The Predictors of Patient–Physician Race and Ethnic Concordance: A Medical Facility Fixed-Effects Approach

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Objective. To examine the predictors of patient–physician race/ethnicity concordance among diabetes patients in an integrated delivery system.

Data Source. Kaiser Permanente's Northern California Diabetes Registry of 2005.

Study Design. Logistic regression predicted concordance for each racial/ethnic group. Availability of a concordant physician, whether a patient chose their physician, and patient language were main explanatory variables.

Data Collection/Extraction Methods. The study population consisted of 109,745 patients and 1,750 physicians.

Principal Findings. Patients who chose their physicians were more likely to have a same race/ethnicity physician with OR of 2.2 (95 percent CI 1.74–2.82) for African American patients, 1.71 (95 percent CI 1.44–2.04) for Hispanic patients, 1.11 (95 percent CI 1.04–1.18) for white patients, and 1.38 (95 percent CI 1.23, 1.55) for Asian patients. Availability of a same race/ethnicity physician was also a predictor of concordance for African American patients (OR 2.7; 95 percent CI 2.45–2.98) and marginally significant for Hispanic patients (OR 1.02; 95 percent CI 1.01–1.02), white patients (OR 1.02; 95 percent CI 1.00–1.04), and Asian patients (OR 1.05; 95 percent CI 1.03, 1.07). Limited English language was a strong predictor of concordance for Hispanic patients (OR 4.81; 95 percent CI 4.2–5.51) and Asian patients (OR 9.8; 95 percent CI 7.7, 12.6).

Conclusion. Patient language, preferences, and the racial composition of the physician workforce predict race/ethnicity concordance.

Key Words. Racial/ethnic differences in health and health care, health work force, distribution

Affirmative action programs and other recruitment and retention efforts in health care may reduce disparities by allowing more patients to have access to medical professionals from similar linguistic and cultural backgrounds (Saha et al. 2000). Currently, African Americans and Hispanics make up 25 percent of the U.S. population, but only 6 percent of the physician workforce (Cooper

et al. 2006). Owing to the low proportion of underrepresented physicians, African American and Hispanic patients are more likely than white patients to be treated by a physician from a dissimilar racial or ethnic background. While race is a social and political construction, that is, racial categorization is not based on biological differences between groups but on continually changing and contextual relationships between groups, it is widely documented that unequal treatment stemming from physician uncertainty or bias and linguistic and cultural barriers may negatively influence health outcomes for patients of color (van Ryn 2002; Smedley et al. 2003).

Increasing opportunities for racial/ethnic match between minority patients and physicians can have important consequences. Studies have found that minority patients in race/ethnic concordant relationships are more likely to use needed health services, are less likely to postpone or delay seeking care, and report a higher volume of use of health services (Saha et al. 2000; LaVeist and Nuru-Jeter 2002). Patients in race concordant patient–provider relationships also report greater satisfaction (LaVeist and Nuru-Jeter 2002) and better patient–provider communication (Cooper-Patrick et al. 1999; Cooper et al. 2006).

Studies on patient preferences for a same race/ethnicity physician have found that African American and Hispanic patients who have a choice are more likely to choose a same-race physician. Not surprisingly, patients who report that their choice in physician is influenced by race or ethnicity are more likely to be in concordant relationships (Saha et al. 2000; Laveist and Nuru-Jeter 2002). Blacks and Hispanics with strong beliefs about racial discrimination in health care are also more likely to prefer a race/ethnic concordant physician (Chen et al. 2005). Patients are not the only actors influencing disproportionate racial match for minority patients. Minority physicians often locate their practices in neighborhoods with larger minority populations and

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disproportionately care for disadvantaged patients with worse health and lower socioeconomic status (Moy and Bartman 1997).

Few previous studies have examined the influence of medical facility workforce diversity on patient–physician race concordance or have focused on patients with chronic illnesses. Arguably, the predictors of concordance might differ in acute versus chronic care. This paper builds on previous research on patient–physician racial match by examining whether patients who choose their physicians are more likely to have a same-race/ethnicity physician after controlling for medical facility racial and ethnic diversity of the physician workforce. We also examine the association between patient language, socioeconomic and health status, and patient–physician concordance. Unlike previous studies, we conducted a series of race stratified logistic regression models that account for geographic and medical facility factors by including the medical facility where a patient receives care as a fixed effect.

METHODS

Study Population

This study used data from Kaiser Permanente's (KP) Northern California Diabetes Registry of 2005. KP is the largest, integrated prepaid health care plan in the nation, operating over 30 hospitals and 437 medical centers across the country. KP's 8.2 million members are served by 11,275 physicians and over 100,000 employees. The Northern California region serves 3.2 million members from diverse racial, ethnic, and socioeconomic backgrounds. Patients were selected from the KP diabetes registry if they were identified as having diabetes and had been continuously enrolled in 2005. Patient race was obtained from several sources as of 2002. These sources include KP member surveys, study surveys, and hospitalization data. Physician data (including self-reported race) were obtained from physician demographic files. The validity and reliability of the KP diabetes registry and its laboratory and pharmacy databases have been documented previously (Schmittdiel et al. 2008).

Patients with missing racial and ethnic data or who were categorized as "mixed race" were excluded from the analysis (18 percent of patients). Owing to small sample sizes, patients from Native American (<1 percent) and Pacific Islander backgrounds (<1 percent) were also excluded from the analysis. The final study population consisted of 109,745 African American, Hispanic, white, and Asian patients that received care from 1,750 physicians in 49 facilities across Northern California.

Dependent Variable

Patient–physician racial/ethnic match or concordance is defined as the patient and physician having the same racial background. In this study, racial/ethnic match or concordance was indicated by a binary variable of 1 if a patient had a same-race or ethnicity provider and 0 if a patient had a provider of a different race or ethnicity.

Main Explanatory Variables

Availability of a Same-Race Physician. To assess the extent to which patient–physician racial match is influenced by the diversity of the medical workforce, three continuous variables were calculated: (1) African American physician availability: the percentage of all patients at each medical facility treated by African American physicians, (2) Hispanic physician availability: the percentage of all patients at each medical facility treated by Hispanic physician, (3) white rhysician availability: the percentage of all patients at each medical facility treated by white physician, and (4) Asian physician availability: the percentage of all patients at each medical facility treated by Asian physicians. We conducted a sensitivity analysis using the racial composition of the physician workforce as the main explanatory variable (defined as the percentage of physicians at each facility that are African American, Hispanic, white, or Asian for each stratified analysis).

Patient–Physician Link. Two binary variables indicating how a patient was assigned to a physician were also included in all models. The first indicates whether a physician was chosen by the patient or assigned by Kaiser. Because patient–physician link was unknown for a substantial portion of the sample (45 percent), a second binary variable comparing patients with unknown link, to patients assigned to their physician by Kaiser, was also included.

Multivariate Analyses

Stratified logistic regression models were used to predict patient–physician racial match for African American, Hispanic, white, and Asian patients. All models adjusted for patient demographic variables (patient age, gender, language). Socioeconomic status variables included geo-coded median household income (the median household income of the Census block a patient lives in) and geo-coded education (the percentage of individuals aged 25 and older with a college degree in the Census block a patient lives in). Patient health

status, as measured by the number of comorbid conditions, baseline blood glucose laboratory values (a measure of diabetes control), and number of medical visits, was also controlled for. Physician variables included physician age, gender, race, language, specialty, and panel size. To adjust for clustering of patients and physicians within medical facilities, patient–physician medical facility was included as a fixed effect. To address any bias due to missing data (patient–physician link was unknown for 45 percent of the sample), we conducted a sensitivity analysis in which the full logistic regression models assessing the predictors of concordance for all patients were compared with restricted models that included only patients for whom the patient–physician link was known.

RESULTS

Sample Characteristics

Patients were more likely to be male (52 percent) and almost 97 percent reported speaking at least some English. Average patient age was 61. Most patients over the age of 65 were covered by Medicare (87 percent). Almost 46 percent of the patients were white, 14 percent Asian, 11 percent Hispanic, and 10 percent were African American (Table 1).

More physicians were male (56 percent of physicians). Almost a quarter of physicians (23 percent) spoke another language in addition to English. The majority of physicians were under 50 (average age of 45). Physicians were disproportionately white (47 percent) or Asian (40 percent). Less than 8 percent of physicians were either African American or Hispanic. Most physicians were family practice (14 percent) or internal medicine (58 percent). Approximately 28 percent were specialists or subspecialists (Table 2).

Facilities varied significantly in the racial composition of their physician workforce. The percentage of patients seen by African American physicians at each facility ranged from 0 percent to 21 percent, while the percentage of patients seen by Hispanic physicians ranged from 0 percent to 45 percent. On the other hand, the percentage of patients seen by white physicians at each facility ranged from 18 percent to 89 percent and the percentage of patients seen by Asian physicians at each facility ranged from 0 percent to 100 percent. Approximately 26 percent of all patients received care at facilities with no African American physicians, while 20 percent of all patients received care at facilities with no Hispanic physicians and 3 percent of all patients received care at a facility with no Asian physicians (data not shown).

Table 1:   Patient Characteristics by Patient Race/Ethnicity

	African American *n = 15,905* (%)	Hispanic *n = 17,750* (%)	White *n = 74,900* (%)	Asian *N = 22,722* (%)
Patient demographic characteristics				
Age (mean)	60.8	60.1	63.8	60.1
Male	45	50	52.6	49.2
Female	55	50	47.4	50.8
English not primary language	0.7	22	1.5	10.2
Income* (median)	U.S.$50,371	U.S.$55,956	U.S.$61,712	U.S.$68,016
% College degree[†]	15.3	15	19.5	21.7
How patient was linked to a physician				
Kaiser linked patient to physician	17.3	23.7	22	22.5
Patient chose a physician	32.4	32	32	30.2
Unknown patient–provider link	50	44	45.7	47.3
Physician specialty				
Internal medicine	82.4	75.9	76	85.7
Family practice	10.5	16.1	16.6	7
Other specialty	7	7.9	7.4	5.5
Physician race				
African American	9.7	3.4	3.3	2.2
Hispanic	3.7	11.2	4.4	2.5
White	40.4	35.6	47.4	31.5
Asian	44	46.3	41.7	63.2
Health status variables				
No. of visits (mean)	6.4	6.2	6.3	5.3
No. of comorbid conditions (mean)	2.7	2.5	2.8	2.4
Pill burden	8.3	7.4	8.2	7.6

*Median household income variable is the geo-coded median household income for the population over 25 years old in the Census block where a patient lives.
[†]Geo-coded education is the percent of the population over 25 years old with a college degree in the Census block where a patient lives.

Prevalence of Racial Match

Underrepresented minority patients were less likely than white or Asian patients to have a race physician. Only 9.7 percent of African American patients and 11.2 percent of Hispanic patients were racially/ethnically matched while nearly 48 percent of white patients and 63 percent of Asian patients were racially/ethnicity matched. Hispanic patients who spoke Spanish as a primary language were more likely to have a same-ethnicity physician. Almost 26 percent of Spanish-speaking Hispanic patients had a Hispanic physician, whereas <8 percent of English-speaking Hispanic patients had a Hispanic

Table 2:   Physician Characteristics

	Physicians (N= 1,750) n (%)
Gender	
Male	972 (54)
Female	769 (43)
Missing	50 (3)
Race/ethnicity	
White	834 (47)
African American	66 (4)
Hispanic	83 (4)
Asian American/Pacific Is.	712 (40)
Multiple	NA
Native American	14 (1)
Missing	81 (4)
Mean age (SD)	45 (8.9)
Mean number of patients in panel (SD)	1904 (1,314)
Mean number of diabetes patients in panel (SD)	136 (113)
Family practitioner	252 (15)
Internist	999 (57)
Specialist/subspecialist	499 (28)

NA, not applicable.

physician. Likewise, almost 60 percent of Asian patients with limited English proficiency had an Asian physician, whereas 40 percent of English-speaking Asian patients had an Asian physician.

Conversely, viewed from the physician perspective, minority physicians disproportionately served minority patients. While only 11 percent of all patients were African American, over 25 percent of the patients seen by African American physicians were African American. Likewise, while 12.5 percent of patients in the sample were Hispanic, 24 percent of patients seen by Hispanic physicians were Hispanic. Underrepresented minority physicians also served twice as many patients from low-income backgrounds than white and Asian patients (Table 3).

Predictors of Racial Match

Compared with patients who were assigned a physician by the health care organization, minority patients who chose their physicians were more likely to have a same-race physician, OR 2.2 (95 percent CI 1.74–2.82) for African American, OR 1.71 (95 percent CI 1.44–2.04) for Hispanic, and OR 1.38 (95 percent CI 1.23, 1.55) for Asian patients. African American, white, and Asian

Table 3:   Racial Distribution of Physician Panels

Provider Race	% Black Patients	% White Patients	% Hispanic Patients	% Asian/Other Minority	% Minority*	% Low Income[†]
African American	25	40	10	25	35	11.1
Hispanic	7	39	24	30	31	12.7
White	9.7	54	9.6	26.7	19.3	6.7
Asian	9	41	11	39	20	7.1

*African American and Hispanic patients.
[†]Geo-coded household income under U.S.$30,000.

patients with an unknown patient–provider link were also more likely to be racially matched, compared with similar patients who were linked to their providers by the health plan. Availability of a same-race provider was also a strong predictor of racial match for African American patients (OR 2.7; 95 percent CI 2.45–2.98) and a marginally significant predictor of concordance for Hispanic patients (OR 1.02; 95 percent CI 1.00–1.04), white patients (OR 1.02; 95 percent CI 1.01–1.04), and Asian patients (OR 1.05, 95 percent CI 1.03, 1.07). Limited English proficiency was the strongest predictor of racial/ethnic match for Hispanic patients (OR 4.81; 95 percent CI 4.2, 5.51) and Asian patients (OR 9.8; 95 percent CI 7.6, 12.6) (Table 4).

Patient age and gender were not significant predictors of concordance for patients from any racial group. Patient socioeconomic status was not a significant predictor of concordance; however, Asian patients from census blocks with a higher percentage of college graduates were more likely to be in concordant relationships (OR 2.09; 95 percent CI 1.41, 3.1) Patient health status was not a predictor of concordance for African American, Hispanic, and Asian patients. However, a lower baseline blood glucose value (a measure of diabetes control) was a significant predictor of race concordance for white patients.

DISCUSSION

This study makes a number of contributions to the existing literature on race concordance. First, while other studies explored race concordance across a general population, we assessed the predictors of race concordance among a large cohort of patients with diabetes. Arguably, the effects of concordance should be most pronounced in the treatment and management of chronic

Table 4:   Predictors of Racial Match by Race

	African American Concordance n = 12,982	Hispanic Concordance n = 14,890	White Concordance n = 62,557	Asian Concordance n = 19,316
Main explanatory variables	OR (95%, 95% CI)	OR (95%, 95% CI)	OR (95%, 95% CI)	OR (95%, 95% CI)
Patient chose their provider	2.2 (1.74, 2.82)	1.71 (1.44, 2.04)	1.11 (1.04, 1.18)	1.38 (1.23, 1.55)
Unknown patient–provider link*	1.39 (1.09, 1.79)	0.97 (0.80, 1.18)	1.19 (1.12, 1.18)	1.18 (1.05, 1.32)
Availability of concordant provider	2.7 (2.45, 2.98)	1.02 (1.00, 1.04)	1.02 (1.01, 1.02)	1.05 (1.03, 1.07)
Patient demographic and SES variables				
Geo-coded median household Income	0.88 (0.73, 1.06)	0.90 (0.74, 1.10)	0.99 (0.90, 1.08)	0.85 (0.70, 1.04)
Geo-coded college education	1.61 (0.80, 3.25)	0.67 (0.32, 1.41)	1.19 (0.95, 1.5)	2.09 (1.41, 3.1)
Female	1.06 (0.93, 1.22)	0.88 (0.78, 1.01)	1.03 (0.99, 1.07)	0.98 (0.91, 1.05)
Age	0.99 (0.99, 1.00)	1.00 (0.99, 1.01)	1.00 (0.99, 1.00)	1.00 (0.99, 1.00)
Primary language, NOT English	—	4.81 (4.2, 5.51)	—	9.8 (7.6, 12.6)
Patient health status				
Pill burden	1.00 (0.99, 1.01)	0.99 (0.98, 1.00)	1.01 (1.00, 1.01)	0.99 (0.99, 1.00)
No. of visits to PCP	0.99 (0.98, 1.00)	1.00 (0.99, 1.00)	0.99 (0.99, 1.00)	1.00 (0.99, 1.01)
No. of comorbid conditions	0.98 (0.93, 1.04)	0.98 (0.92, 1.03)	1.01 (0.99,1.02)	0.96 (0.93, 1.00)
HgA1c lab values†	0.97 (0.93, 1.01)	1.02 (0.98, 1.05)	0.98 (0.96, 0.99)	0.98 (0.95, 1.00)
Physician characteristics				
Female	1.62 (1.39, 1.9)	0.74 (0.64, 0.86)	0.51 (0.48, 0.54)	1.83 (1.69, 1.99)
Physician speaks second language	0.12 (0.09, 0.16)	4.15 (3.6, 4.7)	0.35 (0.34, 0.37)	1.94 (1.79, 2.11)
Panel size	1.00 (1.00, 1.00)	0.99 (0.99, 1.00)	0.99 (0.99, 0.99)	1.00 (1.00, 1.00)
Family practice specialty	1.83 (1.48, 2.27)	2.07 (1.74, 2.46)	1.24 (1.17, 1.31)	0.66 (0.56, .77)
Age	0.94 (0.93, 0.95)	0.96 (0.95, 0.97)	1.00 (0.99, 1.00)	0.91 (0.90 0.91)
R^2	0.19	0.251	0.194	0.233

*Comparing patients with unknown link, to patients assigned to their physician by Kaiser.

†A measure of diabetes control.

Because fixed-effects models examined the predictors of concordance within medical facilities; Black and Hispanic patients receiving care at medical facilities with no Black and Hispanic physicians, respectively, were excluded from the analysis.

Reference categories: male, Kaiser linked, provider specialty internal medicine, English as first language, Physician does not speak second language.

diseases such as diabetes, where the patient–provider relationship plays a prominent role (Kaplan, Greenfield, and Ware 1989). Another unique aspect of this study is the use of the "availability" variable to understand the extent to which patient–physician racial match is influenced by the diversity of the medical workforce. In a sensitivity analysis, racial composition (the percentage of physicians at each facility from African American, Hispanic, white, or Asian backgrounds for each stratified analysis) as opposed to the percentage of patients treated by each racial group as a main explanatory variable, was also a strong predictor of racial match. It should be noted that while availability was a strong predictor, even after controlling for availability, minority patients who had a choice in physician were more likely to have a same-race provider.

Consistent with previous research on racial match, minority patients were disproportionately served by minority physicians (Moy and Bartman 1997; Xu et al. 1997; Stinson and Thurston 2002) and limited English speakers were more likely to have same-race/ethnicity physicians (Murray-Garcia et al. 2001). Previous research has used English language proficiency as a proxy for acculturation for immigrant patients (Xu and Borders 2008; Nguyen and Tsui 2009). It is possible that limited English speakers were more likely to have same-race/ethnicity physicians (regardless of physician language) because they may be less acculturated and may be more comfortable with a physician from their same racial/ethnic background.

In bivariate analysis, African American and Hispanic physicians also served lower income patients regardless of the race/ethnicity of the patient. However, after controlling for medical facility fixed effects, socioeconomic status was not a strong predictor of concordance. This is consistent with research suggesting that minority physicians are more likely to locate their practices in economically disadvantaged communities (Moy and Bartman 1997; Bach et al. 2004). Within medical facilities, however, patient geo-coded income and education status was similar for patients in concordant and discordant patient–physician relationships.

Few other significant differences were documented between patients in concordant versus discordant relationships in this system. Patients in concordant and discordant relationships were similar in age, gender, and Medicare status. African American and Hispanic patients in concordant relationships did not significantly differ in measures of health status, which is somewhat inconsistent with previous research suggesting that minority physicians treat sicker patients than white physicians. This finding might be explained by differences in the study populations in question—as insured members with

diabetes all receiving care from the same health care organization, patients in this sample may have more uniform health status and more equal access to an extensive array of nutritionists, health educators, and other specialists, compared with studies that examine a general population or those served by county clinics.

To our knowledge, this is the largest study examining predictors of race concordance after controlling for patient, provider, and facility effects simultaneously. However, there were some important limitations. This study utilized quantitative data available in existing clinical databases; patient and physician perspectives were not measured directly. Also, how a patient was linked to a physician was unknown for a substantial portion of the study population. Hence, we conducted a sensitivity analysis with logistic regression models assessing the predictors of concordance for all patients who were compared with models assessing patients for whom the provider link was known. This did not alter the direction or magnitude of the results; however, there may still have been some unmeasured bias due to missing data. Another potential concern for this study is that we were unable to assess important variables that could influence racial match such as cultural competency or communication styles of physicians. Future qualitative research would be useful for understanding the considerations that patients take into account when choosing a physician. Finally, there is great heterogeneity within racial and ethnic groups. Even when minority patients have a provider from a similar racial or ethnic background, considerable linguistic, religious, and cultural differences may exist. Similarly, barriers to care for minority patients may occur more broadly and systematically than the interpersonal relationship between patients and their providers.

CONCLUSION

The results of this study lend support to the hypothesis that racial match is at least partially explained by the availability of a same-race physician, and also lend support to the theory that patients may choose their physicians based on race. In addition, the results support the hypothesis that patients with limited English fluency are more likely to have a same-race/ethnicity provider, independent of the patient–physician language concordance. The findings presented here provide evidence that the availability of a same-race physician is a strong predictor of concordance for African American and to a lesser extent, Hispanic patients.

Increasing the availability of minority physicians is likely to require targeted outreach programs and race-based recruitment and retention programs, including affirmative action programs. These policies may increase the proportion of physicians able to provide patients with linguistically and culturally appropriate care that will reduce barriers for minority patients. If, as the literature suggests, race concordance improves patient experience of care and improves health outcomes, race-conscious recruitment and retention efforts can reduce racial and ethnic disparities in health.

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REFERENCES

Bach, P. B., H. H. Pham, D. Schrag, R. C. Tate, and J. L. Hargraves. 2004. "Primary Care Physicians Who Treat African-Americans and Whites." *New England Journal of Medicine* 351 (6): 575–84.

Chen, F. M., G. E. Fryer, R. L. Phillips, E. Wilson, and D. E. Pathman. 2005. "Patients Beliefs about Racism, Preferences for Physician Race and Satisfaction with Care." *Annals of Family Medicine* 3 (2): 138–43.

Cooper, L., M. C. Beach, R. Johnson, and T. Inui. 2006. "Delving below the Surface: Understanding How Race and Ethnicity Influence Relationships in Health Care." *Journal of General Internal Medicine*. 21 (Suppl 1): S21–7.

Cooper-Patrick, L., J. J. Gallo, J. J. Gonzales, H. T. Vu, N. R. Powe, and C. Nelson. 1999. "Race Gender and Partnership in the Patient–Physician Relationship." *Journal of the American Medical Association* 282: 583–9.

Kaplan, S., S. Greenfield, and J. Ware. 1989. "Assessing the Effects of Physician–Patient Interactions on the Outcomes of Chronic Disease." *Medical Care* 27 (Suppl): S110–S127.

Laveist, T. A., and A. Nuru-Jeter. 2002. "Is Doctor–Patient Race Concordance Associated with Greater Satisfaction with Care?" *Journal of Health and Social Behavior*. 43 (3): 296–306.

Moy, E., and B. A. Bartman. 1997. "Physician Race and Care of Minority and Medically Indigent Patients." *Medical Care* 35 (12): 1212–9.

Murray-Garcia, J. L., J. A. Garcia, M. E. Schembri, and L. H. Guerra. 2001. "The Service Patterns of a Racially, Ethnically, and Linguistically Diverse Housestaff." *Academic Medicine* 76 (12): 1232–40.

Nguyen, L. S., and H. A. Tsui. 2009. "Interview Language: A Proxy Measure for Acculturation among Asian Americans in a Population-Based Survey." *Journal of Immigrant Minority Health* July 29. Epub ahead of print. DOI: 10.1007/s10903-009-9278-Z

Saha, S., S. H. Taggart, M. Komaromy, and A. B. Bindman. 2000. "Do Patients Choose Physicians of Their Own Race?" *Health Affairs* 19 (4): 76–83.

Schmittdiel, J., C. S. Uratsu, A. J. Karter, M. Heisler, U. Subramanian, C. M. Mangione, and J. V. Selby. 2008. "Why Don't Diabetes Patients Achieve Recommended Risk Factor Levels? Poor Adherence vs. Lack of Treatment Intensification." *Journal of General Internal Medicine* 23 (5): 588–94.

Smedley, B. D., A. Y. Stith, A. R. NelsonInstitute of Medicine (U.S.) Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care. 2003. "Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care." edited by BD Smedley, AY Stith, and AR Nelson, pp. 160–179. Washington, DC: National Academies Press.

Stinson, M. H., and N. K. Thurston. 2002. "Racial Matching among African-American and Hispanic Physicians and Patients." *Journal of Human Resources*. 37 (2): 410–28.

van Ryn, M. 2002. "Research on the Provider Contribution to Race/Ethnicity Disparities in Medical Care." *Medical Care* 40 (1, Suppl): 1140–51.

Xu, G., S. K. Fields, C. Laine, J. J. Veloski, B. Barzansky, and C. J. Martini. 1997. "The Relationship between the Race/Ethnicity of Generalist Physicians and Their Care for Underserved Populations." *Medical Care* 35 (12): 1212–9.

Xu, K. T., and T. F. Borders. 2008. "Does Being an Immigrant Make a Difference in Seeking Physician Services?" *Journal of Health Care for the Poor and Underserved* 19 (2): 380–90.

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