HMO Employment and African-American Physicians

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Objectives: To assess the level and determinants of African-American physicians' employment in health maintenance organizations (HMOs), particularly early in their careers.

Methods: We analyzed data from the 1991 and 1996 Young Physicians Surveys to assess racial differences in the likelihood of HMO employment (n=3,705). Using multinomial logistic regression, we evaluated four explanations for an observed relationship between African-American physicians and HMO employment: human capital stratification among organizations, race-based affinity between physicians and patients, financial constraints due to debt burden, and different organizational hiring practices. Using binomial logistic regression, we also evaluated differences in the odds of being turned down for a prior practice position, of subsequently leaving the current practice organization and of later having career doubts.

Results: Without any controls, African-American physicians were 4.52 times more likely to practice in HMOs than Caucasian physicians. After controlling for human capital stratification, racial concordance and financial constraints, African-American physicians remained 2.48 times more likely to practice in HMOs than Caucasian physicians. In addition, 19.2% of African-American physicians in HMOs reported being turned down for another job, far more than any other racial/ethnic group in the HMO setting and any racial/ethnic group, including African-American physicians in the non-HMO setting (including all other practice locations). Five years later, those same African-American physicians from HMOs also reported significantly more turnover (7.50 times more likely than non-HMO African-American physicians to leave their current practice) and doubt about their careers (2.17 times more likely than non-HMO African-American physicians to express serious career doubts).

Conclusions: African-American physicians were disproportionately hired into HMO settings, impacting their subsequent careers.

Key words: African Americans ■ health maintenance organizations ■ physician careers

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INTRODUCTION

An initial rise in African-American physicians graduating from U.S. medical schools during the 1970s and 1980s was followed by slow growth during the 1990s and early 2000s, despite calls for increasing diversity levels in medicine.[1-3] There were 229 AAMD graduates in 1970 (2.4% of all medical school graduates), 766 in 1980 (4.9%), 918 in 1990 (6.0%), and 1,034 in 2004 (6.5%), the most recent year for which statistics are available.[4] Those African-American physicians entering practice in the 1980s, therefore, represent an important bellwether cohort because they were the first relatively large group of African-American physicians to be integrated into the landscape of medicine. Studying the careers of this AAMD cohort should help us to understand the AAMD practice experience in general as well as the medical care provided to the many African-American patients treated by them.

During that same time period of the 1980s, staff- and group-model HMOs also expanded greatly. As a result, some observers raised concerns that HMOs were disproportionately enrolling racial and ethnic minority patients and then restricted services to them.[5-7] Others claimed that HMOs benefited minorities by standardizing care while providing more equitable access to care by limiting racially biased decisions among providers.[8]

Observers on both sides of that HMO debate have

largely ignored the prominent role that HMOs appear to have played in the careers of many African-American physicians. To investigate this issue, we used data from an established national physician survey to see whether African-American physicians were overrepresented in HMO settings and to examine four possible explanations for overrepresentation: human capital stratification, selective affinity, financial constraints and hiring practice differences.

The basis for the human capital stratification mechanism is the view that African-American physicians may exhibit poorer formal qualifications on average in the labor market when compared with Caucasian colleagues. Recent analyses show that the average test scores of African-American physicians in training lie well below those of others.[2,9] Given this situation, African-American physicians may end up disproportionately employed in HMOs because of weaker qualifications that lead them to have fewer labor market choices. HMOs are often considered less desirable practice locations, with lower remuneration and prestige.[10,11] This leads physicians with marginally better qualifications to avoid them, leaving those with poorer qualifications (disproportionately African-American physicians) to accept employment in them with little choice.

Another possible pathway connecting African-American physicians and HMOs is selective affinity, which reflects a tendency for racial matching, or "racial homophyly," to occur between physician and patient.[12-14] African-American physicians treat a disproportionate share of African-American patients,[15,16] perhaps simply due to geographic colocation of HMOs and African-American communities, or racial preferences for providers of the same race among African-American and/or Caucasian patients,[17] or AAMD preferences to treat underserved patients through practice opportunities provided by HMOs.

Financial constraints are known to be greater on African-American physicians relative to Caucasian counterparts. In particular, the debt burden reported by African-American physicians on graduation from medical school is higher than that reported by Caucasian graduates.[18] Because private practices traditionally require all partners to contribute their own capital to the practice, they entail greater capital expenditure and financial risk. Physicians with a high debt burden may be wary of these factors, and private practice groups themselves may be wary of recruiting new physicians who lack access to capital because of their debt obligations. In contrast, HMO employment provides a guaranteed steady income, minimizing financial uncertainty, and it does not require any capital expenditure. Hence, to the extent that African-American physicians are disproportionately burdened with debt when entering the

Table 1. Average levels of physician and patient-panel characteristics across six physician practice settings

Type of Predictor	HMO (N=302)	Government (N=369)	Academic (N=403)	Hospital (N=835)	Large Group (N=190)	Small Group and Solo (N=1,606)
Selective Affinity						
Percent black patients in panel	19.5%	25.8%	24.1%	20.0%	16.4%	13.5%
Human Capital						
Test score index	48.9	54.1	53.2	52.5	57.7	50.5
Board-certified	83.7%	74.8%	82.6%	83.6%	95.3%	81.6%
Financial Constraint						
Debt burden ($ in thousands)	31.1951	34.607	25.688	29.054	22.373	28.001
Gender						
Female	35.8%	27.8%	30.6%	23.9%	19.8%	21.0%
Race/Ethnicity						
Caucasian non-Hispanic	82.7%	89.6%	91.9%	93.4%	87.9%	92.0%
Hispanic	3.0%	3.9%	3.1%	1.8%	2.9%	2.3%
African-American	8.8%	4.9%	1.6%	2.4%	0.7%	2.6%
Other race	5.6%	1.6%	3.3%	2.5%	8.5%	3.0%
Region						
Northeast region	23.9%	13.5%	21.1%	31.2%	11.2%	25.9%
Midwest region	22.3%	19.1%	28.8%	26.5%	33.1%	21.4%
Southeast region	21.2%	40.6%	32.5%	28.4%	17.9%	31.4%
West region	32.6%	26.7%	17.6%	13.8%	37.9%	21.3%

Definitions of employment settings are as follows: 1) HMO includes a staff- or group-model HMO as well as "freestanding ambulatory care, surgical or emergency care center operated by a hospital or by a chain with centers operated under the same name" and for-profit clinics (average size: 115 MDs); 2) government (local, state or federal); 3) academic (medical school or university); 4) hospital (hospital or hospital clinic); 5) large groups (with ≥20 MDs (average size: 102 MDs); 6) solo practices and small group or partnership settings (with ≤19 MDs) (average size: 3.4 MDs). Percentages are weighted to correct for survey sample design effects. Test score index construction is described in the text. Data values for employment setting were missing on 61 cases.

medical practice, this could lead to their overrepresentation in HMO employment.

Hiring practice differences between HMOs and other medical practices may also produce overrepresentation of African-American physicians in HMOs. This could be the case if the well-documented tendency for larger, more formalized organizations to employ more diverse staffing[19] also occurs in medicine. The logic is that informal hiring in smaller organizations leads to more racially homophilous staffing (e.g., Caucasian practice partners choosing to hire individuals who are racially similar to them). Larger size, in contrast, brings with it exposure to federal or state equal employment opportunity regulation (which applies to organizations with ≥50 employees), greater awareness of and vulnerability to employment discrimination legal actions, and the formalization of hiring functions with an emphasis on fairness.[20]

METHODS

In order to test these hypotheses, we used data from the 1991 Young Physicians Survey (YPS),[21] a nationally representative sample survey of U.S.-trained physicians who were up to five years postresidency at the time of the survey. The core survey population was defined by a simple random sample of physicians born 1952 or later who completed residency between 1986 and 1989 (inclusive), drawn from the AMA Physician Masterfile. The survey was administered by telephone, and the usable sample described below contained 3,705 allopathic physician respondents.

Table 2. Results of multinomial logistic regression predicting physicians' type of employment setting using physician race and other characteristics of physician and patient panel

Predictor	HMO	Government	Academic	Hospital	Large group
Intercept	-1.21***	-2.527***	-2.702***	-0.67***	-4.682***
	{0.298}	{0.080}	{0.067}	{0.512}	{0.009}
	[0.25, 0.35]	[0.07, 0.08]	[0.06, 0.08]	[0.46, 0.58]	[0.007.0.012]
Percent patients black	0.0224***	0.0362***	0.033***	0.024***	0.0201***
	{1.023}	{1.037}	{1.034}	{1.024}	{1.020}
	[1.021, 1.024]	[1.035, 1.038]	[1.032, 1.035]	[1.023, 1.026]	[1.018, 1.022]
Test score index	-0.00065^{NS}	0.0112***	0.00549***	0.0054***	0.0128***
	{0.999}	{1.011}	{1.006}	{1.005}	{1.013}
	[0.998, 1.001]	[1010, 1.013]	[1.004, 1.007]	[1.004, 1.006]	[1.011, 1.015]
Board-certified	0.0829^{NS}	-0.3269***	0.00924 ^{NS}	0.0883**	1.2432***
	{1.086}	{0.721}	{1.009}	{1.092}	{3.467}
	[0.997, 1.184]	[0.671, 0.775]	[0.941, 1.082]	[1.034, 1.154]	[2.974, 4.041]
Debt burden	0.9755^{NS}	4.0649***	-2.4174***	1.2103**	-5.0142***
	{2.652}	{58.26}	{0.089}	{3.354}	{0.007}
	[0.942, 7.466]	[23.9, 141.8]	[0.034, 0.231]	[1.669, 6.744]	[0.002, 0.029]
Female	0.5895***	0.3436***	0.4822***	0.026^{NS}	-0.1138*
	{1.803}	{1.410}	{1.620}	{1.026}	{0.892}
	[1.687, 1.928]	[1.320, 1.506]	[1.527, 1.718]	[0.978, 1.077]	[0.817, 0.975]
Hispanic	0.3537**	0.5827***	0.4903***	-0.0985^{NS}	0.7521***
	{1.424}	{1.791}	{1.633}	{0.906}	{2.121}
	[1.185, 1.712]	[1.533, 2.092]	[1.401, 1.903]	[0.785, 1.046]	[1.714, 2.626]
African-American	0.9066***	-0.156^{NS}	-1.1946***	-0.5345***	-0.9593***
	{2.476}	{0.856}	{0.303}	{0.586}	{0.383}
	[2.147, 2.856]	[0.731, 1.001]	[0.248, 0.369]	[0.512, 0.671]	[0.259, 0.566]
Other race/ethnicity	0.3635***	-0.9431***	-0.0139^{NS}	-0.2231**	0.7578***
	{1.438}	{0.389}	{0.986}	{0.800}	{2.134}
	[1.249, 1.657]	[0.315, 0.482]	[0.853, 1.141]	[0.708, 0.904]	[1.854, 2.455]
Midwest region	0.1066*	0.6143***	0.6473***	0.0206^{NS}	1.3613***
	{1.112}	{1.848}	{1.910}	{1.021}	{3.901}
	[1.091, 1.215]	[1.680, 2.033]	[1.776, 2.054]	[0.967, 1.077]	[3.477, 4.378]
Southeast region	-0.5704***	0.6604***	0.1009**	-0.4564***	0.2655***
	{0.565}	{1.936}	{1.106}	{0.634}	{1.304}
	[0.517, 0.618]	[1.776, 2.109]	[1.031, 1.187]	[0.601, 0.667]	[1.151, 1.478]
West region	0.6243***	1.1795***	0.2848***	-0.535***	1.532***
	{1.867}	{3.253}	{1.329}	{0.586}	{4.627}
	[1.717, 2.030]	[2.966, 3.567]	[1.227, 1.441]	[0.551, 0.623]	[4.123, 5.194]

N=3,705; NS: not significant, * p<0.05, ** p<0.01, *** p<0.001; Data source described in reference 21: Unstandardized regression coefficients shown. All analyses used normalized population weights to adjust for sampling (weights developed by survey author; see Hadley reference 21). Debt burden was rescaled by dividing debt in $1,000s by 1,000 so that coefficients and odds ratios would be more readily interpretable.

The YPS is a unique data set for three reasons pertinent to the present study. First, it oversampled self-identified African-American physicians and other minority physicians, enabling much more precise estimates by racial and ethnic physician group. The data set provides weights for use in correcting the resulting bias in error estimates that arise from the disproportionate stratified sampling design.

Second, the YPS contains unique indicators for key influences on physician employment patterns because survey responses from roughly half of the sample were matched to the American Association of Medical Colleges' Student and Applicant Information Management System database. This provides independently verified data on human capital and debt burden measures for individual physicians.

Third, the 1991 YPS was linked to a 1996 follow-up survey that targeted the same physicians. Below, matched data are available for a subsample of 1,527 respondents, with separate weights developed for use in this panel data set.

Variables

The major dependent variable was characterized as practicing in one of six different types of organizational settings: 1) HMO includes a staff- or group-model HMO as well as "freestanding ambulatory care, surgical or emergency care center operated by a hospital or by a chain with centers operated under the same name" and for-profit clinics (average size: 115 MDs); 2) government (local, state or federal); 3) academic (medical school or university); 4) hospital (hospital or hospital clinic); 5) large groups (with ≥20 MDs) (average size: 102 MDs); and 6) solo practices and small group or partnership settings (with ≤19 MDs) (average size: 3.4 MDs). These categories were derived from the descriptions of employment settings provided by survey responses to three questions, one about whether the respondent was currently a practice owner, a second about whether the respondent was a solo practitioner and a third that listed 13 practice setting options (HMO; practice owned by a physician or group of physicians; hospital; hospital clinic; freestanding ambulatory care, surgical or emergency care center operated by a hospital or by a chain with centers operated under the same name; medical school; university or college; local government; state government; federal government; industrial, commercial or other for-profit clinic; community health or other not-for-profit clinic; long-term care facility, hospice or nursing home; or some other type of employer).

Four race/ethnicity categories were used: African-American, Caucasian, Hispanic and other. These categories were taken directly from the public use version of the YPS data file. (The public use data file aggregated other racial and ethnic categories in order to prevent unique respondent identification.)

Human capital measures included five Medical College Admission Test (MCAT) scores for biology, chemistry, physics, science problems, reading and quantitative analysis; and two undergraduate grade-point averages (GPAs) for science courses and nonscience courses. In the analyses shown below, we used an index of all seven scores. We created this index by first converting the raw scores (0–15 for MCAT and 0–4 for GPA) to percentiles. Then we averaged each individual's percentiles across all available MCAT and GPA scores. This allowed us to include human capital index scores for the 1,879 physicians in our sample who lacked MCAT scores and the 168 physicians who lacked GPA scores. Within the index, all variables were correlated at the $p<0.0001$ level, and the alpha coefficient was 0.908. Values of >50 on the index represent human capital scores above the population mean, and values of <50 represent scores below the mean. We also included a variable reflecting contemporary specialty certification reported by the American Board of Medical Specialties for the time of the survey.

Selective affinity was measured by survey respondents' estimates of the percentage of their patient panels made up of members of various racial and ethnic groups. The survey asked, "Over the past year, what per-

Table 3. Relationship between HMO employment in 1991 and prior and subsequent career experiences, by physician race, 1991 and 1996

	Relative Odds of Selected Career Experiences for HMO Employees versus All Other Physicians		
Sample	**Reported having been turned down for another practice opportunity prior to joining 1991 practice (1991 survey only)**	**Reported switching practice settings between 1991 & 1996 (1991 & 1996 follow-up surveys)**	**Expressing career doubts in 1996 (1991 & 1996 follow-up surveys)**
All physicians	1.64* (n=5,714)	3.72*** (n=1,321)	1.16^{NS} (n=1,527)
Caucasian MDs	1.51^{NS} (n=4,045)	3.32*** (n=923)	1.05^{NS} (n=1,066)
African-American physicians	1.93* (n=667)	7.50*** (n=171)	2.17* (n=196)

Source: Authors' analysis of the Robert Wood Johnson Foundation Survey of Young Physicians 1991, or 1991 and 1996 as appropriate. All analyses used normalized population weights to adjust for sampling (weights developed by survey author; see Hadley reference 21); Note: HMO is health maintenance organization; NS: not significant; * $p<0.05$, ** $p<0.01$, *** $p<0.001$

cent of your patients in your [first] practice were black?" Where physicians had earlier reported more than one practice, this question was asked for each practice. In the analyses shown below, we used the percentage of black patients reported for the main practice (0–100%); in analyses not shown, we constructed a weighted average percentage for those with multiple practices and found that the results were unchanged.

Financial constraints were captured using a question that asked respondents to report their total educational debt when competing medical school, including all debt from college through the end of medical school. The analyses below include a variable for this debt (0–200, in thousands of dollars). In the regression presented in Table 2, the debt burden variable was rescaled by dividing debt (in thousands of dollars) by 1,000 in order to provide coefficients and odds ratios that are more readily interpretable.

Unobserved hiring practice differences were inferred indirectly from any remaining gap in HMO overrepresentation of African-American physicians. Collateral evidence of exposure to selective hiring practices was also available from answers to questions asking physicians about their experiences in job searches and results. Specifically, respondents were asked, "When you were deciding to work in your current practice, was there a position or practice arrangement you applied for that would have been your first choice but was not offered?" (yes or no).

Other physician demographic and professional characteristics (age, gender and specialty) were available for use as control variables. Specialty was reported at a fine-grained level of analysis and aggregated up to 13 broad categories available in the public use version of the YPS data file (general/family practice, general internal medicine, medical specialty, general surgery, surgical specialty, pediatrics, obstetrics and gynecology, radiology, psychiatry, anesthesiology, pathology, other and specialty with no reported subspecialties). In addition, area characteristics were represented by four main regions of the United States (northeast, midwest, southeast and west). These regions also represent an aggregation of original survey data in the public use data file.

For the panel data set, two 1996 follow-up survey questions were used to assess subsequent career issues. First, a change in practice settings was based on the following question asked at the very beginning of the 1996 follow-up study: "You may remember that we interviewed you in 1991 about your perceptions and attitudes regarding a career in medical practice. Is that still your main practice—that is, the practice where you spend most of your time?" (yes or no). A set of verifying and clarifying questions followed, designed to ensure that the respondent was accurately reporting on this question. The variable used in analyses below is based on a final coding of this question provided in the YPS public use data file (coded 1 or 0).

The second variable from the 1996 follow-up survey used focused on career doubts, captured by the following question: "At the present time, do you have any doubts that medicine is the right profession for you? Would you say you have: a) serious doubts, b) slight doubts, or c) no doubts at all?" In the analyses below, a dichotomous variable was used for ease of interpretation, coded 1 for serious doubts (n=76) or slight doubts (n=310), and 0 for no doubts at all (n=663); in analyses not shown, the variable was entered with all three levels, producing similar results.

Analyses

All analyses were conducted using SAS version 8.0 software. After examining univariate and bivariate statistics, we formulated and tested multivariate categorical logistic models predicting type of practice organization. The variables used as controls are listed in Table 1 (dummies for Hispanic and other race, gender and three region dummies). Nine birth-year dummies and 12 specialty dummies were included in analyses but not shown for space reasons (available from the authors upon request). Weights were used to adjust for minority oversampling in the original survey sample.

Next, we examined how physician career activities before and after the 1991 survey differed by employment setting and physician race. Using binomial logistic regression, we reported the unadjusted odds ratios of being turned town for a prior position for HMO employees compared with physicians from other practice settings. Analyses were conducted first for all physicians and then separately for Caucasian physicians and African-American physicians. Finally, we conducted similar analyses to compare the odds of having changed practice setting and of having career doubts in 1996 for the same types of physicians.

RESULTS

HMOs play an important role in African-American physician labor markets. Table 1 reports the mean levels of African-American physicians found practicing across different settings, and HMOs had higher rates (8.8%) than all other settings (4.9% for government settings, 1.6% for academic settings, 2.4% for hospital settings, 0.7% for large group settings and 2.6% for small group settings). At the same time, Table 1 also indicates that HMOs also disproportionately serve African-American patient populations, with an average 19.5% of the HMO physician's panel constituted by African-American patients, compared with 16.4% for large groups and 13.5% for small groups (although government, academic and hospital settings had equal or larger African-American patient averages).

Being an African-American physician was associated with each of the key independent variables measured

(Student's t tests significant at the 0.001 level). As we hypothesized, mean values for African-American physicians were either higher (percent of black patients in panel, debt burden) or lower (human capital index, board certification) than those of Caucasian physicians.

Table 2 provides the results of analyses, predicting the odds of practicing in each type of setting. The base category for practice setting is the small group (the largest category), and results are shown for the other five settings (HMO, government, academic, hospital and large group). For each variable at each practice setting, the coefficient is reported in the first row, followed by the associated odds ratio in curly brackets in the second row, and the 95% confidence interval for the odds ratio in square brackets in the third row.

Without any controls, the bivariate odds ratio indicates that African-American physicians were 4.52 times more likely to practice in HMOs than Caucasian physicians ($p<0.001$). However, the results from Table 2 indicate that even after controlling for our three principle explanatory factors, African-American physicians were still 2.48 times more likely to be HMO employees ($p<0.001$) compared with their Caucasian counterparts. In addition, African-American physicians were one-third as likely to be academic physicians (0.30, $p<0.001$) or large group physicians (0.38, $p<0.001$), and two-thirds as likely to be hospital physicians (0.59, $p<0.001$). African-American physicians were not significantly associated with odds of government employment.

In the analyses shown in Table 2, selective affinity was captured using the variable, percent of black patients in panel. This variable was positively associated with the odds of HMO employment ($p<0.001$) as well as with the government, academic, hospital and large group settings ($p<0.001$). The human capital index was positively associated with government, academic, hospital and large group settings (all $p<0.001$) but not the HMO setting (NS). Specialty board certification was positively associated with hospital and large group settings ($p<0.01$ or better) and negatively with the government setting ($p<0.001$). Financial constraints were measured using the variable debt burden, which indicated that greater debt was positively associated with government and hospital settings ($p<0.01$ or better), and negatively associated with the large group setting and academia ($p<0.001$).

Other controls in Table 2 are also relevant. Female physicians had higher odds of practicing in HMOs (1.76, $p<0.001$), government (1.41, $p<0.001$, and academic settings (1.62, $p<0.001$), and were not significant for hospitals, and negative for large group settings (0.89, $p<0.05$). Hispanic physicians had higher odds of practicing in HMOs (1.42, $p<0.01$), government (1.79, $p<0.001$), academic (1.63, $p<0.001$) and large group settings (2.12, $p<0.001$). Geographic regions were also associated with different practice settings; odds of HMO employment were greater for physicians in the midwest (1.11, $p<0.05$) and west (1.87, $p<0.001$) and lesser for physicians in the southeast (0.57, $p<0.001$). Area effects also existed for other practice settings, particularly large groups, which were more likely in the midwest (3.91, $p<0.001$) and west (4.63, $p<0.001$).

These general findings were found to be robust to alternative specifications. In particular, analyses using six of the seven individual human capital measures produced similar results, even when the sample size was reduced as a result of missing data. A binomial logistic regression analysis that substituted a dichotomous practice size variable (1 if >50 physicians, 0 otherwise) for the six practice setting categories also produced similar findings.

In addition, African-American physicians in HMOs reported distinctive career experiences consistent with the hiring practice hypothesis. Among African-American physicians working in HMOs, 19.2% reported being turned down for another practice opportunity when they took their present position. The comparable percentage for non-HMO African-American physicians was only 11.0%, a significant difference. This HMO/non-HMO difference among African-American physicians is reflected in Table 3 by a doubling of the odds of being turned down for another practice opportunity (1.93, $p<0.05$). The comparable HMO/non-HMO percentages were 11.2% and 7.0%, respectively, reflecting a non-significant difference in the odds of being turned down for another practice opportunity, as indicated in Table 3.

Additional evidence from the 1996 follow-up suggests that there were enduring consequences of early-career HMO employment, especially for African-American physicians. Bivariate odds ratios shown in Table 3 indicate that between 1991 and 1996, HMO employees were 3.72 times more likely to switch organizations compared with physicians in other practice settings ($p<0.001$). Among African-American physicians, those who were HMO employees were fully 7.50 times more likely to switch ($p<0.001$). Further, identically controlled regressions indicate that African-American HMO employees from 1991 were 2.17 times more likely to express doubts about their choice of medicine for a career compared with other African-American physicians (regardless of 1996 practice setting, $p<0.05$). However, Caucasian HMO employees were not more likely to report such doubts when compared with Caucasian physicians practicing in other settings.

Limitations

We recognize certain limitations to our study. The data we used are somewhat dated, and our cross-sectional research design makes definitive causal inference problematic. Further, international medical graduates, who now constitute nearly one-quarter of the U.S. physician supply and who often work in low-income communities and HMO settings,[20] were excluded from this

sample. In addition, our measures of human capital stratification may be somewhat insensitive to distinctions made by potential physician employers based on the educational credentials of candidates that reflect prestige differences of medical schools or residency programs. Yet it remains unclear how much such institutional prestige differences index actual variation in graduates' potential or performance as opposed to justifications for long-standing hiring practice patterns.

Despite these limitations, however, our study focused on a unique cohort of physicians, the first to include large numbers of minorities trained in the United States. The YPS oversampled minority physicians and linked educational performance and aptitude measures, enabling a test of the human capital hypothesis as well as financial burden. To our knowledge, no nationally representative physician data source has done this kind of linkage since then and might be unlikely to do so now, given the current climate regarding sensitive information linkages. Analyses of follow-up data on this cohort collected in 1996 also supported inferences from 1991 cross-sectional analyses.

DISCUSSION AND CONCLUSION

We found African-American physicians were strongly overrepresented in HMO settings even after controlling for human capital stratification, which itself had only a modest impact on African-American physician practice locations, for selective affinity leading African-American physicians to colocate in settings with more African-American patients and for financial constraints faced by individual physicians. The remaining substantial overrepresentation of African-American physicians is consistent with hiring practice differences found between larger and smaller organizations in other occupations. Our supplemental evidence based on physician self-reports of experiences seeking other practice opportunities is also consistent with this explanation.

The distinctive features of medical organizations that differentially employ African-American physicians contrast strikingly with the features of firms in the broader economy where African-Americans are differentially employed. In particular, in most sectors of the economy, larger organizations consistently provide better jobs, higher pay and improved career prospects.[23,24] In contrast, staff- and group-model HMOs from the time period of this study have been associated with resource and autonomy constraints, ranking low in remuneration, prestige and stability,[25,26] suggesting that African-American physicians' overrepresentation in their ranks may contribute to inequalities for them.

Consistent with this, we found that subsequent turnover rates for African-American physicians in HMOs were significantly higher than rates for any other group or setting, and they expressed greater doubts about their careers relative to other groups. This situation may affect African-American physicians' capacity to provide comprehensive and continuous care for their patients, a matter of additional concern given that African-American physicians' patients are also likely to be disproportionately African-American. Some differences in medical care received by African Americans may stem not just from receiving care in settings with greater resource constraints,[27-30] but also from seeking and receiving treatment from African-American physicians who may be more likely to leave these settings. In such situations, involuntary discontinuity of care may result in adverse health consequences for the patients left behind,[12] locked into an HMO arrangement and unable to follow their physician.

Further investigation into those African-American physician career trajectories themselves is also critical. Our data do not speak directly to the reasons African-American physicians were less successful in obtaining traditional private practice positions. It is also important to recognize that African-American physicians were over- or underrepresented in each of the other practice locations presented in Table 2 as well. One possible contributing factor in these trends may be the concurrent shift during this time period away from solo and small group practices in the general population of practicing physicians.[31] African-American physicians may have been previously overrepresented in those solo and small group practices. In order to understand these developments better, the physician hiring process itself must be better understood as a complex and dynamic labor market process.[32]

In addition, future research needs to examine the different role played by the staff- and group-model HMOs captured in this research as opposed to the open-panel and network model HMOs and other arrangements that spread during the 1990s and eventually came to dominate the managed care marketplace. Some evidence suggests that later HMO models were also problematic for physician satisfaction and careers.[33] Yet those later HMO models may have more often formed in regions with Caucasian patient populations and recruiting Caucasian doctors and small private practices into them. What roles have they played in the careers of African-American physicians coming into practice during the 1990s and 2000s, and for the patients of those physicians? These questions are of importance given the ongoing debate about which forms of organization in healthcare can best serve society's needs.

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