

Advancing Health Disparities Research Can We Afford to Ignore Measurement Issues?

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BACKGROUND. Research on racial and ethnic health disparities in the United States requires that self-report measures, developed primarily in mainstream samples, are appropriate when applied in diverse groups. To compare groups, mean scores must reflect true scores and have minimal bias, assumptions that have not been tested for many self-report measures used in this research.

OBJECTIVE. To identify conceptual and psychometric issues that need to be addressed to assure the quality of self-report measures being used in health disparities research.

METHODS. We present 2 broad conceptual frameworks for health disparities research and describe the main research questions and measurement issues for 4 key concepts hypothesized as potential mechanisms of health disparities: socioeconomic status, discrimination, acculturation, and quality of care. This article is based on a small conference convened by 6 Resource Centers for Minority Aging Research (RCMAR) measurement cores. We integrate written materials prepared for the conference

by quantitative and qualitative measurement specialists and cross-cultural researchers, conference discussions, and current literature.

RESULTS. Problems in the quality of the conceptualizations and measures were found for all 4 concepts, and little is known about the extent to which measures of these concepts can be interpreted similarly across diverse groups. Many problems also apply to other concepts relevant to health disparities. We propose an agenda for accomplishing this challenging measurement research.

CONCLUSIONS. The current national commitment to reduce health disparities may be compromised without more research on measurement quality. Integrated, systematic efforts are needed to move this work forward, including collaborative efforts and special initiatives.

Key words: Measurement; health disparities; patient–physician communication; discrimination; minority health; socioeconomic status; acculturation (Med Care 2003;41: 1207–1220)

Minority populations and persons of lower socioeconomic status (SES) in the United States experience a disproportionate burden of disease and complications from the most prevalent and serious conditions.^{1–10} Addressing these health disparities has become a national priority. Health disparities research examines the nature of such

disparities, explores mechanisms by which they occur, and tests interventions to improve the health of minority and lower SES populations. Most constructs used in health disparities research are abstract and hence not directly observable or measurable. Measurement science typically involves the process of identifying specific items that

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adequately represent unobservable, underlying (latent) constructs, and creating scale scores that meet standard psychometric criteria. When mean scores are compared across diverse groups, measurement studies also determine how well the observed scores reflect true mean scores on the latent construct and the extent to which the latent construct is being measured similarly across groups (without response bias).

Currently, little is known about the measurement quality of popular self-report measures of health and its determinants across diverse groups, because measurement studies in health disparities research are relatively scarce. Existing measures are potentially limited because: 1) they might not reflect adequately the issues and concerns of minority or vulnerable populations, primarily because they were not developed with these groups in mind, and 2) they might not have similar psychometric properties across comparison groups. Evidence suggests that many measures could be conceptually or psychometrically problematic when applied to diverse groups.^{11–20} The Resource Centers for Minority Aging Research (RCMAR) coordinated one of the first systematic efforts to advance the scientific basis of measurement across racial/ethnic groups. One goal of the 6 initial RCMAR centers, funded by the National Institute on Aging, the National Institute for Nursing Research, and the Office of Research for Minority Health, was to understand the measurement implications of using self-report measures in health disparities research. This article is based on written materials and discussions from a small working group conference of measurement and cross-cultural research specialists convened in May 2001 by the measurement cores of the RCMAR centers to address measurement issues in health disparities research in the United States. The objectives of this article are to:

1. Identify measurement issues for self-report concepts and measures that are the focus of current research on the determinants of health disparities;
2. Clarify how complementary qualitative and quantitative methods can be used to examine the quality of self-report measures for use in health disparities research; and
3. Develop an agenda for future measurement studies in health disparities research.

We review conceptual frameworks guiding health disparities research, identify key concepts that are found in this research, and highlight

relevant measurement issues. We summarize qualitative and quantitative methods for conducting the needed measurement studies and make recommendations for future measurement studies in health disparities research.

Conceptual Frameworks of Racial/Ethnic Health Disparities

Measuring Race and Ethnicity. Most current research on health disparities compares racial/ethnic groups, although a substantial body of research has examined disparities between lower SES groups and their counterparts. This article focuses on racial/ethnic disparities, henceforth referred to as “diverse groups,” but the issues apply to other diverse groups (eg, gender, age). Defining and ascertaining race/ethnicity is a major issue in this research, and many excellent reviews are available.^{21–25} Researchers usually have individuals self-identify their racial/ethnic group to reduce misclassification. Self-identification using a standard method such as the Office of Management and Budget (OMB) Federal Standards for Racial and Ethnic Data²⁶ permits comparisons across studies and consistency with federal data. Rather than using pan-ethnic labels (Latino or Asian), specific groupings (eg, Mexican American, Cambodian) enable studies of national origin subgroup differences in health. More precise classifications can more effectively identify groups at risk of poor outcomes.²⁷

The most important point about defining race and ethnicity is that researchers need to treat race/ethnicity classifications as markers of many complex, interrelated factors such as acculturation, SES, health behaviors, literacy, health beliefs, racism, power differentials, skin color, culture, and environment that are confounded with race/ethnicity and hence might be underlying determinants of disparities.²⁸ This point is critical to understanding mechanisms of racial/ethnic disparities in health.

Overview of Frameworks. Frameworks to study disparities fall into 2 broad categories: public health (population-level) models and health services research models. Public health models focus on ecologic or multilevel determinants, including biologic, family, cultural, community, health care, political, economic, social, environmental, system, policy, and other contextual factors.^{29–36} These multilevel models consider individuals as embed-

ded within systems that shape their behavior and constrain their access to resources necessary to maintain health.^{4,37–41} Public health models are more recently considering how these types of factors accumulate over the lifecourse to affect health; such lifecourse frameworks are providing additional insights into the mechanisms for health disparities.^{35,42–49}

Health services research frameworks are concerned with health care as a determinant of health. Health services models focus on the beliefs, cognitions, affect, and behaviors of patients and providers that can influence interpersonal and decision-making processes of care, treatment quality, and subsequent patient satisfaction.^{50,51} Cooper and colleagues propose a conceptual framework of potential determinants of disparities that incorporates technical and interpersonal processes of care such as cultural competence, communication skills, medical knowledge, technical skills, and bias/stereotyping.⁵²

Health disparities studies in healthcare settings need to consider how population-based factors such as living conditions, social services resources, ability to negotiate the system, psychologic resources, acculturation, and literacy affect patients' health. Thus, optimal health services research models "embed" the healthcare factors within the population factors.^{53,54}

Population-Based Determinants: Key Concepts. Countless population-level factors are being explored as possible mechanisms of health disparities; some major hypotheses include cumulative stress, social factors, the physical or built environment, community and psychosocial resources, and working conditions. Virtually all of these involve concepts for which measurement research would be useful. We have selected 3 to illustrate the conceptual and measurement issues involved, because they are so closely intertwined with race and ethnicity: SES, discrimination, and acculturation/enculturation.

Socioeconomic Status Extensive research links lower levels of SES to poorer health.⁵⁵ Low SES is associated with poor access to health care, greater exposure to environmental toxins, riskier health behaviors, fewer resources, and higher mortality.^{29,42,56–58} Evidence that this "gradient" is found at all levels of SES^{29,59–61} has piqued considerable interest in understanding the mechanisms by which this occurs. SES and race/ethnicity are often highly confounded, with minority groups overrepresented in the lower SES groups; thus it is a

critical concept in understanding mechanisms for racial/ethnic disparities in health.⁶²

Many studies of how SES contributes to health disparities simply control for race/ethnicity. Similarly, racial/ethnic health disparities studies often control for SES.^{28,63} Controlling for SES usually reduces, but does not completely account for, racial health differences.⁵⁸ Because of the complex ways SES and race/ethnicity operate to affect health, more research needs to explore how race and SES collectively influence health. When such interactions are explored, the relationship of SES to health is often found to vary by racial/ethnic group,^{5,63,64} confirming this as a promising direction.

Current SES measures are limited for numerous reasons.^{65,66} Many studies measure only education, income, and sometimes occupation, although numerous other SES-related concepts are essential to understand this complex construct such as poverty, wealth, deprivation, and social class.⁶⁷ Most measures focus on current SES, whereas lifecourse models emphasize the cumulative effects of various factors.⁴² Developing good lifecourse SES measures such as measures of childhood social class, adequacy of health insurance at critical points, economic stress, and cumulative occupational hazards could advance our ability to understand the complex relationships between cumulative socioeconomic disadvantage, ethnicity, and health.⁵⁶ Most SES measures focus on individual-level variables such as income and education; however, research increasingly finds that aggregate or area-based SES indicators contribute to disparities over and above individual factors.^{47,68–71}

The finding that relationships of race/ethnicity and health vary within SES levels could be in part because commonly used SES measures are not similarly interpreted across racial/ethnic groups.⁷² This could occur because similar levels of resources such as income or education might not confer the same health benefits across racial/ethnic groups,⁴¹ given that minorities have experienced large disparities in the quality of education content.⁶

Discrimination For blacks, the provocative literature on the adverse effects of discrimination on health suggests that this is a fruitful hypothesis for identifying mechanisms of health disparities.^{5,9,28,56,73–76} Despite a relatively small body of research, racism has been linked consistently with psychologic distress and well-being, a weak sense

of mastery, poor self-esteem,^{76,77} and high blood pressure.^{78–81}

Hypotheses as to how racism affects health have been identified at both the individual and institutional level,⁷⁴ and include truncated socioeconomic mobility; restricted access to economic and other resources; and psychologic, social, and physiological stress responses.^{58,77,82} Comparing subjective measures of discrimination with objective measures could yield interesting information, because their relationships appear to vary across diverse groups.⁸³ The adverse effects of discrimination could be more pronounced in persons who do not report being discriminated against.⁷⁹ Future research needs to clarify whether it is the actual discriminatory act, the perception of discrimination, or the reaction to the act that results in adverse health. Most likely, the act, the perception, and the response will vary in importance depending on the outcome assessed and whether the pathway is indirect or direct.

A substantial amount of measurement work is needed to develop valid self-report measures of racial discrimination⁷⁵ and associated processes leading to poor health. Several measures assessing discrimination are available^{74,78,84–89}; however, they vary widely in content, scope, and approach, and no psychometric evaluation is available for some of them. Measurement issues in discrimination have been described by others^{74,76}; thus, we highlight only a few. Although discrimination is multidimensional, its domains have not been consistently defined.⁷⁶ Measures often assess recent (eg, past year) and lifetime experiences of discrimination, although reference periods vary; experiences at various points in time (childhood, adolescence) can have different effects. Measures of chronic experiences of discrimination, which seem especially critical for health outcomes, focus only on work and education domains.⁷⁶ Measurement research can identify various types and sources of discrimination to determine if they vary in their effects on health. Most research on discrimination has involved blacks, with some exceptions⁸⁷; we need to learn whether and how these concepts and measures apply to other groups.

Answering questions about exposure to racial discrimination is complex and can be distressing for respondents who may prefer not to recall such memories, thus, distributions can be skewed.⁹⁰ Cognitive interviews using open-ended probes could yield new information on important content areas in discrimination, and optimal item wording

and framing to develop comprehensive measures that are less distressing and have more power to explain variations in health.

Acculturation/Enculturation A broad category of variables that can affect health disparities relates to the acculturation process. Culturally prescribed attitudes about preventive care, regular screening examinations, self-efficacy, physicians, and health care could explain differences in utilization, adherence, self-care practices, and health. For example, cultural norms about family structure have predicted cancer screening in Latinos,⁹¹ and cultural norms about materialism have been associated with elevated blood pressure in blacks.^{92–96}

Acculturation has been associated with positive and negative changes in health and health behaviors,^{97,98} suggesting complex relationships. Socio-cultural factors such as spirituality or collectivism could buffer the effects of stress or discrimination on blood pressure and other health outcomes,⁹⁹ illustrating positive effects. Cultural beliefs and attitudes have also been associated with negative outcomes. For example, the black-white differential in late-stage breast cancer diagnosis was significantly reduced after accounting for beliefs that air causes cancer to spread, the devil can cause a person to get cancer, and that chiropractic is an effective treatment for breast cancer, controlling for demographic and socioeconomic factors.¹⁰⁰ It is also possible that a high level of involvement in both cultures could predict better health.¹⁰¹ Because acculturation is a fluid construct, health disparities studies also need to examine how changes in acculturation affect health over time.

Refining measures of cultural affiliation and acculturation could thus lead to advances in understanding mechanisms of health disparities pertaining to culture. Acculturation is multidimensional, including lifestyle behaviors, health beliefs, language, norms, and attitudes. Yet, most acculturation measures are unidimensional, language-based, focus primarily on behavioral and lifestyle changes, and assume that cultural change only occurs in one direction.⁹⁸ However, individuals are influenced by the culture in which they develop (enculturation) and by the culture acting on them (acculturation); thus, an individual's culture is a product of both enculturation and acculturation processes.¹⁰² Acculturation might need to be defined differently for various ethnic groups as a result of the complex interplay between educational, language, financial, and social factors.¹⁰³ Finally, to examine how changes in acculturation

affect health over time, we need to ensure that the measures are sensitive to change.

Health Services Research Determinants: Quality of Care. A large body of research finds that minority patients receive suboptimal medical treatment compared with whites.^{104–118} Possible mechanisms to explain these differences include discrimination in healthcare settings, ie, differences in care resulting from biases, prejudices, stereotyping, and uncertainty in clinical communication and decision making.^{51,52,78,109,119,120} Discrimination in these settings compounds the effects of discrimination outside this setting on health. Differences in interpersonal processes of healthcare are a potential mechanism; several studies have observed such differences between minority patients and their white counterparts.^{51,52,120–122} Some research has examined differences in patient satisfaction with care across diverse groups, suggesting that quality-of-care differences are being perceived by minorities. Results generally indicate that Asian/Pacific Islander groups tend to rate their satisfaction lower.^{14,123} Language differences between patients and providers could account, to a large extent, for lower satisfaction ratings in both Asians and Latinos.¹²⁴ The data on satisfaction among blacks is mixed; some studies find comparable or greater satisfaction than whites¹²³ and others find less satisfaction.^{125,126}

Research on quality of health care relies heavily on self-report measures (eg, of communication and decision-making processes, satisfaction). The California Pan-Ethnic Health Network (CPEHN) concluded that although standard consumer surveys can identify some quality-of-care differences, current surveys are limited by numerous methodologic and measurement problems.¹²⁷ For example, differences in how Spanish- versus English-speaking respondents use response scales on a satisfaction survey have been noted.^{123,128} Measurement issues in assessing quality of care across diverse groups include: 1) limited inclusion of concepts relevant to the quality of care of minority populations such as cultural competence and discrimination,^{127,129} 2) lack of information on the psychometric invariance of quality of care measures across diverse groups,¹²⁹ 3) traditional survey methods (mail, telephone) fail to reach many minority groups, and 4) surveys need to be translated into other languages and written at lower reading levels to include patients with limited English proficiency.^{127,129}

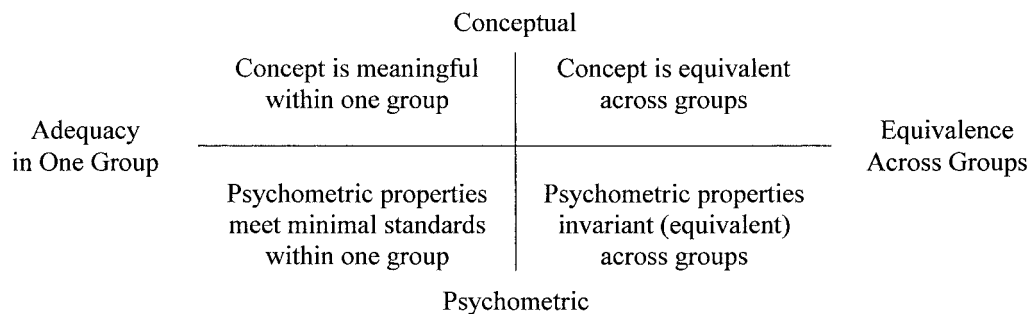
Methods for Addressing Measurement Issues in Health Disparities Research

This review highlighted major issues facing health disparities researchers for a few of the many concepts being examined as potential determinants of health disparities. Our review illustrated 2 broad types of measurement problems: conceptual and psychometric. Health disparities research tends to compare groups. A valid comparison of self-report measures requires that the concepts have similar meaning across groups, sometimes referred to as conceptual equivalence. Measures must also conform to psychometric criteria in similar ways across the groups being compared, ie, have psychometric equivalence, usually referred to as measurement invariance.

We illustrate these principles in Figure 1. The left column reflects traditional measurement studies of conceptual or psychometric adequacy in one group (or one sample). The right column illustrates additional measurement considerations in health disparities research, where one needs to address conceptual equivalence and psychometric invariance across groups. Conceptual nonequivalence can occur because of culturally mediated differences in perceptions of the meaning of items and health constructs^{130–132} or because a concept is missing an important dimension in one group.¹³³ The need for psychometric invariance studies arises from the likelihood of response bias resulting from cultural or group differences in the cognitive processes of answering, using response scales, or differences introduced by inadequate translations and failure to address varying literacy levels.¹³⁴

This 2 × 2 grid serves a heuristic function, as a way to conceptualize needed measurement information for any measure to assess its appropriateness for use in a health disparities study. For instance, in a study of the role of trust in physicians in explaining disparities in patient acceptance of coronary artery bypass surgery, one could assess whether sufficient evidence exists within each of the 4 cells for measures of trust in physicians for the ethnic groups of interest. If there is a limited empiric basis that the assumptions of a cell have been met, there is a clear need to conduct measurement studies in that area.

These conceptual and psychometric issues can be addressed through a blend of qualitative and quantitative methods. Each method has strengths and weaknesses for addressing these types of



*Group(s) can refer to any sociodemographic strata being compared

FIG. 1. Conceptual and psychometric adequacy and equivalence within one group and across groups.*

measurement problems, but combining the approaches in an iterative fashion can yield optimal measures that assess the same construct in similar ways across racial/ethnic groups.^{135–138} We summarize some of the main qualitative and quantitative methods for addressing group comparisons.

Qualitative Methods. Qualitative methods explore the salience, relevance, acceptability, and dimensions of various constructs within and across racial/ethnic groups. They can help identify missing constructs and cognitive processes of answering, that is, how people interpret words and phrases and construct their answers to self-report questions. By providing researchers with access to the language and concepts used by participants about particular topics, these methods can help in developing appropriate wording for items. Qualitative studies can help us understand the extent to which a concept is appropriate and complete within a diverse group and whether it has the same meaning across groups.

Numerous approaches for using qualitative methods in measurement studies are available, including focus groups,¹³⁹ consultation with cultural experts,¹⁴⁰ and ethnography.¹⁴¹ Extensive literature exists on cognitive interviewing methods^{142–150}; indeed, a special issue of *Quality of Life Research* (volume 12, 2003) is devoted to cognitive methods in measurement. The random probe technique¹⁵¹ is a cognitive interviewing approach in which respondents are probed on a randomly selected survey question at the time of a structured survey. The item-rating approach involves having key researchers, staff, and respondents from di-

verse groups independently rate various aspects of measures such as ease of wording, relevance, and cultural appropriateness.^{133,148}

Quantitative Methods. Psychometric criteria of reliability and validity assess whether measures are replicable across situations and occasions and represent the targeted construct (eg, depressive symptoms). However, excellent reliability and validity within a group do not guarantee that measures can be compared in a meaningful way across demographic strata. Factors such as gender roles, cultural norms, and language differences unrelated to the targeted construct could systematically inflate or deflate item response levels.¹⁵² If these factors operate differentially across demographic strata, then group differences or similarities assessed by instrument scores could be partially the result of response bias. Measurement invariance holds when an instrument produces valid measures that can be meaningfully compared across diverse groups. Measurement invariance of self-report instruments across demographic strata is generally ignored.

Two basic approaches are available for examining measurement invariance and item bias, confirmatory factor analysis (CFA)^{152–155} and item response theory (IRT).^{156–159} Reviews and examples of these and other methods are also available.^{134,160,161} The different quantitative approaches can be viewed as complementary because each contributes information about whether the measures are of sufficient quality to allow for valid group comparisons.

A Research Agenda to Address Measurement Issues in Health Disparities Research

As a result of the large number of possible racial/ethnic groups and instruments, rigorous development of appropriate measures for studies of health disparities is a daunting task. Realistically, systematic progress must be limited to a few key measures and major U.S. population subgroups. Practical constraints require tradeoffs between allocating the necessary resources and accepting assumptions about the transferability of concepts and measures across racial/ethnic groups without evidence that these assumptions have been met.

Drawing from our reviews, we present in Table 1 a summary of the key research issues on how SES, discrimination, acculturation, and quality of care might operate as mechanisms of health disparities and the corresponding measurement efforts that can facilitate this research. This summary is intended to guide systematic measurement studies over the next several years. The focus on these 4 concepts serves to illustrate the types of issues that probably pertain to the many other concepts we were unable to review here.

Our broad recommendations for accomplishing the needed measurement studies are to: 1) integrate measurement studies into health disparities research to begin to build an evidence base of the conceptual and psychometric adequacy and equivalence of key measures; 2) disseminate data on measurement properties of key measures used in health disparities research; and 3) create more funding opportunities for measurement research in health disparities studies. Within a selected clinical or health disparities issue, measurement specialists need to work with content specialists in all phases of instrument selection, adaptation, and development. Another collaborative strategy is to establish an infrastructure for creating item banks. Item banks are compilations of items that can be calibrated for use in specific populations (development of complex scoring algorithms to equate responses across items/subgroups of respondents).¹⁶² This would require establishment of a nonprofit corporation so that item banks are in the public domain, accessible to the scientific community, and reflect scientific priorities. The probability of funding is improved if measurement work is linked to a specific programmatic objective of an agency, ie, a specific issue related to healthcare quality or quality of life. To assure integrated

progress, special RFAs or initiatives may be needed, in which investigators collaborate on specific questions aimed at advancing the state-of-the-art of measurement across several studies.

It is incumbent on researchers to demonstrate that the additional methodological rigor and expense produce superior results to those obtained using standard approaches. Demonstrating the value of this work involves examining whether measurement studies: 1) identify constructs that otherwise would have been overlooked; 2) produce measures of known constructs that are more valid, reliable, and invariant across groups than measures that are already contained in the literature; and 3) generate new theoretical insights and conceptual models that are more informative than those produced by either quantitative or qualitative methods used alone.¹³⁶

Conclusions

The current U.S. Department of Health and Human Services' commitment to reduce health disparities by the year 2010 through funded initiatives could be compromised without more systematic measurement research. Our review of the current research on disparities is cursory, given the countless concepts being explored. However, it highlights the need for increased attention to measurement science to evaluate the transferability of existing measures of health and its determinants for use in diverse subpopulations. Health disparities researchers need to know the potential threats to the validity of their research, that is, whether observed similarities or differences in health across racial/ethnic groups are true (valid) or, alternatively, if findings are the result of conceptual and psychometric problems. Inaccurate conclusions based on the inappropriate use of self-report measures could be costly to groups (within the context of policy formulation or benefit assessment) and individuals (within the context of diagnosis and treatment). We hope that these recommendations will lead to the systematic development of measurement research in diverse groups through coordinated efforts across funding agencies and research institutions.

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TABLE 1. Summary of Measurement Issues for 4 Concepts of Determinants of Health Disparities and Recommendations for Future Research

Key Concepts and Associated Research Issues	Needed Measurement Studies
Socioeconomic Status	
How do race/ethnicity and SES interact in studies of racial/ethnic health disparities?	Develop a broad array of measures of SES that can be used across diverse groups.
How do lifecourse experiences related to SES affect current health over and above indicators of current SES level?	Develop good concepts and measures of lifecourse SES that can be used across diverse groups.
Do aggregate and individual indicators of SES contribute independent information in explaining health disparities?	Develop improved concepts and measures of environmental SES indicators (eg, effects of neighborhood) and assess the optimal geographic area for assessing environmental effects on health by SES domain (eg, poverty) and outcome.
Discrimination	
To what extent do experiences of racism and discrimination affect health in diverse racial/ethnic groups?	Continue to develop concepts and measures of racism and discrimination that address multiple domains, types, and sources.
What are the mechanisms by which perceived racism and discrimination affect health such as adverse physiological, psychologic, and economic impacts of racism and maladaptive coping?	Develop and test measures in diverse racial/ethnic groups in addition to blacks.
Does perceived discrimination resulting from socioeconomic status have the same adverse effect on health as that attributed to racism?	Continue to develop and test concepts and measures of emotional and behavioral responses to experiences of discrimination and racism.
	Explore how best to access people's memories of experiences of racism and discrimination.
	Explore the meaning of words and phrases used to express experiences of racism and discrimination, ie, are they offensive and do alternative words mean the same thing.
Acculturation/enculturation	
How do changes in acculturation affect health?	Develop multidimensional concepts and measures of acculturation and enculturation.
Is there an optimal level of acculturation in relation to health?	Identify measures of acculturation and enculturation that operate at the individual and group level to affect health.
Do acculturation and enculturation processes affect health differently?	Develop measures of acculturation and enculturation that are sensitive to changes over time.
What are the key dimensions of acculturation/enculturation (eg, language, health beliefs, and health behaviors) that affect health?	
Quality of Care	
What are the determinants of unequal health care?	Ensure that relevant concepts, eg, discrimination and cultural competence are included in measures of interpersonal processes and patient satisfaction used in diverse groups.
What are the interpersonal processes of care that are associated with unequal treatment?	Develop and test concepts and measures of interpersonal processes of care between patients and providers that might account for health disparities in healthcare settings.
What are the specific mechanisms by which health care leads to health disparities?	

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