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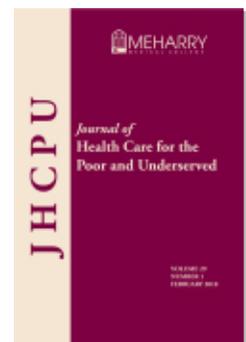
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Physicians, Physician Extenders and Health Outcomes: Race, Gender and Patient-Health Provider Concordance in North Carolina Medicaid

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Abstract: Background. No studies were found that consider the role of race and gender concordance in patient-physician extender relationships. **Methods.** A telephone survey in summer 2012 allowed measures of the relationship between physicians and physician extenders with race and gender concordance. Randomized stratified sampled adults (n =1,401) enrolled in North Carolina Medicaid's managed care networks met the study's criteria. **Findings.** The analysis determined the association of provider type and race and gender concordance. It also explored the association of race and gender concordance with trust, satisfaction, and decision-making propensity. Separate logistic regression models were constructed for each dependent variable. Race concordance was associated with significantly higher trust scores among respondents in the physician subgroup when race was not included in the predictive model. However, in those models where race and gender were included as control variables, provider type was not associated with race and gender concordance in the logistic regressions.

Key words: Race concordance, gender concordance, physicians, physician extenders, Medicaid, trust, satisfaction, decision-making, quality of care.

The patient-practitioner relationship is perhaps the most sensitive indicator of the persistence of differences adverse to the underprivileged in the organization and delivery of care. Such differences are the last to disappear when the goal is to put all patients on an equal footing with regard to the care offered to them.^{1,p20}

Avedis Donabedian, 2003 (posthumous book)

Since the reforms in medical education in the first quarter of the 20th century that created modern medicine, increasing concern has been expressed about physician shortages, the lack of primary care physicians, and the relatively small proportion of

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women and minorities in practice. The increase in educational requirements associated with the activities of Abraham Flexner^{2,3} from minimal high school required for entry into a proprietary two-year medical school to a four-year science-based bachelor's degree before matriculation at one of a smaller number of expensive four-year medical schools led to reduced proportions of women and minorities attending medical school. By mid-century the proportion of physicians in the population was smaller than at the beginning of the century; primary care physicians constituted less than half of practicing medical doctors (MDs).^{4,5} In the 1970s, women constituted 8% of practicing physicians and Blacks less than 2%.⁶ Simultaneously, the socioeconomic status of physicians rose rapidly. A potential danger was that physicians might become less understanding of ordinary patients and less responsive to the conditions of their lives.

This study explores one answer—use of alternatives to highly trained physicians, “physician extenders”—to these twin problems of primary care physician shortages and the potential that racial and gender differences between patients and doctors may lead to misunderstanding, less patient involvement in decision-making, and poor patient experiences. It compares the reports of adult Medicaid patients who identify their personal care provider (PCP) as a physician extender (specifically, a nurse practitioner or physician assistant) with those regularly seeing a physician for primary care. Because one-fifth of survey respondents (72% female; 41% Black) used physician extenders, this population provides the necessary diversity to determine whether using physician extenders with their potential for greater similarity between health provider and patient makes a difference in patients' health care experience.

Background and literature. The Patient Protection and Affordable Care Act of 2010 (ACA) has triggered sweeping changes to the U.S. health care system, including delivery system and payment reforms to increase quality and provision of financial access to some 30 million Americans.⁷ Greater patient volume and the enhanced focus on quality of care are expected to exacerbate the problem of physician shortages.^{8,9} Estimates indicate possible physician shortages of between 35,000 to more than 112,000 physicians by the year 2025.^{10,11}

Physician extenders. Physician extenders are heralded as one possible solution to the shortage of primary care physicians. Physician extenders, licensed health care professionals with differing scopes of practice, levels of education, and requirements for clinical licensure, have been employed since 1967 in the U.S. to supplement physicians in an effort to increase health care access and reduce health care costs.¹² The majority of physician extenders practice in primary care with nurse practitioners and physician assistants constituting 19% and 7% of the U.S. primary care workforce, respectively.¹⁰ In North Carolina PAs have full prescription authority, but their scope of practice, supervision requirements, and the necessity for supervising physician to co-sign treatment plans are negotiated by the PA and practice physician, according to Burton Associates.¹³ The same source reports that North Carolina NPs may not “diagnose/treat patients without physician involvement,” require physician supervision (instead of negotiating a collaborative agreement with the supervising physician permitting more independent NP diagnosis and treatment), and do not have “independent prescribing authority.”¹⁴ Thus, in North Carolina PAs appear to have more potential legal independence within the context of a specific practice than do NPs, but the degree of

autonomy granted individual PAs or NPs can vary greatly. In reality, clinical independence is less a matter of scope of practice legislation and more a function of the culture in specific medical practices. Both kinds of physician extenders work as colleagues in larger practices that delegate decision-making as deemed appropriate and responsible depending on the individuals involved. For purposes of this study, the rough comparability of PAs and NPs justifies regarding them both as “physician extenders.” Although physician extenders such as nurse anesthetists and nurse midwives play many other roles in health care systems, this article only considers physician assistants and nurse practitioners in the physician-involved primary care setting.

In the reality of busy medical practices, physician extenders exercise considerable autonomy in terms of clinical decision-making and prescriptive authority in primary care settings; recent research suggests that patients increasingly recognize physician extenders as their primary source of care.^{12,15–17} Because physician extenders are believed to be capable of providing between 70 and 90% of office-based primary care services, relatively healthy patients may have little reason to schedule regular physician visits.¹⁸ Research also suggests that there is no difference in the quality of care delivered by nurse practitioners compared with physicians in primary care settings,^{19–21} between nurse practitioners or physician assistants compared with physicians in office-based practice,²² or between nurse practitioners or nurse midwives compared with physicians in primary care settings.²³

Patient-provider concordance. A number of factors unrelated to health providers’ demographic characteristics—including the ability of providers to listen carefully, to explain things clearly, to show respect for their patients, and the willingness to spend time with their patients—have been demonstrated to affect patient-provider communication.²⁴ However, important research has also been conducted over the last two decades examining the effects of physician demographic characteristics and how these characteristics may play a role in exacerbating health disparities within certain demographic subpopulations.^{25–27} Thus, increasing *patient-provider concordance* has been proposed as a possible means toward minimizing or eliminating these health disparities.^{27,28–30} Concordance and its opposite, discordance, are the quasi-technical terms indicating that a patient and health provider dyad share or do not share some common demographic characteristics, including race, ethnicity, gender, and language.^{31,32} Much of the concordance-related research in health care has focused on the race—and ethnicity-based health disparities consistently found in minority subpopulations.^{27,33} For example, health disparities such as increased diabetes morbidity, increased mortality associated with cancer, and decreased life expectancies are more prevalent among racial and ethnic minorities.³⁴ Disparities are also found at the health care system delivery level with racial minorities reporting a lower level of involvement in their care, a lower level of trust in their providers, and less satisfaction with their care overall when compared with White patients.^{27,35–39}

The concordance hypothesis suggests that matching providers and their patients on the basis of a demographic characteristic will improve communication, patients’ perceptions of their care, and ultimately lead to improved health outcomes.^{27,28} For instance, race concordance has been shown to influence patients’ level of satisfaction with their physicians as well as the degree to which patients are involved in the decision-making

process.⁴⁰ Another example is the impact of patient-physician language concordance on communication and decision-making. The ability of physicians to involve patients in the decision-making process depends on clear communication with patients.⁴¹ Some research, however, fails to sustain the concordance hypothesis: one study demonstrated that neither race concordance nor gender concordance* improved trust among women of low socio-economic status.⁴² In any case, a thorough literature review failed to find *any studies* of concordance/discordance involving patients and physician extenders.

Another objection to the concordance hypothesis takes seriously its implication that health care systems might seek same-race or same-sex patient-provider uniformity, which might seem reminiscent of segregation of races or sexes.** It should be remembered that the context for concordance research is the U.S. health care system, where patient autonomy, including choice of health care provider, is highly valued (if not always achieved). No one would want to erect yet another barrier to seeking care for males who feel uncomfortable receiving primary care from a female provider. Moreover, the particular context of this research, North Carolina's primary care case management Medicaid program, has become a national model for its success in recruiting large numbers of community-based primary care practices, thereby generating greater patient choice among health care providers than is common in Medicaid programs.*** If uniformity is chosen when genuine choice exists, invidious segregation does not exist.

The relationship between concordance and health outcomes, the anticipated increase in physician extenders in primary care, and the dearth of research examining concordance between patients and their personal physician extender provide the rationale for this research. Using a two-step logic, our study addresses two research questions: (1) Do preliminary bivariate relationships indicating that both race concordance and gender concordance were more prevalent among the users of physician extenders hold true when controlled for a number of variables in more robust, multivariate regression analyses? (2) Do race concordance and gender concordance significantly affect health outcomes such as trust, satisfaction, and decision-making propensity in a manner consistent with the theory in patient subpopulations using each provider type (physicians and physician extenders)?

Methods

The data in this study come from Medicaid eligibility files provided by the North Carolina Division of Medical Assistance and responses to a computer-assisted telephone survey administered in summer 2012 by Clearwater Research, Inc. of Boise, Idaho

*The terms *gender* and *gender concordance* have been the source of controversy with respect to their conceptualization as biological versus social constructs. The authors' conceptualization and operationalization of these terms as analytic variables are described in detail in the Methods section of this paper. The authors have chosen to use the term *gender concordance vis-à-vis sex concordance* because of the former's historical significance and widespread use in the literature.

**The authors wish to thank a very thoughtful reviewer who made us aware of this potential implication.

***According to the program's website, Community Care of North Carolina involves more than 5,000 health providers across the state in caring for Medicaid patients.⁴³

under contract with the University of North Carolina Charlotte (UNC Charlotte). The survey of adult Medicaid recipients enrolled in North Carolina Medicaid's primary care case management networks used the Consumer Assessment of Health Providers and Systems Health Plan Survey 4.0 Medicaid Questionnaires to elicit respondents' perception of their access, satisfaction, trust, health status, utilization, and communication. The sampling frame for the randomized stratified sample was determined by specific inclusion criteria (Appendix A) and continuous enrollment for at least six months in the network care system. The target of 200 completed surveys from each of 14 networks permitted meaningful comparisons among networks and detection of relatively small effect sizes.⁴⁴ A total of 3,202 respondents from across the state completed the survey. Additional inclusion criteria and listwise deletion procedures necessitated by the survey's skip pattern (Appendix A) reduced the dataset to 1,401 respondents. All 1,401 respondents reported at least one visit with their PCP in the last six months. The Institutional Review Board of UNC Charlotte approved the research protocol.

The study variables were operationalized in accordance with the study's research questions and two-step logic. Two variables, *race concordance* and *gender concordance*, functioned as dependent variables in the first step of analysis and predictor variables in the second step. Race concordance is a dichotomous variable created from survey respondents' self-reported identification of their race and the race of their PCP. The race concordant groups consist of those individuals aligned on the basis of race (viz., White enrollee–White provider and Black enrollee–Black provider), whereas the race discordant groups consist of individuals not aligned by race (viz., White enrollee–Black provider, Black enrollee–White provider). Gender concordance was constructed in a similar manner with the concordant groups consisting of respondents aligned with their providers by gender (male enrollee–male provider, female enrollee–female provider) and the discordant groups pairing male enrollees with their female providers and female enrollees who saw male providers. The discordant groups were selected as the comparison groups for both the race concordance and gender concordance variables.

Decision-making propensity also served as both an independent and a dependent variable depending on the outcome being studied in the second step of the analysis. For example, it was included as an independent variable in the multivariate models attempting to predict race concordance and gender concordance but functioned as a dependent variable in the multivariate models that examine trust, satisfaction, and decision-making as health outcomes. It was a binary variable obtained from responses to the question appearing in the survey asking respondents if any decisions were made about their health care in the previous six months. Respondents who reported no decisions about their health care in the previous six months were selected as the comparison group.

Three variables—enrollee's self-reported *health status*, *trust*, and *satisfaction*—were each created as index measures constructed from several responses to survey questions (Appendix B). The health status variable served exclusively as a control variable in the second step of the analysis. In contrast, the satisfaction and the closely allied notion of trust variables functioned not only as both independent predictor variables

of interest and control variables, but following Donabedian,* also as outcome variables in regression analyses ascertaining the explanatory power of concordance when considered as an independent variable of interest. The health status variable (Cronbach's alpha = 0.5253) consisted of three possible values—worst, moderate, and best—with respondents reporting the worst health status constituting the comparison category. Satisfaction (Cronbach's alpha = 0.7063) and trust (Cronbach's alpha = 0.6678) were binary index variables with respondents reporting lower satisfaction and lower trust scores serving as the comparison groups for their respective variables.

Provider type is an important independent variable and was derived from survey responses to a question asking respondents to specify whether their PCP was a general doctor, a specialist doctor, a nurse practitioner, or a physician assistant. (The proportion of female providers reported for each of these categories was 39%, 41%, 92%, and 64%, respectively; the proportion of Black providers reported for each of these categories was 22%, 23%, 13%, and 20%, respectively.) Because all Medicaid enrollees are encouraged to choose their primary care provider, these figures reflect the result of patient choice, not the distribution by race, gender, or provider type available to Medicaid enrollees. The responses were dichotomized into two values: (a) “physician users,” which included respondents who stated that their PCP was either a general or specialist doctor and (b) “physician extender users,” which included respondents receiving primary care from nurse practitioners and physician assistants. The “physician user” category represented the comparison group in our analysis.

A number of other variables served as independent or control variables. Enrollees' self-reported *race* was operationalized as White and Black; Whites were selected as the comparison group. A categorical variable describing the enrollee's *education* came from a survey question asking respondents to choose their highest level of education from six possible values. Its values were collapsed into three—less than high school graduate, high school graduate, and some college—with the group of high school graduates serving as the comparison category. The rationale for collapsing the values of the education variable into three categories was to eliminate some categories that were characterized by disproportionately small cell sizes and to create a variable that was fairly evenly distributed amongst the three categories. Respondents' *age* and *sex* (*gender*) were obtained from the eligibility files and validated during the survey. Age was operationalized as a continuous variable rounded to the nearest year (range = 19 to 96 years). The gender variable had two values—male and female—with females as the comparison group. The *region* variable, which recorded the respondent's residence at

*Avidis Donabedian, the pioneer of quality of care research who conceptualized the triune typology of structure, process, and outcome in his classic 1966 *Milbank* article⁴⁵, later wrote: “Effectiveness is indicated entirely by outcomes, provided outcomes are taken to include not only changes in health status, but also client satisfaction, knowledge, and health-related behavior.”^{46, p100} The authors are again indebted to an anonymous reviewer whose searching queries led us to revisit Donabedian's seminal corpus and thence to an understanding of how his insights legitimate research into concordance-discordance. The quotation that begins this paper acknowledges the gratitude our field owes a true scholar who died while laboring to produce a quality of care guide that could help his fellow Armenians in a homeland that he was never able to visit.

the time of the survey, had the four geographic regions of North Carolina—Mountains, Piedmont, Coastal Plain, and Tidewater—as delineated by Diemer and Bobyarchick.⁴⁷ The Piedmont region served as the comparison category in our analysis. *Urbanicity*, which captured the rural or urban character of the enrollee's county of residence, was derived from the 2003 Rural-Urban Continuum codes.⁴⁸ It had three possible values—urban, mixed, or rural—with the urban areas selected as the comparison category. The rationale for including the region and urbanicity variables in the analysis was to “provide spatial control variables intended to reflect the cultural, social, economic, and political diversity associated with each” land region and level of urbanicity within the state.^{42(p9)*} The enrollee's *dual eligibility status* came from the eligibility files and was operationalized as a binary variable with respondents not receiving Medicare as the comparison group.** The data analysis, which used Stata/IC 13.1 for Mac (College Station, TX: StataCorp LP), was conducted in a two-step manner consistent with the research questions using a combination of bivariate (i.e., cross-tabulations) and multivariate (i.e., binary logistic regression) techniques. We examined outcomes in the aggregate (i.e., the combined pool of both physician users and respondents identifying as extender users) and within each subpopulation. Both bivariate and multivariate analyses used $p < .05$ to define statistical significance.

Results

Table 1 describes demographic characteristics of survey respondents and the distribution of values for selected outcome and predictor variables. In aggregate, nearly two-thirds of respondents were White and approximately three-fourths were female. Almost two-thirds (65.9%) were 45 years of age or older and more than 40% qualified for both the Medicare and Medicaid programs (dual eligibles). Overall, the self-reported health status of respondents was not good with almost 39% falling in the “worst health” category of the health status index measure. The majority of respondents lived in the Piedmont region of North Carolina and almost 62% lived in an urban county. Almost half of all respondents reported the highest trust and satisfaction scores; two-thirds reported that decisions were made about their health care in the last six months.

Table 2 describes a number of bivariate relationships between the provider type and the demographic and outcome variables that appear in Table 1. The relationships between race and gender concordance and the type of provider identified as respondents' PCP that provided the impetus for this study stand out: both gender concordance and race concordance were significantly greater among extender users compared with physician

*For example, most of the major cities within North Carolina are located in the Piedmont region. The major economic drivers within this region include manufacturing, distribution, banking, education, research, and the service sector industries. On the other hand, the character of the Mountain, Coastal Plain, and Tidewater regions is more agrarian with farming a major industry common to all three regions and the tourism and hospitality industries playing major roles in the Mountain and Tidewater regions.

** Because 99.3% of respondent-provider dyads were language concordant, this variable was not relevant in our analyses.

Table 1.**DESCRIPTIVE STATISTICS OF DEMOGRAPHIC AND SELECTED VARIABLES**

Age			Region		
19 to 24 yrs	66	4.7%	Mountains	231	16.5%
25 to 34 yrs	169	12.1%	Piedmont	807	57.6%
35 to 44 yrs	242	17.3%	Coastal Plain	263	18.8%
45 to 54 yrs	324	23.1%	Tidewater	100	7.1%
55 to 64 yrs	356	25.4%		1,401	
65 to 74 yrs	175	12.5%			
75 yrs and older	69	4.9%			
	1,401		Urbanicity		
			Rural	216	15.4%
			Mixed	322	23.0%
			Urban	863	61.6%
				1,401	
Dual Status			Decision Propensity		
Dual	583	41.6%	Yes	932	66.5%
Non-dual	818	58.4%	No	469	33.5%
	1,401			1,401	
Sex			Health Status		
Female	1,025	73.2%	Worst	542	38.7%
Male	376	26.8%	Moderate	522	37.3%
	1,401		Best	337	24.1%
				1,401	
Education			Trust		
< high school grad	531	37.9%	Less	712	50.8%
High school grad	494	35.3%	Highest	689	49.2%
Some college	376	26.8%		1,401	
	1,401		Satisfaction		
			Less	622	44.4%
			Highest	779	55.6%
				1,401	
Race					
White	888	63.4%			
Black	513	36.6%			
	1,401				
Provider Type					
Physicians	1,122	80.1%			
Physician Extenders	279	19.9%			

users. Extender users also had significantly fewer respondents living in the Piedmont region and proportionately more who reported lower satisfaction index scores.

The second analytic step used binary logistic regression to examine the impact of the predictor variables on five different outcomes—race concordance, gender concordance, trust, satisfaction, and decision-making propensity. The analyses were performed for the aggregated population and for the physician user and extender user subgroups.

Race was a strong predictor of race concordance in both the aggregate and in each

Table 2.

DESCRIPTIVE STATISTICS OF DEMOGRAPHIC CHARACTERISTICS AND KEY OUTCOMES BY PROVIDER TYPE (N = 1, 401)

	Provider Type					Provider Type			
	Physicians		Extenders			Physicians		Extenders	
Age**					Region**				
19 to 24 yrs	56	5.0%	10	3.6%	Mountains	180	16.0%	51	18.3%
25 to 34 yrs	118	10.5%	51	18.3%	Piedmont	666	59.4%	141	50.5%
35 to 44 yrs	188	16.8%	54	19.4%	Coastal Plain	207	18.5%	56	20.1%
45 to 54 yrs	262	23.4%	62	22.2%	Tidewater	69	6.2%	31	11.1%
55 to 64 yrs	291	25.9%	65	23.3%		1,122		279	
65 to 74 yrs	144	12.8%	31	11.1%	Urbanicity				
75 yrs and older	63	5.6%	6	2.2%	Rural	168	15.0%	48	17.2%
	1,122		279		Mixed	251	22.4%	71	25.5%
					Urban	703	62.7%	160	57.4%
Dual Status*					Decision Propensity				
Dual	485	43.2%	98	35.1%	Yes	735	65.5%	197	70.6%
Non-dual	637	56.8%	181	64.9%	No	387	34.5%	82	29.4%
	1,122		279			1,122		279	
Sex*					Health Status				
Female	805	71.8%	220	78.9%	Worst	430	38.3%	112	40.1%
Male	317	28.3%	59	21.2%	Moderate	418	37.3%	104	37.3%
	1,122		279		Best	274	24.4%	63	22.6%
						1,122		279	
Education*					Trust				
< high school grad	430	38.3%	101	36.2%	Less	570	50.8%	142	50.9%
High school grad	408	36.4%	86	30.8%	Highest	552	49.2%	137	49.1%
Some college	284	25.3%	92	33.0%		1,122		279	
	1,122		279		Satisfaction*				
					Less	480	42.8%	142	50.9%
Race					Highest	642	57.2%	137	49.1%
White	698	62.2%	190	68.1%		1,122		279	
Black	424	37.8%	89	31.9%					
	1,122		279		Race Concordance*				
					Concordant	745	66.4%	205	73.5%
Gender Concordance***					Discordant	377	33.6%	74	26.5%
Concordant	564	50.3%	178	63.8%		1,122		279	
Discordant	558	49.7%	101	36.2%					
	1,122		279						

Notes:

*p < .05

**p < .01

***p < .001 (statistical significance of X² or Fisher's exact test for bivariate relationship with provider type)

of the provider type subpopulations (Table 3). When controlled for all variables in the model including gender, the predicted odds of being race concordant were significantly lower for Blacks compared with Whites (.001 significance). Residents of the Mountain region were significantly more likely to be race concordant than residents of the Piedmont region in the aggregate and among physician users. This relationship was also observed among extender users but was not statistically significant. In contrast, gender concordance and residing in the mixed urbanicity counties reduced the probability of being race concordant.

Respondents' sex was strongly associated with gender concordance (Table 3). Specifically, controlling for all variables in the model, the probability of gender concordance was greater for males than for females in the aggregate and the physician user group ($p < .001$). However, the opposite was observed among extender users where the probability of gender concordance was decreased for males compared with females. Additionally, the probability of gender concordance decreased as physician users' and extender users' age increased, but was only significant in the aggregate and among physician users. Similarly, compared with high school graduates, the predicted odds of gender concordance were reduced among respondents who had attended some college. This observation was significant in the aggregate and among physician users, but not among extender users. Compared with respondents living in urban counties, those living in rural counties had lower predicted odds of gender concordance. However, this relationship was statistically significant among extender users but not physician users. Most importantly, the probability of gender concordance was significantly greater among extender users compared with physician users in the aggregated population ($p < .001$).

The findings pertaining to race concordance and gender concordance as dependent variables in this more rigorous multivariate regression analyses reveal that the direction of the relationship between these variables and provider type is consistent with the initial bivariate relationships reported in Table 2. However, in terms of statistical significance, when controlled for all variables in the regression, there is a significantly greater probability of gender concordance but not of race concordance among those with a physician extender as their PCP compared with those with a physician as their PCP.

High satisfaction index scores were strongly associated with trust in the provider in both the aggregate and in the physician user and extender user groups (Table 4). Compared with respondents reporting lower satisfaction scores, high satisfaction scores significantly increased the predicted odds of reporting high trust scores ($p < .001$). Similarly, compared with high school graduates, attending some college significantly increased the probability of reporting high trust scores in the aggregate and in the physician user and extender user groups. Additionally, the probability of reporting high trust scores was significantly lower for Blacks and males compared with their respective comparison groups in the physician user group.* In contrast, the predicted odds for high trust scores were increased among males compared with females for extender users. However, this relationship was not statistically significant.

*Collinearity diagnostics performed in STATA did not reveal collinearity between race and race concordance or gender (sex) and gender concordance.

Table 3.
ODDS RATIOS FROM LOGISTIC REGRESSION PROCEDURES
FOR RACE CONCORDANCE AND GENDER CONCORDANCE
OUTCOMES BY AGGREGATED AND PROVIDER TYPE
SUBPOPULATIONS

Dependent variable	Race Concordance			Gender Concordance		
	Agg	MD	EXT	Agg	MD	EXT
n =	1,401	1,122	279	1,401	1,122	279
Mean of DV	0.6781	0.6640	0.7348	0.5296	0.5027	0.6380
Independent variables						
Age	1.000	1.005	0.976	0.989*	0.986**	0.994
Black	0.091***	0.097***	0.048***	1.069	1.264	0.624
Male	1.050	1.087	0.560	1.740***	3.160***	0.087***
Dual status	1.028	0.977	1.381	0.840	0.868	1.114
< high school grad	1.040	0.926	2.292	0.981	0.946	1.129
Some college	1.030	1.111	0.872	0.685**	0.588**	0.961
Mountains	2.896***	2.990***	2.416	1.367	1.677**	1.403
Coastal Plain	0.816	0.813	0.798	1.131	1.125	1.324
Tidewater	0.918	0.854	1.154	1.201	1.030	1.808
Rural	1.042	1.072	0.850	0.693*	0.768	0.352*
Mixed urbanicity	0.755	0.873	0.363*	0.731	0.705*	0.746
Moderate health status	1.324	1.320	1.311	1.056	1.231	0.755
Best health status	1.454	1.528*	1.057	1.164	1.405	0.653
Highest trust	1.157	1.199	0.972	1.011	0.993	1.381
Highest satisfaction	1.088	1.024	1.704	0.848	0.828	0.671
Decision made	1.343	1.358	1.443	0.903	0.950	0.625
Race concordant	NA	NA	NA	0.764	0.836	0.367
Gender concordant	0.772	0.837	0.350*	NA	NA	NA
Physician extender	1.366	NA	NA	1.853***	NA	NA
McFadden Pseudo R ²	0.2524	0.2442	0.3382	0.0409	0.0744	0.1921

Notes:

*p < .05

**p < .01

***p < .001

Agg = Aggregated Population

MD = Physician User Group

Ext = Extender User Group

Na = Not Applicable

Table 4.
ODDS RATIOS FROM LOGISTIC REGRESSION PROCEDURES FOR TRUST, SATISFACTION,
AND DECISION MAKING PROPENSITY OUTCOMES BY AGGREGATED AND PROVIDER TYPE
SUBPOPULATIONS

Dependent variable	Trust			Satisfaction			Decision Making Propensity		
	Agg	MD	EXT	Agg	MD	EXT	Agg	MD	EXT
Population/subpopulation									
n =	1,401	1,122	279	1,401	1,122	279	1,401	1,122	279
Mean of DV	0.4918	0.4920	0.4910	0.5560	0.5722	0.4910	0.6652	0.6551	0.7061
Independent variables									
Age	0.991	0.992	0.989	1.018***	1.014**	1.037**	1.009	1.009	1.010
Black	0.575***	0.586**	0.497	1.293	1.251	1.607	1.477*	1.492*	1.544
Male	0.747*	0.697*	1.148	0.900	0.975	0.535	0.871	0.882	0.617
Dual status	1.104	1.030	1.426	1.327*	1.295	1.528	0.748*	0.768	0.716
< high school grad	0.774	0.748	0.924	1.353*	1.420*	0.984	0.819	0.844	0.692
Some college	1.963***	1.928***	2.378*	0.595**	0.614**	0.485*	1.366	1.377	1.392
Mountains	0.826	0.749	1.081	1.147	1.167	1.159	1.077	1.040	1.202
Coastal Plain	0.889	0.943	0.702	1.222	1.174	1.649	1.050	1.032	1.080
Tidewater	0.811	0.704	1.098	0.924	0.935	0.803	1.079	0.970	1.719
Rural	0.835	0.840	0.917	0.735	0.769	0.585	0.726	0.613*	1.499
Mixed urbanicity	1.094	0.961	1.722	1.085	1.024	1.394	0.763	0.638**	1.784
Moderate health status	1.068	0.996	1.492	1.084	1.244	0.647	0.544***	0.514***	0.697
Best health status	1.059	0.956	1.405	1.843***	1.772**	2.491*	0.224***	0.226***	0.179***
Highest trust	NA	NA	NA	4.149***	4.060***	4.974***	1.249	1.162	1.653

(continued on p. 542)

Table 4.

Dependent variable	Trust			Satisfaction			Decision Making Propensity		
	Agg	MD	EXT	Agg	MD	EXT	Agg	MD	EXT
Population/subpopulation									
Highest satisfaction	4.156***	4.066***	4.943***	NA	NA	NA	1.026	1.072	0.840
Decision made	1.262	1.174	1.675	1.020	1.065	0.871	NA	NA	NA
Race concordant	1.140	1.184	1.018	1.104	1.027	1.846	1.339	1.348	1.303
Gender concordant	1.010	0.997	1.402	0.845	0.827	0.648	0.905	0.947	0.637
Physician extender	0.983	NA	NA	0.800	NA	NA	1.249	NA	NA
McFadden Pseudo R ²	0.1121	0.1112	0.1452	0.1174	0.1034	0.2016	0.0723	0.0730	0.1070

Notes:
 * p < .05
 ** p < .01
 *** p < .001
 Agg = Aggregated Population
 MD = Physician User Group
 EXT = Extender User Group
 NA = Not Applicable

Most of the significant relationships between independent variables and higher satisfaction index scores occurred in the aggregate and in each of the provider type subpopulations (Table 4). Compared with their respective comparison groups, high trust index scores, best health status, and older age all significantly increased the probability of reporting high satisfaction scores. In contrast, those with some college experience had significantly decreased probability of reporting high satisfaction scores compared with respondents who had completed the 12th grade. One variable resulted in different effects in the physician user and extender user groups. Compared with high school graduates, the probability of reporting high satisfaction scores was greater among respondents who had not attended high school among physician users but lower in the same group of extender users. This observation attained weak statistical significance at the .05 level in the physician user group but not among extender users.

Health status was significantly related to decision-making in the aggregate and in each of the provider type subgroups (Table 4). Compared with respondents reporting the worst health status, reporting the best health status decreased the probability of making a health-related decision in the six months prior to responding to the survey. Additionally, the predicted odds of making a health-related decision were greater among Blacks compared with Whites. This was observed in both provider-type subpopulations, but was significant only among physician users. Living in a rural or mixed urban county significantly decreased the probability of making a health-related decision in the physician user group.

As an independent variable in the regression models, race concordance increased the probability of higher trust scores, higher satisfaction scores, and decision making (Table 4) while decreasing the probability of gender concordance (Table 3). However, these relationships failed to achieve statistical significance. On the other hand, gender concordance decreased the probability of race concordance (Table 3), high satisfaction scores, and decision-making (Table 4), but was significant only in its effect on race concordance. The impact of gender concordance on trust index scores was mixed as gender concordance decreased the probability of high trust scores among physician users, but increased that probability in the extender user group. However, this relationship failed to achieve significance in either subgroup.

It is worth noting that the impact of concordance on trust scores was markedly altered when race and gender were removed as control variables from the regression models (Table 5). Specifically, race concordance significantly ($p < .01$) increased the probability of higher trust scores in the aggregate and in the physician user subgroup when race and gender were excluded as controls. The direction and magnitude of this effect was similar in the extender-user group, but the relationship failed to achieve statistical significance in this subgroup. On the other hand, the removal of race and gender as control variables from the regression models did not significantly affect the impact of gender concordance on trust, satisfaction, or decision-making propensity. Most of the other relationships observed in Table 4 were retained when removing race and gender as controls, with notable exceptions being the ascent of age and attending some college as significant predictors of trust and decision making, respectively, in the aggregate population and the descent of dual eligibility status as a significant predictor of decision making in the aggregate population.

Table 5.

ODDS RATIOS FROM LOGISTIC REGRESSION PROCEDURES FOR TRUST, SATISFACTION, AND DECISION MAKING PROPENSITY OUTCOMES BY AGGREGATED AND PROVIDER TYPE SUBPOPULATIONS (RACE AND SEX EXCLUDED AS CONTROL VARIABLES)

Dependent variable	Trust			Satisfaction			Decision Making Propensity		
	Agg	MD	EXT	Agg	MD	EXT	Agg	MD	EXT
Population/subpopulation									
n =	1,401	1,122	279	1,401	1,122	279	1,401	1,122	279
Mean of DV	0.4918	0.4920	0.4910	0.5560	0.5722	0.4910	0.6652	0.6551	0.7061
Independent variables									
Age	0.990*	0.990	0.990	1.019***	1.015**	1.036**	1.009	1.009	1.010
Dual status	1.095	1.049	1.279	1.345*	1.297	1.577	0.766	0.781	0.745
< high school grad	0.772	0.747	0.908	1.338*	1.405*	0.994	0.805	0.826	0.704
Some college	1.990***	1.923***	2.379*	0.602**	0.620**	0.494	1.396*	1.414	1.447
Mountains	0.927	0.865	1.218	1.091	1.112	0.992	0.996	0.960	1.050
Coastal Plain	0.867	0.924	0.668	1.247	1.193	1.739	1.082	1.063	1.119
Tidewater	0.857	0.724	1.244	0.905	0.924	0.743	1.050	0.959	1.576
Rural	0.833	0.827	0.939	0.733	0.770	0.606	0.724	0.612*	1.565
Mixed urbanicity	1.102	0.958	1.815	1.071	1.016	1.367	0.749*	0.627**	1.716
Moderate health status	1.033	0.979	1.427	1.102	1.261	0.649	0.557***	0.527***	0.695
Best health status	1.007	0.932	1.277	1.927***	1.830**	2.729*	0.238***	0.240***	0.193***
Highest trust	NA	NA	NA	4.083***	3.990***	4.781***	1.218	1.133	1.577
Highest satisfaction	4.085***	3.997***	4.660***	NA	NA	NA	1.040	1.084	0.892
Decision made	1.224	1.139	1.587	1.037	1.080	0.918	NA	NA	NA

(continued on p. 545)

Table 5. (continued)

Dependent variable	Trust			Satisfaction			Decision Making Propensity		
	Agg	MD	EXT	Agg	MD	EXT	Agg	MD	EXT
Race concordant	1.519**	1.543**	1.462	0.974	0.922	1.514	1.107	1.111	1.093
Gender concordant	0.970	0.900	1.418	0.837	0.828	0.799	0.897	0.938	0.736
Physician extender	1.014	NA	NA	0.805	NA	NA	1.262	NA	NA
McFadden Pseudo R ²	0.1019	0.1002	0.1358	0.1156	0.1022	0.1917	0.0682	0.0687	0.0993

Notes:
 *p < .05
 **p < .01
 ***p < .001
 Agg = Aggregated Population
 MD = Physician User Group
 EXT = Extender User Group
 NA = Not Applicable

Discussion

This paper has been motivated by the need to answer two important questions. As the health care system increasingly emphasizes the role of PAs and NPs, largely out of a concern to enhance efficiency and patient access to constrained physician resources, will gender and/or racial concordance also be promoted? The second question, which is independent of the answer to the question whether investment in physician extenders is likely to increase racial and/or gender concordance, addresses the received opinion of the bulk of the published literature that views concordance both in race and gender as fostering a meaningful improvement in health outcomes. We test this conventional wisdom with three health outcome measures: patient satisfaction, the closely allied concept of trust in the patient's health provider, and decision-making in the previous six months.^{45,46}

The short answer to the first question is that for the study population in North Carolina's Medicaid population, gender concordance is significantly greater when patients use physician extenders such as NPs and PAs than when they are served by physicians. Compared with their physician user counterparts, the probability of being gender concordant was nearly 15% greater among respondents in the extender use category. However, the same cannot be said for race concordance. In spite of the finding in the bivariate models that race concordance is significantly greater when patients use physician extenders, this observation was not replicated, at least in terms of statistical significance, in the multivariate models.

The more complex analysis necessary to produce answers for our representative Medicaid population to the issue of the importance of concordance for health outcomes revealed that in the aggregate: (1) race and gender were negatively associated with trust while education and satisfaction were positively associated with trust; (2) age, dual eligibility status, health status, and trust were positively associated with satisfaction while education had a mixed effect (lowest levels of education had a positive relationship with satisfaction and highest levels had a negative association); and (3) race was positively associated with decision making while dual status and health status were negatively associated with decision making (Table 4). Our research design allowed us to drill down to determine the efficacy of racial and gender concordance in promoting health outcomes by two provider types, physicians and physician extenders. In the physician extender subgroup, the only independent variables attaining significance in the multivariate model were: (1) satisfaction and the highest levels of education were positively associated with trust; (2) health status was negatively associated with decision making; and (3) age, trust, the lowest levels of education, and the best health status were positively associated with satisfaction whereas the highest levels of education were negatively associated with satisfaction. Meanwhile, in the physician user subgroup, independent variables attaining significance in the multivariate model were: (1) education and satisfaction were positively related to trust while race and sex were negatively related to trust; (2) race was positively related to decision making whereas health status and urbanicity were negatively related to decision making; and (3) trust, health status, age, and the lowest levels of education were positively associated with satisfaction, while the highest levels of education were negatively related to satisfaction.

Note that in this extended multivariate model that included both race and gender as control variables, race concordance increased the probability of favorable outcomes, but failed to attain significance in each subgroup and for each outcome. Additionally, gender concordance actually *reduced* the probability of favorable outcomes in most cases, although these relationships also failed to achieve statistical significance. Thus, neither race concordance nor gender concordance achieved statistical significance with any of the study's three major health outcomes (Table 4). Race concordance (like gender concordance) is a complex variable that involves the patient's race (or sex); in the regression equation using race by itself as an independent control variable and race concordance, race registered significant or very significant associations with trust and decision-making for aggregate and physician users. (Sex as a control variable along with gender concordance was only weakly significant for aggregate and physician users with the trust variable.) When race and gender were excluded as control variables in the multivariate regression models, race concordance was very significantly associated ($p < .01$) with higher trust scores (Table 5), but gender concordance failed to achieve significance in either Table 4 or Table 5.

Our discussion must be rounded out by considering the implications of our research for medical practice and the existing literature on concordance. It is instructive to start with the fundamental questions that motivated our research: (1) will an expanded role for physician extenders promote race concordance and gender concordance, and (2) do race concordance and gender concordance improve health outcomes?

Our research reveals a significant association between gender concordance and seeking care from physician extenders (Table 3). This important finding may be fostered by the manner in which care is organized and delivered within North Carolina Medicaid's managed care system. Specifically, almost three-in-four (73.2%) respondents to the survey were female and almost four-in-five (78.9%) of all members of the physician extender group were female. Yet, almost 75% of females in the physician extender subgroup were gender concordant. It is unclear from our data if this high level of concordance reflects a "voluntary" patient choice as opposed to a "less voluntary," passive acceptance of circumstances (distance constraints, time constraints, other factors related to convenience, etc.). However, what is clear is that there was an adequate supply of female physician extenders within the North Carolina Medicaid system to meet this subgroup of recipients' needs. Therefore, the answer to the question of whether an expanded role for physician extenders promotes concordance may depend, in part, on the demographic diversity of the supply of physician extenders and the strategic manner in which these providers are targeted and distributed. This notion of demographic diversity in the supply of providers may also apply to the relationship between provider type and race concordance. Although our research failed to confirm that receiving care from a physician extender significantly promoted race concordance, a lack of racial diversity in the supply of providers (physicians and physician extenders) may be a possible explanation for the finding that Blacks had a significantly lower probability of being race concordant.

Concerning the impact of concordance on health outcomes, our research failed to confirm the conventional wisdom reported in the concordance literature that concordance improves health outcomes. For the most part, neither race concordance nor

gender concordance had a significant impact on our reported outcomes. The observation that race concordance significantly increased the probability of reporting high trust scores is important, but occurred only when race and gender—vital control variables in any social science context—were eliminated from the specified models. Even in these constrained models where race concordance achieved statistical significance, it failed to do so in the physician extender group.

Limitations. A number of factors limit the usefulness of our findings. The study is designed as an observational study, which limits our ability to assert causality. Moreover, it is a case study of North Carolina's Medicaid program, which is a model primary care case management program involving many primary care physicians across the state; the experience of patients in other states' Medicaid programs may be very different. On the other hand, careful study of this model Medicaid program is worthwhile precisely because it has received so much national attention.⁴⁹⁻⁵²

A technical limitation may be the measure of internal index reliability, Cronbach's alpha, which is low for the health status index and, to a lesser degree, the satisfaction index (Appendix B). There may also be some recall bias associated with recounting events that occurred six months prior to administering the survey. Additionally, the survey response rate was 34.8% using American Association for Public Opinion Research standards and formulae.⁵³ Although respectable by 2012 standards for telephone surveys of Medicaid enrollees, this rate reflects the difficulties encountered contacting members of the Medicaid population. Finally, there is a substantial imbalance in the number of respondents claiming that their primary care provider is a physician ($n = 1,122$) compared with those claiming a physician extender ($n = 279$). This imbalance may have affected the statistical significance of the observed results, with a greater likelihood of attaining significance in the larger, physician provider subgroup compared with the physician extender provider subgroup.

Conclusion. This paper provides a detailed snapshot of the character of North Carolina Medicaid's managed care program in 2012 in terms of concordance, provider types, and three important measures of health care quality. Our research revealed that an expanded role for physician extenders promotes gender concordance but not race concordance. The second research question involved asking whether gender and race concordance (characteristics of the structure of health care delivery in Donabedian's typology) fostered improved health outcomes. We must emphasize that our failure to find gender concordance associated with the outcome variables of interest does not in any way undermine the validity and importance of trust, satisfaction or decision making as critical measures for gauging the quality of health care. What it does mean is that for our specific population in 2012 greater gender concordance would have been unlikely to register significant improvement in any of the three quality-of-care outcome measures examined in this paper. We also showed that race or race concordance were not significantly related to the three quality of care measures for patients using nurse practitioners or physicians assistants. However, race or race concordance were significantly associated with the outcome measures for trust and decision-making for all provider types combined and for patients who regarded a primary care physician as their personal doctor.

This research makes a valuable contribution to academics and practitioners alike. For academics, the equations exploring predictors of trust, satisfaction and decision-making propensity revealed greater complexity than previous research suggests. Additionally, our findings suggest that future research that considers physician extenders in the discussion of concordance and health outcomes and their roles in eliminating health disparities may be especially enlightening. For instance, future research could address whether the relationship between patients and physician extenders is fundamentally different from the relationship between patients and their physicians and whether these differences challenge our understanding of the concordance hypothesis. It may also reveal other factors that explain the relationship between patients and providers that were suppressed by using race and gender as causal variables. Furthermore, practitioners and health administrators will also find the results of this paper relevant to their work with regards to building care and payment models that consider what role physician extenders will play in the future delivery of primary care.

Appendix A.

INCLUSION/EXCLUSION CRITERIA AND DATA TRUNCATION STEPS

Adult enrollees in the following program categories were specifically excluded from the initial sampling frame:

Community Alternatives Program, Medicaid for Pregnant Women. Qualified Medicare Beneficiaries (those who are partially eligible because they only receive premium support benefits as opposed to the “full duals” who are eligible for both Medicare and Medicaid), institutionalized enrollees receiving long-term care, nursing home, and Adult Care Home services, enrollees receiving end-stage renal dialysis services.

Additional data truncation from the initial data set of 3,202 adult survey respondents occurred by excluding:

232 respondents who were neither White nor Black (n = 2970);	226 respondents with missing values in the creation of the SATISFACTION index (n = 1497);
878 respondents who failed to meet one of the four concordance and/or discordance dyad categories (WW, BB, WB, BW) (n = 2092);	33 respondents who failed to indicate if any decisions were made concerning their health care (n = 1464);
8 respondents with missing values in the gender concordance variable (n = 2084);	2 respondents who did not specify their level of education (n = 1462);
312 respondents with missing values in the creation of the TRUST index (n = 1772);	5 respondents who failed to indicate their language concordance status (n = 1457);

49 respondents with missing values in the creation of HEALTH STATUS index (n = 1723);

56 respondents with missing values on the question asking the type of provider that characterized their personal health provider (n = 1401).

Notes

WW = White patient–White provider
BB = Black patient–Black provider
WB = White patient–Black provider
BW = Black patient–White provider

Appendix B.

CONCEPTUALIZATION AND DESCRIPTION OF TRUST, SATISFACTION, AND HEALTH STATUS INDICES

Trust Index

Survey items (proportional weight in parentheses): I think my health provider may not refer me to a specialist when needed q45 (0.2), I trust my personal health provider to put my medical needs above all other considerations when treating my medical problems q46 (0.2), I sometimes think my personal health provider might perform unnecessary tests or procedures q47 (0.2), My personal health provider's skills are not as good as they should be q48 (0.2), My personal health provider always pays full attention to what I am trying to tell him or her q49 (0.2)

Comments and pertinent statistics: Original index scaled 0 through 20; collapsed to two categories (0 through 18; 19 through 20) to compensate for the relatively large number of responses skewed to high trust scores, Lower levels of trust (n = 712), Highest levels of trust (n = 689), Cronbach's alpha = 0.6678

Satisfaction Index

Survey items (proportional weight in parentheses): In the last six months, how often did your personal health provider explain things in a way that was easy to understand? q27 (0.09375), In the last six months, how often did your personal health provider listen carefully to you? q28 (0.09375), In the last six months, how often did your personal health provider show respect for what you had to say? q30 (0.09375), In the last six months, how often did your personal health provider spend enough time with you? q31 (0.09375), Using any number from 0 to 10, where 0 is the worst possible and 10 is the best possible, what number would you use to rate your personal health provider? q40 (0.3125), Using any number from 0 to 10, where 0 is the worst possible and 10 is the best possible, what number would you use to rate Carolina Access or Medicaid now? q62 (0.3125)

Comments and pertinent statistics: Original index scaled 0 through 32; collapsed to two categories (0 through 29; 30 through 32) to compensate for relatively large number of responses skewed to high satisfaction scores. Less satisfaction (n = 622), High satisfaction (n = 779), Cronbach's alpha = 0.7063

Health Status Index

Survey items (proportional weight in parentheses): In general, how would you rate your overall health? q67 (0.5714), Do you have a physical or medical condition that seriously interferes with your independence, participation in the community, or quality of life? q70 (0.1429), In the past six months, have you seen a health provider three or more times for the same condition or problem? q72 (0.1429), Do you now need or take medicine prescribed by a doctor? Do not include birth control q74 (0.1429)

Comments and pertinent statistics: Original index scaled 0 through 7; collapsed to three categories (0 through 1; 2 through 3; 4 through 7), worst (n = 542), moderate (n = 522), best (n = 337), Cronbach's alpha = 0.5253

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