

Racial Differences in Cardiac Catheterization as a Function of Patients' Beliefs

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Racial disparities in invasive cardiac procedure use have been widely documented, yet the reasons for these disparities remain unclear.¹⁻⁴ Numerous studies have examined this issue in multiple settings, carefully controlling for sources of variation, but the differences remain unexplained.¹ Thus, the Institute of Medicine report *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care* called for further research to identify the sources of disparities in health care,² specifically mentioning the need for further studies to understand patient-level influences on care and the contribution of physicians' perceptions of patients to the care provided.

Indeed, many researchers have speculated that patients' attitudes and health-related beliefs may be associated with racial disparities in the use of procedures.⁵⁻⁹ African Americans are less likely than Whites to report hypothetical willingness to undergo revascularization,¹⁰ and African American cardiac patients are less satisfied with their care and more likely to perceive racism and to mistrust the medical care system than are White patients.¹¹ By contrast, in our own prior work with a subset of the sample used in the present study, we found few racial differences in numerous beliefs and attitudes related to cardiac catheterization (C-CATH).¹² Others have examined whether patients' preferences, as evidenced by their refusing to use invasive cardiac procedures, were associated with racial disparities in the use of procedures but found conflicting results.¹³⁻¹⁷

Thus, the literature lacks comprehensive studies that simultaneously examine patients' and physicians' beliefs and attitudes and their potential association with actual racial variations in invasive cardiac procedure use while also controlling for sociodemographic and clinical variables. The purpose of this study was to examine whether

Objectives. We examined racial differences in cardiac catheterization rates and reviewed whether patients' beliefs or other variables were associated with observed disparities.

Methods. We did a prospective observational cohort study of 1045 White and African American patients at 5 Veterans Affairs (VA) medical centers whose nuclear imaging studies indicated reversible cardiac ischemia.

Results. There were few demographic differences between White and African American patients in our sample. African Americans were less likely than Whites to undergo cardiac catheterization. African Americans were more likely than Whites to indicate a strong reliance on religion and to report racial and social class discrimination and were less likely to indicate a generalized trust in people but did not differ from White patients on numerous other attitudes about health and health care. Neither sociodemographic or clinical characteristics nor patients' beliefs explained the observed disparities, but physicians' assessments of the procedure's importance and patients' likelihood of coronary disease seemed to account for differences not otherwise explained.

Conclusions. Patients' preferences are not the likely source of racial disparities in the use of cardiac catheterization among veterans using VA care, but physicians' assessments warrant further attention. (*Am J Public Health.* 2004;94:2091-2097)

there were racial disparities in the use of C-CATH in our cohort, and if so, to comprehensively examine whether patients' attitudes and beliefs or physicians' assessments and perceptions about patients could explain this racial disparity when we controlled for the effects of clinical and sociodemographic characteristics.

METHODS

Study Setting and Sample

The study was conducted at 5 Department of Veterans Affairs (VA) Medical Centers (Houston, Tex, Pittsburgh, Pa, Atlanta, Ga, Durham, NC, and St. Louis, Mo), chosen because of their high percentage of African American patients. These hospitals are large, urban, academically affiliated tertiary care facilities with on-site C-CATH facilities. We focused our study on patients who might be candidates for invasive cardiac procedures, establishing a prospective cohort of patients likely to have coronary artery disease by screening the results of all cardiac nuclear im-

aging studies performed between August 1999 and January 2001.

We considered the nuclear imaging study results positive if there was any evidence of reversible cardiac ischemia (evidenced by reversible defects or redistribution). Patients were ineligible if they had no reversible ischemia; had received C-CATH, any revascularization, or heart transplant surgery in the 6 months before their nuclear imaging study; had participated in a clinical trial that determined their cardiac treatment; were of a race that was not White or African American; were not veterans; or were unable to complete the survey because of cognitive impairment.

We screened 5278 patients, and 2335 (44%) had a positive nuclear imaging study. Of these, 456 patients (20%) were excluded because we were unable to contact them to enroll in the study, 78 (3%) because they had impaired mental status, 32 (1%) because they were in another research study determining their cardiac treatment, 102 (4%) because they were not African American or White,

189 (8%) because they had had a cardiac procedure in the preceding 6 months, 5 (0.02%) because they were not veterans, and 99 (4%) because of miscellaneous other reasons (e.g., the nuclear imaging studies were conducted for compensation and pension evaluation, the patients' hearing was impaired, or the patients died before we could enroll them). After these exclusions, 1374 patients with positive imaging studies remained; of these, 329 refused participation, failed to return their informed consent, or failed to return mailed questionnaires. Thus, 1045 patients were included in the final cohort, representing a 76% response rate from those 1374.

To examine the representativeness of the sample, we compared the 1045 patients with positive nuclear imaging study results who were included in the cohort to those who were not ($n=1290$) and found that there were disproportionately fewer African Americans in the cohort (23% African Americans in the cohort vs 29% in the excluded patients, $P=.003$). There were no differences in marital status or age between these groups.

Data Collection

Procedure. The patient health attitude and belief questions were taken from 2 serially administered questionnaires that included nonoverlapping content: 1 completed within 4 weeks after the patients' nuclear imaging study and 1 completed after the patients reported that they had received the study results. Patients were contacted by the study research assistant either in person or by telephone. For each enrolled patient, the physician who ordered the nuclear study was also asked to complete a survey.

Patient questionnaire measures. The study questionnaires assessed self-reported demographic information including the patient's age, race, education, income, and marital status. The questionnaire also included the Seattle Angina Questionnaire, which assesses patients' perceptions of several dimensions of coronary artery disease including anginal stability and frequency.¹⁸ In our previous work with the first 854 patients enrolled in the cohort,¹² we developed psychometrically valid scales to assess patients' beliefs and attitudes about their health and the health

care they received. These scales assess the following specific dimensions: patients' evaluations of physicians' capabilities and interpersonal style (e.g., how well the physician knows the patient both medically and personally, the degree of respect and caring evidenced by physicians, trust in physicians' judgments and qualifications); patients' evaluations of VA care (e.g., degree of respect with which one is treated in the VA system, the quality of care in VA and satisfaction with it), and patients' attitudes toward religion and its role in dealing with cardiac disease and attendant treatment decisionmaking. We included the 4 items that constitute the medical skepticism scale: "I can overcome most illness without help from a medically trained professional," "Home remedies are often better than drugs prescribed by a doctor," "If I get sick, it is my own behavior that determines how soon I get well again," and "I understand my health better than most doctors do."¹⁹ We did not combine these items into a scale because earlier analyses indicated that the scale did not have acceptable psychometric properties in this setting.¹² Finally, in addition to the scales we previously developed, for the present analyses we also included several published scales to assess other dimensions of patients' attitudes and experiences thought to be relevant to racial differences in patients' perceptions of their care: a generalized trust in people,²⁰ optimism,²¹ and prior experiences of racial and social class discrimination.²² To the racial and social class discrimination scale, which included an item about experiences of discrimination when getting medical care, we added an item referencing VA medical care.

Although all patients were asked to complete both the study questionnaires, the instruments included several planned skip patterns, so that, for example, patients who had not been offered C-CATH were not asked about their beliefs about the procedure. Similarly, patients who denied having heart disease were not asked about their perceptions of its severity. Thus, although in our earlier work we reported data on these latter 2 dimensions from the subset of the sample answering them (approximately 40% of the full cohort), we did not include these scales in the

present article because of the significant amount of missing data in these dimensions, related to the skip patterns.

Physician questionnaire measures. We asked each patient's physician to provide overall clinical assessments, including, "How important it is for [your patient] to have cardiac catheterization now?" (response categories: lifesaving or crucial, procedure is not crucial but the benefits are greater than the risks, equivocal, risks are greater than the benefits). To assess the physician's perception of the probability of the patient's having coronary artery disease, we asked, "On a scale from 0%–100%, please estimate the probability of coronary artery disease in this patient (70% or more narrowing of an epicardial artery)."²³ Then we assessed physicians' perceptions about patients' personal characteristics,²⁴ asking physicians to indicate, on a scale of 1 to 5 (1 indicating the greatest amount of the characteristic, and 5 indicating the least), whether their patient is a good communicator, has high socioeconomic status, is independent, is intelligent, is knowledgeable, is likely to underreport pain or comfort, is likely to show up for follow-up appointments, is likely to comply with medication treatment, and is likely to participate in cardiac rehabilitation, if recommended.

Clinical and Treatment Variables.

We reviewed the medical records of each study respondent, obtaining records for non-VA care where possible. Trained nurses abstracted patients' demographics, cardiac symptoms, past medical history (including prior myocardial infarction, diabetes, hypertension, congestive heart failure, and renal or lung disease), laboratory values, test findings, procedure utilization, and hospital course, if admitted. As an indication of the extent to which medical therapy had been maximized for each patient, we used the American College of Cardiology/American Heart Association guidelines for coronary angiography and the management of patients with chronic stable angina.^{25,26} Thus, we defined maximal medical therapy as antiplatelet therapy, sublingual nitroglycerin, and at least 1 of the following: beta blockers, calcium channel blockers, or long-acting nitrates. We also included patient-reported indicators of anginal fre-

TABLE 1—Demographic and Clinical Characteristics, Physicians' Assessments and Perceptions of Patients, and Study Outcome of the Study Cohort, by Race: United States, August 1999–January 2001

	African Americans, n = 236 ^a	Whites, n = 809 ^a	P
Demographic variables			
Age, y			
< 65, %	57.2	53.7	.59
65–74, %	30.5	33.9	
≥ 75, %	12.3	12.5	
Education			
< 12 y, %	32.8	27.9	.15
12 y/high school, %	30.2	36.7	
> 12 years, %	37.0	35.4	
Married, % yes	47.9	62.2	.001
Clinical variables			
Prior revascularization, % yes	15.0	34.8	<.0001
Prior MI, % yes	25.9	34.0	.02
Hypertension, % yes	85.4	76.2	.003
Angina, % yes	65.8	64.8	.79
Congestive heart failure, % yes	17.1	17.9	.78
Diabetes, % yes	35.6	31.1	.20
Lung disease, % yes	18.5	27.4	.006
Renal dysfunction, % yes	17.5	10.2	.002
Maximal medical therapy, % yes	33.5	36.2	.44
SAQ anginal frequency ^b	72.8	75.4	.19
SAQ anginal stability ^b	64.9	69.8	.04
Physician variables			
Physicians' assessments ^c			
Importance of catheterization ^d	2.76	2.59	.11
Probability of coronary artery disease, % ^e	65.79	73.81	.005
Physicians' perceptions			
Patient is good communicator ^f	2.36	2.15	.04
Patient has high socioeconomic status ^f	3.34	3.08	.003
Patient is independent ^f	2.10	2.15	.61
Patient is intelligent ^f	2.29	2.29	.93
Patient is knowledgeable ^f	2.58	2.48	.30
Patient underreports pain/discomfort ^f	2.81	2.71	.20
Patient is likely to show up for appointments ^f	1.94	1.78	.14
Patient is likely to comply with medication treatment ^f	2.08	1.86	.04
Patient is likely to participate in cardiac rehab ^f	2.07	2.06	.97
Outcome variable			
Received cardiac catheterization, %	33	47	.0002

Note. MI = myocardial infarction; SAQ = Seattle Angina Questionnaire.

^an = all patients for whom data are available.

^bVariables obtained through patient self-report; higher scores indicate better functional status: less anginal frequency and greater anginal stability.

^cWe included in the model 591 patients with physician data available.

^dAnswer categories as follows: 1 = lifesaving or crucial; 2 = benefits > risks; 3 = equivocal; 4 = risks > benefits.

^eAnswers could range from 0% to 100%.

^fAnswer categories: 1 = to a very great extent; 5 = to a small extent.

quency and anginal stability from the Seattle Angina Questionnaire.¹⁸

Statistical Analysis

We examined bivariate associations between race and each of the sociodemographic, clinical, health belief, physicians' assessment, and perception variables using χ^2 or *t* tests. We then employed 5 sequential logistic regression models to examine the effects of distinct blocks of variables on racial disparities in the use of C-CATH, while accounting for the effect of clustering of patients within the 5 study sites with the SAS (SAS Institute Inc, Cary, NC) macro GLIMMIX to run a mixed effects model. We included site as a random effect in the logistic regression model to account for the site cluster effect such that patients within the same site might share similar characteristics that are associated with C-CATH.^{27,28}

The race indicator variable, sociodemographic variables, clinical variables, health belief variables, and physician assessment/perception variables were added into the models in sequence as fixed effect independent variables. The change in the magnitude of the odds ratio of receiving C-CATH for Whites versus African Americans after the inclusion of each set of independent variables indicates the confounding effect of each set of independent variables on the association between race and C-CATH (racial disparity).²⁹

RESULTS

Characteristics of the Patients

Most of the sample were male (98%); most were younger than 65 years and had at least a high school education (Table 1). African American and White patients did not differ in age or education, but African Americans were less likely to be married. There were no racial differences in income (not shown), and because this variable was not associated with either race or the use of C-CATH, we did not include it in our multivariable analyses.

The majority of patients had not previously received revascularization (70%) and had not had a prior myocardial infarction (68%). However, most patients did have hypertension (78%) or angina (65%). We ex-

TABLE 2—Patients' Attitudes and Beliefs, by Race^a

	African Americans, n = 188		Whites, n = 686		P
	Mean	SD	Mean	SD	
Health attitudes/belief scales^b					
Positive evaluations of physicians	75.59	14.85	76.84	15.82	.33
Positive evaluation of VA care	75.63	13.47	75.56	15.43	.94
Reliance on religion	78.44	19.37	68.93	22.70	<.0001
Self-reported disease severity	44.48	37.58	46.32	37.24	.55
Trust in people ^c	41.76	38.79	60.28	39.79	<.0001
Optimism	59.22	16.29	59.81	17.64	.68
Class discrimination ^d	19.68	30.20	13.82	23.55	.01
Racial discrimination ^d	36.42	32.44	5.01	12.83	<.0001
Health belief items^e					
I can overcome illness without a professional	2.16	1.05	2.40	1.05	.006
Home remedies are better	2.28	1.00	2.36	.94	.29
If I'm sick, my behavior determines the outcome	3.37	1.24	3.23	1.07	.18
I understand my health better than most doctors do	2.69	1.23	2.69	1.07	.99

Note. VA = Department of Veterans Affairs.

^a Sample (n = 874) includes all patients with complete data on race, sociodemographics, clinical variables, and health belief items and scales. The results using all available data were similar to the results reported here.

^b Scales range from 0 to 100 with higher values indicating a higher degree of what the statement described.

^c Higher scores indicate greater trust.

^d Higher scores indicate more discrimination.

^e Higher scores indicate greater likelihood of agreeing with the statement, on a scale of 1 to 5.

amined other relevant comorbid conditions, finding a minority of patients with congestive heart failure (18%), diabetes (32%), lung disease (25%), or renal dysfunction (12%). Only slightly more than one third of the sample (36%) were receiving maximal medical treatment.

African American and White patients differed clinically in that African American patients were less likely to have had a prior myocardial infarction ($P < .05$) or to have had revascularization in the past ($P < .0001$) but were more likely to have hypertension ($P < .01$). African Americans were less likely to have lung disease ($P < .01$) but were more likely to experience renal dysfunction than Whites ($P < .01$). African Americans were less likely than Whites to undergo C-CATH (33% vs 47%, respectively; $P < .001$).

Patients' Attitudes and Beliefs

African Americans more frequently indicated reliance on religion as a way of coping with their heart disease and treatment decisionmaking and indicated less trust in people (Table 2). African American patients were

more likely to report experiences with racial and social class discrimination and were less likely to agree that they could overcome illness without help from a medically trained professional. All P values were significant at $\leq .01$.

Physicians' Assessments and Perceptions

Physicians felt the necessity (or importance) of C-CATH was slightly greater for White than for Black patients (2.59 vs 2.76; $P = .11$; lower values indicate more importance) (Table 1). Doctors also rated Whites' pretest probability of coronary artery disease higher than African Americans' (74% vs 66%). Physicians rated White patients as better communicators, of higher socioeconomic status, and as more likely to comply with medication treatment than Black patients. All P values were significant at $< .05$.

Variables Associated With C-CATH

We examined variables that might explain the racial difference in C-CATH through sequential regression models (Table 3). Whites had a higher C-CATH rate than African Americans (model 1) (unadjusted odds ratio

[OR] = 1.43). After we adjusted for sociodemographic variables, the odds ratio remained almost identical (1.44) in model 2, indicating that sociodemographic variables are not confounded with (do not explain) the racial disparity in the use of C-CATH.

After we added clinical variables into model 2, the odds of Whites versus African Americans receiving C-CATH increased slightly (to 1.64), with increased statistical significance (from $P < .04$ to $P < .009$).

After we added the health belief variables into model 3, the odds ratio increased slightly (from 1.64 to 1.79) and remained highly significant ($P = .015$). These results indicate that health beliefs do not explain racial variation in the use of C-CATH in our cohort, consistent with the lack of bivariate associations between health belief variables and C-CATH (results not shown).

Finally, we examined whether the physicians' variables explained racial disparities in C-CATH. Because of the limited response rate from physicians (67%), only 591 patients and their physicians (56% of the full sample) were included in this analysis. In model 5, the odds ratio decreased to 1.20 and was no longer significant ($P = .647$). The drop in odds ratio after adding physician variables into the model indicates that physician variables explain some of the racial disparity in C-CATH rates. Physicians' ratings of patients' probabilities of coronary artery disease and the importance of C-CATH both significantly predicted C-CATH. To determine how much of this decrease in odds ratio was due to the inclusion of the physician variables but not to the different analysis sample used, we reran the 5 models with the subsample for which we had physician data and obtained similar results.

DISCUSSION

In this study, we examined racial differences in the use of cardiac catheterization among VA patients with documented reversible cardiac ischemia. Then we explored whether patients' attitudes or beliefs, or physicians' assessments or perceptions, could explain observed differences, after we controlled for clinical and sociodemographic characteristics.

Patients' health beliefs did not explain the observed racial differences, but physicians'

TABLE 3—Odds Ratios (for Whites Compared With African Americans) of Receiving Cardiac Catheterization After Nuclear Imaging Study, Accounting for Patient Clustering Within Site

Model	Variables	OR (95% CI)	P
Model 1	Race only	1.43 (1.02, 2.02)	.040
Model 2	Race + demographic	1.44 ^a (1.01, 2.03)	.041
Model 3	Race + demographic + clinical	1.64 ^b (1.13, 2.39)	.01
Model 4	Race + demographic + clinical + patients' health attitudes/beliefs	1.79 ^c (1.12, 2.86)	.015
Model 5	Race + demographic + clinical + patients' health attitudes/beliefs + physicians' assessments and perceptions	1.20 ^d (0.55, 2.62)	.647

Note. Odds ratio = OR; CI = confidence interval. Individual variables included in each block of adjuster variables are listed in Tables 1 and 2.

^aSignificant covariates from this model other than race included age older than 75 years (OR = 0.63, $P = .05$); > 12 years of education (OR = 0.69, $P = .04$).

^bSignificant covariates from this model other than race included hypertension (OR = 1.45, $P < .05$); anginal stability (OR = 0.99, $P < .04$); maximal medical therapy (OR = 1.74, $P = .001$).

^cSignificant covariates from this model other than race included hypertension (OR = 1.46, $P < .05$); anginal stability (OR = 0.99, $P = .05$); maximal medical therapy (OR = 1.73, $P = .001$).

^dSignificant covariates from this model included hypertension (OR = 2.17, $P < .05$); maximal medical therapy (OR = 1.78, $P < .05$); physicians' ratings of patients' probability of coronary artery disease (OR = 1.02, $P < .01$); and importance of receiving cardiac catheterization (OR = 0.23, $P < .0001$).

assessments of patients did explain some of the variation. In particular, physicians' ratings of coronary artery disease and the importance of C-CATH for a patient (both higher for White patients) contributed to the observed racial disparities in C-CATH use beyond what could be attributed to clinical differences identified by chart review. These assessments may have captured the effects of other unmeasured clinical variables, but our inclusion of numerous relevant clinical indicators that physicians rely on to make decisions to send patients to C-CATH minimized this possibility.

We also observed several racial differences in patients' beliefs and attitudes. African American patients indicated a greater reliance on their religion or God in coping with and making decisions about their cardiac treatment and in their lives in general than did White patients. African American patients indicated less generalized trust in people and more experiences of racial and class discrimination. Contrary to prior findings about African American patients not trusting their doctors or the health care system,^{11,30} in our study we detected no such differences. However, African American patients were less likely to believe that they could overcome

illness without a professional, suggesting greater reliance on health professionals, but notably, neither this item nor any of the other health beliefs explained the observed racial differences in C-CATH use.

The continued existence of racial disparities in the use of C-CATH is troubling, especially when observed in an equal access system such as the VA. Two decades of research documenting such racial disparities in cardiac procedure use have failed to identify the causes of such disparities,¹ yet our findings are among the first to address an oft-hypothesized source: patient attitudes and beliefs. However, our results significantly extend those of other studies, which have documented racial disparities in cardiac care, by simultaneously examining patient- and physician-based variables that might be associated with such disparities, while controlling for clinical and sociodemographic variables. Although previous studies have documented racial differences in patients' preferences¹⁰ or trust in the medical care system,¹¹ none have examined the association of such dimensions with actual use of C-CATH, nor has this variety of factors been examined simultaneously. Our findings also echo others regarding racial disparities in renal transplantation, where adjustment for

patients' preferences regarding transplantation did not account for the racial disparities in referral for the procedure.³¹

Because we studied patients cared for in VA facilities, the effects of ability to pay for care, or physicians' financial incentives to recommend or deny procedures, were diminished. Further, the sociodemographic gap between White and African American patients is minimized in this setting.³² Both variables, as well as different attitudes among veterans or different practice patterns in the VA, may affect patients' and physicians' perceptions and thus limit the generalizability of our findings to non-VA patient populations; however, numerous previous studies have detected similar racial disparities in care in the VA as found in other environments. Further, the VA system cares primarily for male patients, so our results may not be generalizable to women. Strengths of our study include the fact that all study sites had on-site C-CATH facilities, an important determinant of procedure use in the VA and elsewhere.^{33,34} Further, unlike many prior studies, we included individual-level controls for sociodemographic characteristics.

African American patients were less well represented in our study cohort than in the eligible population, and some patients did not have complete data for all study measures and were thus not included in some analyses. Thus, the more distrustful patients may not have been included in the sample, minimizing the effects of patients' beliefs on receipt of C-CATH. However, 22% of the sample was African American, which represents a significant oversampling of nearly twice the proportion of African American patients using the VA nationwide, where 13.2% of patients are self-described African Americans.³⁵ Further, to examine any effects of bias due to sampling issues, we conducted additional regression analyses comparing patients with complete data with those who had partial data and observed similar patterns of findings. Thus, although selection bias may have affected the absolute value of the racial disparities in C-CATH use, it did not affect the conclusions about the confounding effects of sociodemographic, clinical, health belief, or physician variables on racial disparities in C-CATH. Also, our analy-

ses using physician data were limited to a reduced sample size. However, our physician response rate was comparable to that of other studies of physicians' attitudes about cardiac patients²⁴ and did not vary by patients' race.

What do these findings suggest for potential clinical interventions to decrease racial disparities in C-CATH? They suggest that educational interventions aimed at altering patients' perceptions of cardiac procedures or the health care system may not be successful, because we found few such racial differences and they did not explain disparities in care in this setting. Similarly, others have suggested that racial differences in patients' trust of individual physicians or the health care system may differentially affect patients' acceptance of recommended procedures, and that interventions aimed at increasing trust may help, but our results do not support that notion. To the extent that physicians evaluate White and African American patients' clinical presentation differently, computerized decision aids (e.g., computerized clinical reminders or decisionmaking algorithms) provided to physicians at the point of care that provide objective and accurate estimates of the prior probability of disease might help reduce this source of disparity. Raising physicians' consciousness about the possibility of bias through cultural competency training may also help decrease the use of racially based clinical stereotypes, which are one kind of cognitive "shortcut" busy clinicians may use to help order their world.²⁴ Future research should examine the contribution of other potential sources of disparities in care, especially process issues such as deficiencies in doctor-patient communication or limitations in patients' health literacy, while controlling for the effects of clinical, sociodemographic, reimbursement, and financing variables and the availability of cardiac procedure technology.

Racial disparities in cardiac care are widespread, but before they can be addressed and eliminated, their cause must be identified. These results suggest that patients' attitudes and beliefs may not play an important role, and that researchers should focus on other possible etiologic variables. Future research needs to validate our findings in other set-

tings and to examine other possible mechanisms by which racial disparities in care are enacted, so that carefully targeted interventions can foster the availability of C-CATH to all patients who can benefit from it. ■

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This article was accepted July 13, 2004.

Note. The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

Contributors

N.R. Kressin originated and supervised the study, obtained funding, and led the writing. B.-H. Chang supervised the data analysis and interpretation. J. Whittle assisted with writing and data interpretation. E.D. Peterson helped with the study design and data interpretation. J.A. Clark helped with data analysis and interpretation. A.K. Rosen helped with the data interpretation and provided feedback on drafts. M.B. Orner completed the analyses. T.C. Collins and L.G. Alley supervised the data collection and provided feedback on drafts. L.A. Petersen assisted with obtaining funding, designing the study design, supervising data collection, and providing feedback on data interpretation and drafts.

Acknowledgments

This research was supported by the Department of Veterans Affairs, Veterans Health Administration, Health Services Research and Development Service (ECV 97-022.2 and RCS 02-066-1, N.R. Kressin, PI, and RCD 95-306, L.A. Petersen, PI), the American Heart Association and the Pharmaceutical Roundtable (9970113N, N.R. Kressin, PI), and the Robert Wood Johnson Foundation (045444, L.A. Petersen, PI, and 038406, T.C. Collins, PI).

Human Participant Protection

This study was approved by the human studies subcommittee of the 5 Department of Veterans Affairs medical centers where data collection took place, and by the study coordinating center site.

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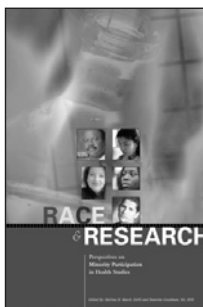
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softcover ■ 2004

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Edited by Bettina Beech, DrPH, MPH, and Maurine Goodman, MA, MPH

Race and Research: Perspectives on Minority Participation in Health Studies is a teaching text and resource guide for students, health professionals, public health researchers, and the general public that extends the discussion of environmental factors that influence ethnic minority participation in health studies. This book examines the lack of minority participation in health studies from social, historical, and scientific perspectives.

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