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Physician Assistants and Nurse Practitioners as a Usual Source of Care

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Abstract

Purpose—The objectives are to identify characteristics and outcomes of patients who use physician assistants and nurse practitioners (PA/NPs) as a usual source of care.

Methods—Cross sectional analysis using the telephone and mail surveys of the Wisconsin Longitudinal Study (WLS), a prospective cohort study of Wisconsin high school graduates and selected siblings (n=6803)

Findings—Individuals from metropolitan (OR=0.40, 95%CI=0.29–0.54) and micropolitan (OR=0.65, 95%CI=0.44–0.95) areas were less likely to utilize PA/NPs than participants from rural locations. Participants without insurance or with public insurance other than Medicare were more likely than those with private insurance to utilize PA/NPs (OR=1.71, 95%CI=1.02–2.86). Patients of PA/NPs were more likely to be women (OR=1.77, 95%CI=1.34–2.34), younger (OR=0.95, 95%CI=0.92–0.98) and have lower extroversion scores (OR=0.81, 95%CI=0.68–0.96). Participants utilizing PA/NPs reported lower perceived access (β =−0.22, 95%CI=−0.35–0.09) than those utilizing doctors. PA/NP utilization was associated with an increased likelihood of chiropractor visits (OR=1.57, 95%CI=1.15–2.15) and decreased likelihood of a complete health exams (OR=0.74, 95%CI=0.55–0.99) or mammograms (OR=0.65, 95%CI=0.45–0.93). There were no significant differences in self-rated health or difficulties/delays in receiving care.

Conclusions—Populations served by PA/NPs and doctors differ demographically but not in complexity. Though perceived access to care was lower for patients of PA/NPs, there were few differences in utilization and no differences in difficulties/delays in care or outcomes. This suggests that PA/NPs are acting as primary care providers to underserved patients with a range of disease severity, findings which have important implications for policy, including clinician work force and reimbursement issues.

Keywords

physician assistant; nurse practitioner; usual source of care; patient characteristics; outcomes

Introduction

The United States (US) is faced with an aging population, projected physician shortages, and an increase in the prevalence of chronic disease, health care costs, and the number of uninsured Americans, making access to health care a leading policy issue. Since 1967, non-physician

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providers such as Physician Assistants (PAs) and Nurse Practitioners (NPs) have been utilized to improve access and reduce health care costs. Approximately 110,000 PAs and NPs currently practice in the US. Fifty percent of PAs and 85% of NPs practice in primary care and are more likely than doctors to practice in rural areas and with underserved populations.¹⁻⁴ Literature suggests that PAs and NPs are accepted by doctors and patients as health care providers, provide quality care within their scope of practice to the satisfaction of their patients, and increase productivity and practice profits.^{1, 5-13} PAs and NPs are licensed professionals with varying scopes of practice, levels of autonomy, and roles, as dictated by their state medical statutes and negotiated agreement with the supervising/collaborating doctor. It is estimated that PA/NPs could provide care for 50-90% of patients presenting to primary care,¹³⁻¹⁵ freeing doctors' time for more seriously ill patients.¹⁶ PAs and NPs work under the supervision of or in collaboration with doctors. Within this framework, these practitioners can play various roles. PAs and NPs can perform a supplementary role in which doctors delegate tasks to improve the efficiency of care provided and/or a complementary role in primary care teams, performing functions their supervising/collaborating doctors do not perform. Finally, PA/NPs can perform substitute roles, taking the place of physicians by providing the majority of services commonly provided by doctors. However, the nature and variability of the role of non-physician practitioners such as PA/NPs in primary care is still not clearly defined.¹⁷

Evidence increasingly demonstrates that PA/NPs have expanding practice autonomy and scope of practice,^{1, 2, 18-21} are treating similar patients in a similar fashion to doctors and producing equivalent outcomes,^{12, 16, 22-27} and are currently recognized by some patients as their primary source of care,^{1, 5, 15} suggesting that the role of PA/NPs in primary care may be progressing toward that of a substitute. However, there is a paucity of data demonstrating how these health care providers can contribute to the functions of primary care (first contact, longitudinality, comprehensiveness, and coordination of care).¹⁷ While studies have examined the nature of care given to patients without direct doctor participation at a given outpatient visit,^{18, 22, 23} achieving a better understanding of PA/NPs in a substitute role is particularly relevant for clinician work force planning in rural areas that are attempting to address access issues through increased utilization of PA/NPs.

Several studies identify factors associated with patient visits to PA/NPs in outpatient settings. PA/NPs visits were more likely to occur in rural areas, the Midwest, involve women, patients younger than 25, and those utilizing public programs including Medicaid.^{16, 18, 28} However, to our knowledge, no study has evaluated the characteristics and perceived health outcomes of patients that identify PA/NPs as their primary source of care. This information can be utilized to develop health care delivery and financing policies to maximize the efficient and effective utilization of PA/NPs.

The objectives of our research were to: 1) identify factors predicting patients who identify PA/NPs as their usual source of care; and 2) identify outcomes associated with patients utilizing PA/NPs as their usual source of care.

Methods

Sample

Data were utilized from the Wisconsin Longitudinal Study (WLS), a long-term cohort study of a 1/3 random sample of people who graduated from Wisconsin high schools in 1957 (N=10,317) and one of their randomly selected siblings (N=8,778). The WLS is conducted by the Department of Sociology at the University of Wisconsin-Madison and studies behavioral and social issues throughout the life course, including physical and mental health and well-being. Survey data were collected from the original respondents and selected siblings approximately once a decade beginning in 1957. Approximately two-thirds of the sample

resided in Wisconsin at the time of the survey. The WLS sample is broadly representative of white, non-Hispanic American men and women who have completed at least a high school education, which constitutes approximately 66% of Americans in this age cohort. Since 1991, the WLS has been supported by the National Institute on Aging (AG-9775 and AG-21079), the Vilas Estate Trust, the National Science Foundation, the Spencer Foundation, and the Graduate School of the University of Wisconsin-Madison.

We used data from the 1993–1994 and 2004–2005 telephone and mail surveys for the graduates and siblings. The 2004–2005 survey defined the sample and is the source for all variables except the 1993 perceived health variable. The 2004–2005 WLS survey was selected because it was the first to include questions regarding provider type. The phone interview response rate was 80% for graduates and 78% for siblings in 2004–2005, resulting in a total of 11,536 graduates and siblings. A 54-page mail survey was given to the participants who completed the 2004–2005 telephone interviews. The response rate for the mailed survey for graduates was 83% in 1993–1994 and 88% in 2004–2005. Sibling response rate was 71% in 1993–1994 and 81% in 2004–2005.

Analyses were conducted on graduate and sibling respondents who stated they had a usual source of care in 2004–2005 and specified a PA, NP, or MD with a primary care specialty (family practice, internal medicine, geriatrics, or preventive medicine) as their usual provider (N=6803). This study was approved by the Institutional Review Board at the University of Wisconsin-Madison.

Variables/Measures

The dependent variable, PA/NP as the usual source of care, was determined by the response to the question: “When you go to (your usual provider), do you usually see a nurse, Physician Assistant, or some other type of health professional?” Those indicating that they had seen a PA or an NP were included in the category of PA/NP. If respondents indicated they utilized a doctor for their usual source of care, they were asked, “What is your doctor’s specialty?” The PA/NPs variable was dichotomized into two categories: doctors and PA/NPs, with the doctor category serving as the reference group. Those indicating that they saw a doctor with a specialty other than primary care, PA and a doctor, or an NP and a doctor were excluded from the sample.

Dependent variables identifying health outcomes included self-reported health status, perceived access to care, and health care utilization. Health status was assessed with the following measures from the 2004–2005 survey: self-rated health, the Health Utility Index Summary score (HUI3),²⁹ and the Short-Form Health Survey (SF-12).³⁰ Self-rated health status was assessed with a question asking respondents to report how they rate their current health on a five-point scale (1=excellent to 5=poor). Responses were dichotomized to 1=poor/fair health and 0=good/very good/excellent health. The HUI3 is an instrument with a scale that ranges from 0 to 1 and includes the following domains: hearing, speech, ambulation, dexterity, emotion, cognition, and pain. The SF-12 is a short-form health survey that includes both physical and mental health domains. Both the HUI3 and the SF-12 are continuous measures, with higher scores indicating better levels of self-rated health status.

Perceived access was assessed using two variables: satisfaction with access and difficulties and delays in obtaining health care. Satisfaction with access to care was assessed with the Group Health Association of America (GHAA) Satisfaction Survey,³¹ an instrument based on a series of statements that participants report their agreement or disagreement with using a 1–5 scale (1=strongly disagree to 5=strongly agree). A summary variable was constructed based on the average of 11 items. Difficulties or delays in obtaining health care were assessed with a summary variable indicating whether respondents “experience[d] difficulties or delays in obtaining any type of health care, or [did] not receive health care” due to one or more reasons

related to ability to access the provider, including cost, insurance, distance to facility, and scheduling.

Health care utilization was assessed with a series of yes/no questions that inquired about prior-year use of preventive care (complete health exam, routine dental check-up, pelvic exam/Pap smear, mammogram, prostate exam, flu shot, blood pressure check, cholesterol test, heart or exercise stress test) and clinic/hospital services (saw doctor in clinic, chiropractor or dentist/oral surgeon, spent one or more nights in the hospital, went to the ER for medical treatment, outpatient surgery).

Explanatory variables were identified using the Andersen Model, a behavioral model of health services utilization.³² This model conceptualizes health service utilization as the result of predisposing, enabling, and need factors. Predisposing factors are existing conditions that are related but not directly responsible for health service utilization. Enabling factors facilitate or impede the use of services. Need factors indicate the perception, existence, or severity of conditions requiring health services. This study identified age, sex, marital status (married, separated/divorced/widowed, never married), education (high school, some college, college graduate, post graduate) and personality types (extent of agreeableness, extroversion, conscientiousness, neuroticism, and openness to new experience) as predisposing variables. Personality was included in the model due to the relationship between personality type and preferences for medical decision making.³³ Enabling variables included metropolitan residence (metropolitan, micropolitan, non-metropolitan), annual income (<\$30,000; \$30,000–45,000; \$45,000–60,000; \$60,000–75,000; and >\$75,000), and insurance type (private, Medicare + private insurance, Medicare, uninsured, or other public). Metropolitan designation was determined by matching Federal Information Processing Standards (FIPS) codes of respondents' residences to U.S. Census county classification as metropolitan (urban core ≥ 50,000 people), micropolitan (urban core >10,000 but <50,000 people), or non-metropolitan.³⁴ Need factors were further identified as perceived need and evaluated need. The perceived need variable was patients' perceived health status in 1993 (very poor/poor/fair; good; excellent). Evaluated need factors included: a count of reported diagnoses (0, 1, or 2+) including any cancer except skin cancer, high blood pressure, diabetes, chronic heart disease, myocardial infarction or cardiac arrest, arthritis, or stroke; and an indicator variable representing reported diagnosis of any of three chronic disease conditions frequently treated by PA/NPs including hypertension, diabetes, and arthritis (0=none of the listed diagnoses, 1=any one of the diagnoses are reported).^{15, 35, 36}

Statistical Analysis

Initial analysis included means and percentages for all variables. Bivariate regression analyses of provider type on each explanatory variable were performed. A multivariable model was estimated utilizing all previously described explanatory variables to identify characteristics associated with the identification of a PA/NP as a usual source of care, using those identifying primary care doctors as their usual source of care as the reference group. To examine the association between utilizing PA/NPs as a usual source of care and outcomes, a series of multivariable regression analyses were conducted with provider type (doctor=0, PA/NP=1) as the primary predictor variable. Linear regression was used for continuous outcome measures and logistic regression was used for dichotomous measures. Other explanatory variables utilized were identical to those used in the previous objective. Ninety-five percent confidence intervals were calculated using a robust estimate of the variance that allows for clustering of siblings within families.

Results

The study population has a mean age of 64 (min=40, max=88) with women constituting 54% of respondents. All respondents have a minimum of a high school education and live in geographically diverse areas of Wisconsin (Table 1). Approximately 4% of participants are uninsured or participating in a public program other than Medicare. Roughly 13% of respondents are living in non-metropolitan areas, 71% in micropolitan, and 15% in metropolitan locations. Four and one half percent (n=306) of respondents reported utilizing PA/NPs as a usual source of care.

Self-rated health status, access scores of participants, and health care utilization rates are reported in Table 2. The mean SF-12 Physical and Mental Component scores were 48 and 55 and the HUI3 summary score mean was 0.83. The mean GHAA access score was 3.7 and approximately 8.5% of participants reported “yes” to at least one question related to difficulties/delays in obtaining health care. The majority of participants (94%) had at least one visit to any health care provider in the past year.

Predisposing and enabling factors, including gender, age, extroversion scores, metropolitan residence, and insurance type were associated with identification of PA/NPs as a usual source of care (Table 3). Adjusting for all other variables, when compared to participants residing in rural locations, participants residing in metropolitan locations had 0.4 times the odds of identifying a PA/NP as their usual source of care while participants residing in micropolitan areas had 0.65 times the odds of utilizing a PA/NP. Participants without insurance or on public insurance other than Medicare had 1.71 times the odds of reporting utilizing a PA/NP. When compared to men, women had 1.77 times the odds of recognizing a PA/NP as their usual source of care. With every year increase in age, participants had 0.95 times the odds of utilizing a PA/NP. Finally, with every point increase in extroversion score, respondents had 0.81 times the odds of reporting a PA/NP as a usual source of care. The remaining predisposing (marital status and educational attainment), enabling (income), and need factors (perceived health in 1992, count of diagnoses, and chronic diseases treated by PA/NPs) were not predictive of provider type.

Identifying PA/NPs as a usual source of care was associated with several outcome measures (Table 4). Measures of perceived access provided conflicting results. Participants utilizing PA/NPs were more likely to report lower GHAA access scores ($\beta=-0.22$) than those with physicians as their usual source of care. However, no differences were observed in reported difficulties or delays in obtaining health care. Several differences in utilization were also noted. Individuals with PA/NPs as a usual source of care had 1.57 times the odds of reporting a chiropractor visit and were less likely to have received a complete health exam (OR=0.74) or mammogram (OR=0.64) than those utilizing doctors.

Discussion

Study findings suggest that patients of PA/NPs differ from those seen by doctors with respect to metropolitan residence, insurance type, gender, age, and extroversion scores. With the exception of the extroversion score, these findings are consistent with literature that evaluates factors associated with visits to PA/NPs in outpatient settings.^{16, 18, 28} However, our study uniquely suggests that perceived health and health care outcomes do not differ except for lower perceived access and lower utilization of some preventive services.

PA/NPs have been utilized to improve access and/or reduce cost while maintaining quality of care. The currently available literature suggests that PA/NPs are improving access by serving underserved populations and treating patients with acute health issues and stable chronic diseases.^{4, 13, 16, 21, 35} It has been shown that some rural PA/NPs act as a primary provider

for a sizable proportion of their patients.¹⁹ However, our data suggests that access may not fully explain utilization patterns of PA/NPs as a usual source of care. In addition to non-metropolitan residents and those without insurance or on public programs other than Medicare, women, younger patients, and those with lower extroversion scores were more likely to identify PA/NPs as a usual source of care. In regard to gender, patient satisfaction with same-sex providers may explain this observation.³⁷ Studies suggest a “feminization” of the PA/NP professions² and that PA/NPs may provide a larger proportion of the woman-provided care in rural areas.^{3, 4} The younger age of patients of PA/NPs could be interpreted as a possible sign of better health status of these patients compared to those patients who see primary care doctors. However, usual provider type was not associated with measures of health status in our analysis. A more likely explanation may be the lower reimbursement for PA/NPs with Medicare patients.³⁸ Regarding personality, previous research demonstrated that low extroversion scores are associated with receipt of personal continuity of care, reporting of a serious health problem and a willingness to wait in order to see their provider of choice.³⁹ This suggests that PA/NPs may be acting as a usual source of care for a subgroup of patients that considers continuity of care important.^{25, 39}

Utilization of health services and perceived health status of patients identifying PA/NPs and doctors as their primary care provider is similar, but those seeing PA/NPs report lower access scores. Regarding health care utilization, visits to chiropractors were more common in patients of PA/NPs. This could be suggestive of either practitioner willingness to recommend non-drug²⁷ or complimentary/alternative therapies, and/or increased willingness of these patient types to utilize PA/NPs. Also of note, services associated with decreased health status, such as emergency room visits and hospitalizations, showed no significant difference, underscoring the finding that there is no significant difference in patient health status by provider type. Patients of PA/NPs were less likely to utilize some preventive services such as complete health exams and mammograms. This result is contrary to literature reporting that PA/NPs do as well or better than doctors in meeting recommended preventive health interventions.^{18, 22, 35} Metropolitan designation is determined at the county level; therefore, it is possible that we could not completely control for differences between doctor and PA/NPs practice location characteristics. PA/NPs are more likely to practice in rural areas; therefore, lower levels of some preventive services may be related to broader access issues for underserved populations.

The average GHAA access score for patients of PA/NPs was approximately 0.2 lower than that of patients of primary care doctors. When considered with the other access variable, which suggests that patients of PA/NPs do not perceive any difficulty or delays receiving care, PA/NPs’ availability may not entirely explain the effect. One explanation could relate to public perception. Some proportion of participants that use PA/NPs may not perceive difficulties or delays, but would prefer to see a doctor, rather than an “assistant.”

There are several limitations to the study. First, the data source is a longitudinal cohort study of a population homogeneous in race and age as well as educated and insured. While potential confounding is minimized, the results may not easily be generalized to other populations. Second, provider utilization and outcomes are evaluated simultaneously due to unavailability of provider data in sequential surveys. Third, verification of reported provider type is lacking. Patients may misclassify the provider type of their usual source of care. Since the average reported length of relationship with a usual provider for the WLS participants identified for this study was approximately nine years, we anticipate that this misclassification, as well as misclassification of all advanced practice nurses as an NP, is minimal. However, if present, misclassification would more frequently result in PA/NPs misclassified as doctors than doctors as PA/NPs. Since the proportion of patients that identify PA/NPs as a usual provider is relatively small (2.57% in U.S., 4.51% in WLS),⁴⁰ we estimate that this would have a negligible effect on findings. Fourth, interpretation of certain variables has limitations. The metropolitan

variable is a county-level definition, suggesting a homogeneity of population that may not exist, potentially diluting the reported effect of geography. The survey question identifying provider type asks about a “usual” source of care. No quantification is provided; therefore, it is unknown if this represents true autonomous care provided by PA/NPs. Finally, the number of respondents identifying PA/NPs as their usual source of care is relatively small.

Multiple strengths of the study are also noted. The study population represents a demographic that is recognized for its utilization of PA/NPs³⁵ in a state with a significant proportion of its population in all three geographic categories. It is also an age cohort that precedes the bulk of the baby boom generation by approximately 10 years, potentially providing early indications of utilization trends for a growing sector of the US population. Utilizing state-level data provides additional advantages. The richness of the data allows for a comprehensive analysis of factors predicting utilization that is rarely found in national data sources. Finally, Wisconsin has a regulatory environment allowing for a broad scope of practice and greater utilization of PA/NPs.²¹ The results of this study are not only useful for Wisconsin State policy, but may inform other states looking to expand the utilization of PA/NPs.

In a policy era that is focused on reducing costs while increasing access and quality, increased utilization of PA/NPs is frequently offered as one solution. The results of this study suggest that while the population served by PA/NPs is unique, patient factors related to need for health care are not significantly different and perceived access to care is lower despite relatively few differences in utilization of services. When taken in context with the current body of literature, the data suggest PA/NPs may be acting in a substitute role as primary care providers to underserved patients with a range of disease severity. While this new evidence should be considered in policy deliberations on clinician work force and reimbursement, caution must be exercised. Currently, clear operational definitions for the potential roles of PA/NPs is lacking, as is evidence of the potential of PA/NPs to contribute to the functions of primary care within each of the potential roles.¹⁷ Until these questions are answered, efficient utilization of PA/NPs will remain elusive.

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Table 1

Descriptive characteristics for explanatory variables (N=6803)^{a,†}

	%Total Sample	%PA/NP	% Doctor	p value		%Total Sample	%PA/NP	% Doctor	P> z
Predisposing Factors									
<i>Age</i>	(mean=64.26)	(mean=64.3)	(mean= 63.5)		Enabling Factors				0.000
<60	9.53	15.36	9.25		<i>County designation</i>				
60–64	52.18	50.33	52.27		Non-Metropolitan	13.40	25.49	12.84	
65–69	29.65	28.76	29.69		Metropolitan	71.13	55.23	71.96	
≥70	8.64	8.79	5.56		Metropolitan	15.37	19.28	15.21	
					<i>Income</i>				0.089
<i>Sex</i>					<\$30,000	19.18	24.84	18.92	
Male	45.67	33.01	46.27	0.000	\$30,000–45,000	16.58	16.67	16.58	
Female	54.33	66.99	53.73		\$45,000–60,000	15.21	16.67	15.15	
					\$60,000–75,000	12.48	10.13	12.59	
					>\$75,000	31.96	27.12	32.18	
<i>Marital status</i>				0.076	Missing	4.59	4.58	4.59	
Currently Married	79.58	74.75	79.89		<i>Health insurance</i>				0.001
Divorced/Separated	16.69	21.31	16.45		Private	54.70	55.88	54.64	
Never married	3.67	3.93	3.66		Medicare & Other private	33.02	25.82	33.36	
					Medicare	8.52	11.11	8.39	
<i>Educational attainment</i>				0.031	Uninsured/Other public	3.77	7.19	3.60	
High school graduate	54.19	58.03	54.00						0.121
Some college	15.93	19.34	15.77		<i>Need Factors</i>				
College degree	15.10	11.48	15.28		Perceived Need				
Some postgraduate	14.78	11.15	14.95		<i>Perceived health in 1992</i>				
					Very poor/poor/fair	10.55	8.85	10.63	
<i>Personality traits</i>					Good	60.96	66.56	60.69	
Agreeableness	38.37 (5.71)	38.73 (5.36)	38.36 (5.71)	0.2759	Excellent	28.50	24.59	28.68	
Extroversion	31.32 (7.49)	30.61 (7.80)	31.35 (7.48)	0.1091	Evaluated Need				0.223
Conscientiousness	38.68 (5.52)	38.75 (5.38)	38.69 (5.52)	0.8547	<i>Count of reported diagnoses</i>				
Neuroticism	22.38 (7.20)	22.22 (7.28)	22.38 (7.19)	0.712	0	18.43	20.92	18.32	
Openness	31.05 (6.23)	30.70 (6.44)	31.08 (6.22)	0.3168	1	34.41	36.60	34.31	
					2+	47.16	42.48	47.38	

	% Total Sample	% PA/NP	% Doctor	p value	Chronic diseases treated by PA/ NPs	% Total Sample	% PA/NP	% Doctor	P> Z
									0.105
					0	27.96	32.03	27.76	
					1+	72.04	67.97	72.24	

* Percentages may not total 100 due to rounding.
† Statistically significant results are in bold type.

Table 2

Descriptive statistics for dependent variables (N=6803)

	% or Mean (SD)
GHAA average access	3.69 (0.66)
Perceived difficulty in obtaining care	8.45
Services utilized within the past year	
Any provider visit	94.49
Hospital stay one night or more	12.05
ER visit	15.57
Outpatient surgery	17.41
Chiropractor visit	16.89
Dentist/oral surgeon visit	79.11
Complete health exam	79.31
Routine dental checkup	81.82
Pelvic/Pap exam	64.07
Mammogram	79.60
Prostate exam	73.75
Flu shot	60.41
Blood pressure check	95.29
Cholesterol test	81.02
Stress test	20.66
Average health measures	
SF12 Physical	48.45 (9.68)
SF12 Mental	55.29 (6.41)
Health Utilities Index	.83 (.20)
Perceived Health in 2004	
Very poor/poor/fair	14.82
Good/excellent	85.18

Table 3

Factors predicting utilization of PA/NPs (N=6803)^{*†}

Variable	Odds ratio	p value	CI
<i>Predisposing Factors</i>			
Age	0.95	0.001	(0.92, 0.98)
Female^a	1.77	0.000	(1.34, 2.34)
Marital Status ^b			
Divorced/separated/widowed	1.22	0.234	(0.88, 1.7)
Never married	1.08	0.811	(0.56, 2.08)
Education ^c			
Some college	1.15	0.440	(0.81, 1.61)
College degree	0.72	0.138	(0.47, 1.11)
Some postgraduate	0.80	0.338	(0.51, 1.25)
Personality Traits			
Agreeableness	1.05	0.569	(0.88, 1.25)
Extroversion	0.81	0.016	(0.68, 0.96)
Conscientiousness	1.07	0.470	(0.89, 1.28)
Neuroticism	0.95	0.468	(0.82, 1.1)
Openness	1.11	0.292	(0.92, 1.33)
<i>Enabling Factors</i>			
Income ^d			
\$30,000–45,000	0.85	0.432	(0.57, 1.27)
\$45,000–60,000	0.96	0.842	(0.64, 1.44)
\$60,000–75,000	0.80	0.350	(0.5, 1.28)
≥\$75,000	0.87	0.495	(0.58, 1.3)
Missing	0.91	0.767	(0.47, 1.74)
Health insurance ^e			
Medicare & Other private	0.93	0.657	(0.67, 1.29)
Medicare	1.52	0.071	(0.96, 2.39)
Uninsured/Other public	1.71	0.043	(1.02, 2.86)
Metropolitan Designation ^f			
Micropolitan	0.65	0.026	(0.44, 0.95)
Metropolitan	0.40	0.000	(0.29, 0.54)
<i>Need Factors</i>			
<i>Perceived Need</i>			
Perceived health in 1992 ⁱ			
Good	1.31	0.093	(0.96, 1.79)
Very poor/poor/fair	0.91	0.741	(0.54, 1.55)
<i>Evaluated Need</i>			
Reported diagnoses ^g			
1	1.11	0.592	(0.76, 1.62)
2+	0.92	0.691	(0.59, 1.41)

Variable	Odds ratio	p value	CI
Chronic diseases treated by PA/ NPs ^{<i>h</i>}	0.85	0.360	(0.61, 1.2)

* Baseline category for comparison is:

^{*a*} male;

^{*b*} married;

^{*c*} <high school graduate;

^{*d*} income <\$30,000;

^{*e*} private;

^{*f*} non-metropolitan;

^{*g, h*} none;

^{*i*} excellent.

^{*†*} Bold type indicates significance at $p < .05$.

Table 4

Relationship between patient outcomes and utilization of PA/NPs as a usual source of care (N=6803)^{*†}

Variable	β or OR	CI
Average satisfaction with access	-0.22	(-0.35, -0.09)
Perceived difficulty in obtaining care	0.80	(0.49, 1.29)
Services utilized within the past year		
Any provider visit	1.44	(0.77, 2.68)
Hospital stay one night or more	0.81	(0.51, 1.29)
ER visit	0.96	(0.66, 1.41)
Outpatient surgery	1.10	(0.78, 1.56)
Chiropractor visit	1.57	(1.15, 2.15)
Dentist/oral surgeon visit	0.86	(0.63, 1.18)
Complete health exam	0.74	(0.55, 0.99)
Routine dental checkup	0.95	(0.68, 1.34)
Pelvic/Pap exam	1.24	(0.87, 1.77)
Mammogram	0.64	(0.45, 0.93)
Prostate exam	0.68	(0.41, 1.12)
Flu shot	0.80	(0.6, 1.06)
Blood pressure check	0.68	(0.4, 1.15)
Cholesterol test	0.90	(0.65, 1.23)
Stress test	0.87	(0.61, 1.25)
Average health measures		
SF12 Physical	0.16	(-0.9, 1.23)
SF12 Mental	0.29	(-0.46, 1.03)
Health Utilities Index	0.01	(-0.01, 0.03)
Perceived Health in 2004		
Very poor/poor/fair	0.69	(0.45, 1.05)

* Higher scores indicate higher satisfaction with access and higher average health measures.

† Bold type indicates significance at $p < .05$.