superior performance to culture. Putting the onus on culture blames a group for not having the same ideals, resources, attitudes, and beliefs as the majority culture. Placing culpability on socioeconomic status shifts the responsibility to social structures that are inherently unbalanced in their distribution of resources.

The cultural variant model describes differences as adaptations to external forces, exemplifying resilience in the face of oppression. Differences are explained not in relation to a majority/superior group but as culturally rooted internal explanations. The third model by definition allows an appreciation for between-group differences and challenges one to explore within-group heterogeneity. Examples of each of these models can be found in current literature.¹⁴ As knowledge about

ethnic minorities grows, it is predicted that so will the use of cultural variant models to explain differences will also increase. The cultural variant model is important not only for the design and interpretation of research, but also for the translation of research for the layperson. Thus, the presentation of findings in a manner that accurately depicts ethnic minority elders will be more informative and better received by older minorities. At some level, minority elders know about the phenomena we study and make interpretations of their own. It is doubtful that they see themselves as deviant. Thus, maintaining good relationships with older minority communities requires the appropriate conceptual models so that information is translated without bias and presented in an acceptable way to the target audience.

GENES, ENVIRONMENT, AND RACE/ETHNICITY

One of the challenges that face those interested in studying health disparities as it relates to HIV/AIDS and drug and alcohol abuse involves the variability in the pattern of effects observed. Identifying the sources of individual differences in the origins of health disparities is a formidable challenge for the health policy community. The impact of genetic influences on health disparities has often either been ignored or considered not to have significant impact on traits or factors under study in research on health disparities.¹⁵ In addition, far too often when genetic influences are implicated, the results have been misinterpreted.

There is an ample information that differences in environmental factors between ethnic groups account for disparities in health status. Much of the previous research has focused on the behaviors and social structures that produce differences in health and disease across ethnic groups. However, recent research on the multifactorial nature of risks for disease processes demonstrate genetic and environmental influences that are both important. This is perhaps our best indicator that science must avoid a reductionistic view (Whitfield et al.¹⁶). In particular, the role of genetics in the origin of racial health disparities is receiving growing attention and has been susceptible to considerable misinterpretation.

On this matter, the definition of race comes into question. Race remains one of the most politically charged subjects in American life. The sociocultural component of race has often led to categorizations that have been misleading and inappropriately used.¹⁷ Race also reflects cultural as well as biological factors that are deeply intertwined. Therefore, it is imperative to distinguish between race as a statistical risk factor and race as a causal genetic variable.¹⁷ Genetics cannot provide a single all-purpose human classification scheme to adequately address all of the multifaceted dimensions of health differentials. It is likely that some alleles associated with destructive or protective factors related to disease and health may be created, modified, or triggered by cultural and contextual factors. It is the way genes and environment work *in concert*, that is, the underlying assumption for quantitative genetic approaches.¹⁸

Quantitative genetic approaches conceptualize that individual differences found for phenotypes are derived from genetic and environmental sources of variability (for discussion, Plomin et al.¹⁹ and Whitfield²⁰). This perspective is in contrast to one gene–one disease scenarios that are typically not the case for most behavioral phenomena. The underlying premise is that multiple genes or pleiotropy (genes having multiple effects) are involved in genetic effects that are observed in a trait.

The quantitative genetic model conceptualized environmental effects as either common (shared) or unique (nonshared). Individual variation thought to arise from

common/shared environmental effects is because of the subjects living in the same family, sharing the same neighborhood, and thus sharing the same environment. The unique/nonshared environmental component consists of phenotypic variance from environmental factors not shared by family members, thus making members of the same family different from one another.

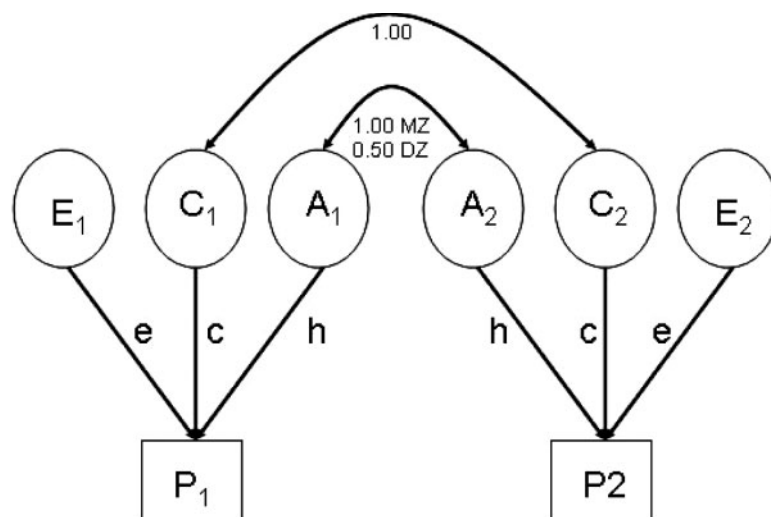
A PRIMER ON GENETICALLY INFORMED APPROACHES TO RESEARCH

Quantitative genetic designs often utilize twin studies. Although there are several variations of this design, the classic twin study tends to be the most frequently used design. The classic twin study involves comparing identical or monozygotic (MZ) and same sex fraternal or dizygotic (DZ) twin pairs (twin pairs that are genetically as alike as siblings but share the same age). The model is established from the well-substantiated assumption that MZ and DZ twin pairs share 100% and on average 50% of their genes, respectively. The heritability of a trait can be analyzed by using several techniques with data from twin pairs and operating under this assumption. Heritability is considered the proportion of phenotypic variance that is due to genetic variation. A simple preliminary method for calculating heritability is to calculate twice the difference between the intraclass correlations (the statistical calculation of how similar one twin is to the other) of MZ and DZ twin pairs. Shared environmental variance can be calculated by doubling the intraclass correlation for the DZ twin pairs and subtracting the MZ intraclass correlation. By subtracting the sum of the heritability and shared environmental estimates from 1.00, an estimate of nonshared environmental variance is obtained.

Biometrical modeling or as it is known in social science fields, structural equation modeling, allows fitting observed data to models of genetic and environmental effects. These are the favored statistical methods by quantitative geneticists working with behavioral data from humans.²¹ Biometrical modeling techniques provide estimates that represent the proportion of genetic and environmental influences. Utilizing variance/covariance matrices, the components of variance (genetic, shared environmental, and unique environmental) are calculated. The advantage of this approach in contrast to intraclass correlation method described earlier is that multivariate extensions can be performed to assess shared and unique genetic and environmental relationships among multiple variables.

An example of a path diagram of a classic univariate twin model is shown in the Figure. It should be noted that the example provided here is a general example and that P can represent any phenotype, trait, or variable. Path analysis is used to test specific hypotheses about relationships between the variables and quantified by parameter estimates. The “ACE” model shown in the Figure shows that the overall phenotypic variance is explained by using three components: A—additive genetic variation, C—common or shared family environmental variation, and E—unique environmental variation. In the Figure, A, C, and E are latent (unmeasured or unobserved) variables, and h, c, and e are parameter estimates. P₁ represents the observed score for twin 1, and P₂ the observed score for twin 2.

In biometrical model fitting, observed data are compared to expected values and results in a χ^2 statistic (for details, Neale and Cardon²¹). To assess the significance of effects, parameters are dropped from the model to determine if a more parsimonious model (one with fewer parameters or latent variables, yet still fitting the data) can account for the data. Statistical significance of these parameters is assessed from



Parameter estimates shown in lower case

FIGURE. Classic twin model. Parameter estimates are shown in lowercase.

maximum likelihood ratio χ^2 comparisons of the models after the parameters have been dropped. Each test of significance involves evaluating the difference between the χ^2 's of the full and reduced model and by using that difference as a χ^2 . The degrees of freedom are established based on the difference between the degrees of freedom for the full and reduced model. If there is a significant difference between two models, the dropped parameter was significant and should remain in the model. For example, if the genetic variance represented by the parameter h is a significant source of variation, this parameter cannot be dropped from the model without causing a significant change in χ^2 between the models. Squaring that parameter, h , also provides an estimate of heritability. The contributions of shared and unique environmental factors to the phenotypic variation are also tested in this same manner. For ease of comprehension, parameter estimates are typically standardized.

In the previous literature on genetics and ethnicity, these types of analyses have not been directly applied to analyses of health disparities. Although there are numerous ways one could consider extending quantitative genetic models to ascertain the influence of cultural factors, Whitfield et al.¹⁵ have offered four different conceptual perspectives in an attempt to explain how the influence of race and ethnicity might be accounted for within the latent factors of a classic twin model. Their approaches include (1) race and ethnicity are encompassed in the shared environmental component of the traditional ACE model; (2) race and ethnic influences are distributed in the shared and nonshared environmental components of the model; (3) race and ethnicity represent an additional component that is not modeled in the traditional ACE model represented in the Figure; and (4) race and ethnicity can be assessed by testing constraints of a multigroup model that tests equality or invariance across groups of identical and fraternal twins from at least two cultural groups.

CONCLUSION

Descriptions and explanations about the differential health burdens experienced by older ethnic minorities can ultimately lead to advances in treatments and public health messages for all age groups. The examinations of behavioral and social factors in conjunction with identifying important biomarkers (such as genes) as interacting contributors to the health of ethnic minority elders will provide a clearer picture of the underlying causes for the health status of these populations. The study of older adults can provide insights into the impact of health behaviors across the lifespan. With careful attention to design and issues related to the study of ethnic minority elders, there can be significant benefit to studying the range of consequences and conditions that come from substance abuse. The change in demographics will impact our society in many ways. These shifts in demographics will not only result in the increases in the number of people but also in the increase in incidence of HIV/AIDS among older adults.²² The current increases are more than likely a glimpse in the future trends that will be observed due to the shifts in the age distribution of the American public. Action sooner rather than later is needed in the form of research that can impact public policy so that appropriate changes in practice can be implemented.

Some of the most significant advances in science will soon come from the discoveries provided from the Human Genome Project. Nonetheless, relying solely on genetic explanations will not provide definitive answers about health disparities. It should be noted that there are considerably smaller genetic differences across racial groups. The role of genetic influences in complex multifaceted systems of influence, however, cannot be completely dismissed. For the study of substance abuse and HIV/AIDS, it is the within-group genetic and environmental influences that have the greatest impact on the health behavior-related phenotype. To study these systems, interdisciplinary team approaches are needed to utilize information that is known from behavioral, social, and biological sciences. With interdisciplinary teams addressing design, methods, and conceptual issues related to the study of substance abuse and HIV/AIDS in ethnic minorities, there is much to be learned about a growing segment of our population that may lead to advances in practice and knowledge that benefit the general population.

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