

Predictors of Final Specialty Choice by Internal Medicine Residents

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BACKGROUND: Sociodemographic factors and personality attributes predict career decisions in medical students. Determinants of internal medicine residents' specialty choices have received little attention.

OBJECTIVE: To identify factors that predict the clinical practice of residents following their training.

DESIGN: Prospective cohort study.

PARTICIPANTS: Two hundred and four categorical residents from 2 university-based residency programs.

MEASUREMENTS: Sociodemographic and personality inventories performed during residency, and actual careers 4 to 9 years later.

RESULTS: International medical school graduates (IMGs) were less likely to practice general medicine than U.S. graduates (33.3% vs 70.6%, $P < .001$). Residents with higher loan indebtedness more often became generalists ($P = .001$). A corresponding trend favoring general internal medicine was observed among those who perceived General Internists to have lower potential incomes (69.0% vs 53.3%, $P = .08$). There was a trend for generalists to have lower scores on scales measuring authoritarianism, negative orientation to psychological problems, and Machiavellianism ($0.05 < P < .10$). In a logistic regression, graduation from a U.S. medical school (odds ratio [OR] 3.02; 95% confidence interval [CI], 1.00 to 9.10, $P = .049$) and perception of low future income (OR 1.65; 95% CI, 1.06 to 2.56, $P = .03$) predicted entry into general medicine, with trends apparent for higher debt ($P = .05$) and greater comfort caring for patients with psychological problems ($P = .07$).

CONCLUSION: Recruitment of IMGs may not increase the supply of General Internists. Prospects of lower income, even in the face of large debt, may not discourage residents from becoming generalists. If increasing generalist manpower is a goal, residencies should consider weighing applicants' personal attributes during the selection process.

KEY WORDS: career choice; general internal medicine; health manpower; international medical graduates.

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On Match Day 1993, the number of American medical students assigned to categorical internal medicine residencies hit an historic low, representing a 36% drop from 1985. Student interest in Family Medicine had reached a nadir a year earlier.¹ Prompted by these trends, the American

Medical Association, the Council on Graduate Medical Education, and the American Association of Medical Colleges expressed concern that future U.S. generalist-specialist physician distribution would not meet the needs of the population.²⁻⁴ Although generalist residency programs rebounded in popularity during the mid-1990s, a recent survey found that 30% of medical school deans perceived continuing shortages of adult primary care physicians, especially General Internists.⁵

Research on medical students has identified several factors associated with selection of a primary care residency.⁶ Women choose generalist careers more often than men. Students who select primary care, in comparison with peers who choose subspecialties, are on average older, more likely to have grown up in nonmetropolitan areas, and to come from middle-class households. They may be less likely to have majored in science during college, and more likely to have attended publicly supported institutions.

Personality attributes have also been associated with student career choice. Merrill and colleagues found that summary scores on attitudinal inventories measuring authoritarianism, Machiavellianism, reliance on high technology, negative orientation to patients with psychological problems, and intolerance of ambiguity were lower for senior students entering primary care than for their peers who selected residencies in surgery, the surgical subspecialties, and anesthesiology.⁷⁻¹¹

Following 3 years of training, internal medicine residents may practice general internal medicine, or pursue a fellowship in subspecialty medicine. In contrast to a substantial literature on students, relatively little is known regarding factors that characterize residents who enter general medicine rather than a subspecialty.⁶ We sought to identify predictors by re-examining factors found to be associated with career decisions in students. Specifically, we hypothesized that residents entering general medicine are older, more often women, and more likely to come from more modest backgrounds and nonmetropolitan areas. We further hypothesized that they would have lower mean scores on the attitudinal inventories previously examined in medical students. In addition, we explored a variety of sociodemographic factors related to education and financial status, and perceptions of internal medicine practice that might plausibly differ between generalists and subspecialists.

METHODS

Study Subjects

This research was performed at the internal medicine residencies at the University of Texas Health Science Center at San

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Antonio and the University of New Mexico. Neither offers a primary care internal medicine track. Eligible subjects consisted of all categorical and preliminary year residents in training during academic year 1993 to 1994, and all new first year residents and residents transferring into the programs during 1994 to 1995 and 1995 to 1996. Hence, the cohort comprised residents who entered training between 1991 and 1995, of whom approximately 60% were enrolled during their first year of residency. The institutional review boards at both universities approved the research protocol. Participants provided written informed consent before data collection.

Measurements

At enrollment, subjects completed a baseline questionnaire covering sociodemographic factors including age at medical school graduation, sex, marital status, ethnicity/race, college major, college and medical school category (public vs private), self-reported medical school class rank, population of hometown, timing of the decision to become a doctor, and current loan indebtedness. Residents indicated whether they had graduated from a U.S. medical school or were international medical graduates (IMGs). Subjects also responded to 8 items intended to measure their perceptions of general internal medicine practice in comparison to subspecialty practice, including leisure time availability, workload demands, stress, competency, potential income, uncertainty, technical skills, and patient education. Each item listed a perception, and subjects indicated their degree of agreement on a 5-point scale.

In addition, residents completed 5 attitudinal inventories developed for research on medical student career choice.⁷⁻¹² The inventories, each comprising 5 to 10 statements, are listed in Table 1, with sample items from each. For example, the medical authoritarianism inventory consists of 7 statements, 1 of which is "Those who contribute the most to society should get better health care." Residents indicated their degree of agreement with each statement on an ordinal scale with values from 1 ("strongly disagree") to 7 ("strongly agree"), and the values were totaled to provide an overall score. Higher scores indicated a stronger association with the attribute. The attitudinal inventories were derived from surveys of physicians and medical students, whose responses to potential scale items were subjected to principal components factor analysis. The derived inventories consist of clusters of items that reflect the attribute of interest. Items that failed to load consistently were excluded. During their development, the inventories were

administered to senior U.S. medical students and were found to have content validity, internal consistency, and construct validity.⁷⁻¹²

We mailed each subject a follow-up survey from 2002 to 2003, 4 to 9 years after the completion of residency training. Nonrespondents to the initial mailing received additional mailings; a small number of repeated nonresponders were contacted by phone. The follow-up survey asked, "Which one area of medicine best describes your current career?" Respondents indicated their career on a list that included general internal medicine as well as standard medicine subspecialties.

Statistical Analysis

Baseline survey responses of categorical track residents who became General Internists were compared with those who ultimately entered a medicine subspecialty. Univariate data analysis was performed using the Statistical Package for the Social Sciences, Version 12.0 (SPSS Inc., Chicago, IL). Frequency distributions of relevant variables were reviewed, and means and standard deviations were calculated. For categorical variables, differences between groups were assessed with the corrected χ^2 test. Student's *t* test was used for continuous variables. Nonparametric tests were used when appropriate. Multivariate logistic regression analysis was performed with the Statistical Analysis System, version 8.2 (SAS Institute Inc., Cary, NC), using final career choice as the dependent variable. Factors with univariate *P* values < .20 were entered in a forward stepwise logistic regression model with a selection criterion of 0.10. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated.¹³ Statistical significance was defined as a 2-sided *P* value less than .05.

RESULTS

We enrolled 265 of 290 potentially eligible residents, a participation rate of 91.4%. The response rate to the follow-up survey mailed 4 to 9 years after residency completion was 97%. We determined the careers of nonrespondents by checking specialty board certification records and contacting their practices. Because our interest was in the final career choice of residents seeking board certification in internal medicine, we restricted our analysis to residents enrolled in the 3-year categorical track. Residents (*n*=53) enrolled in a preliminary year of training before initiating a residency in another specialty were excluded. We also excluded 8 categorical residents who

Table 1. Description of Attitudinal Inventories

Scale (Reference)	No. of Items	Sample Item	Score Range
Authoritarianism ⁷	7	"Those who contribute the most to society should get better health care."	7 to 35
Machiavellianism ⁸	5	"The best way to handle people is to tell them what they want to hear."	5 to 25
Reliance on high technology ⁹	8	"For me the lab profile is the most important part of the medical record."	8 to 40
Negative orientation to patients with psychological problems ¹⁰	10	"You can't win when you treat psychological problems."	10 to 50
Intolerance of ambiguity ¹¹	10	"I dislike having patients whose outcomes don't follow the book."	10 to 50

ultimately did not practice internal medicine or 1 of its subspecialties. The final cohort consisted of 204 subjects. These had a mean age at medical school graduation of 28.3 years (SD \pm 3.9 years); 107 (52.5%) were men. By self-identification, 108 (52.9%) were non-Hispanic whites, 38 (18.6%) Asian Americans, 29 (14.2%) Mexican Americans, 23 (11.3%) other Hispanics, 4 (2.0%) African Americans, and 2 (1.0%) Native Americans. Twenty-seven (13.2%) graduated from international medical schools, about half in Mexico, Colombia, and other Latin American countries; virtually all were non-U.S. citizens. Two were graduates of osteopathic medical schools.

Overall, 134 (65.7%) entered practice as General Internists and 70 (34.3%) now practice an internal medicine subspecialty. There was no difference between the 2 participating residency programs. Those practicing general medicine were, on average, 1 year older at medical school graduation (28.6 ± 3.9 vs 27.6 ± 4.0 years; $P=.08$). Table 2 summarizes the findings for sociodemographic variables. The most important baseline factor predicting future career was whether the resident had graduated from a U.S. medical school or from an international medical school. Of IMGs, only 33.3% entered practice in general internal medicine, versus 70.6% of American graduates ($P<.001$). Among women, 71.1% chose general internal medicine careers, versus 60.7% of men ($P=.16$). Residents who completed medical school before 1993 were less likely to become General Internists than later graduates (56.6% vs 74.0%; $P=.01$), although no relationship was observed with the calendar year of starting residency. Self-reported class rank in medical school was inversely related to entry into general medicine. Of those ranked in the bottom third, 76.2% became General Internists, versus 56.3% in the top third ($P=.035$).

Those reporting higher educational loan debt were more likely to enter general medicine. Of residents who owed more than \$100,000, 83.3% are now General Internists, versus 42.2% of those who had no debt ($P=.001$). Among residents who at baseline perceived General Internists to have a lower potential income than subspecialists, 69.0% entered general medicine while 53.3% became subspecialists ($P=.08$). Other perceptions of general medicine in comparison with subspecialty medicine, including those regarding leisure time availability, workload demands, and stress, did not differ between General Internists and subspecialists. Career choice was unrelated to race or ethnicity, marital status, college major, or other demographic variables (Table 2).

For the 5 attitudinal inventories, no significant differences were found between generalists and subspecialists (Table 3). However, on 3 of the inventories there were trends toward significance between the 2 groups: authoritarianism ($P=.06$), negative orientation to patients with psychological problems ($P=.07$), and Machiavellianism ($P=.09$). No differences were found on scales measuring reliance on high technology or intolerance of ambiguity.

Finally, we performed a stepwise forward logistic regression analysis using final career decision as the dependent variable. Results of the model are shown in Table 4. Graduation from a U.S. school (OR 3.02, 95% CI, 1.00 to 9.10; $P=.049$) and perception of a lower future income (OR 1.65, 95% CI, 1.06 to 2.56; $P=.03$) significantly predicted a general medicine career. Nonsignificant trends were apparent for higher loan debt (OR 1.27, 95% CI, 1.00 to 1.62; $P=.05$) and a negative perception of patients with psychological problems (OR 0.97,

Table 2. Selection of General Internal Medicine Career According to Sociodemographic Factors

Variable	n	General Internists (%)	P Value
Sex			
Women	97	69 (71.1)	.16
Men	107	65 (60.7)	
Race/ethnicity			
Non-Hispanic white	108	72 (66.7)	.87
Other	96	62 (64.6)	
Marital status			
Married	96	62 (64.6)	.91
Not married	108	71 (66.7)	
Medical school location			
United States	177	125 (70.6)	<.001
International	27	9 (33.3)	
Year of medical school graduation			
1992 or earlier	99	56 (56.6)	.01
1993 or later	104	77 (74.0)	
Self-reported rank in medical school			
Top third	80	45 (56.3)	.035*
Middle third	95	66 (69.5)	
Bottom third	21	16 (76.2)	
College major			
Liberal arts	23	14 (60.9)	.45
Other	164	117 (71.3)	
College category			
Public	116	81 (69.8)	1.0
Private	71	50 (70.4)	
Medical school category			
Public	170	114 (67.1)	.47
Private	34	20 (58.8)	
Hometown population			
< 10,000	16	11 (68.8)	.55*
10 to 50,000	34	24 (70.6)	
50 to 100,000	27	16 (59.3)	
100 to 500,000	40	27 (67.5)	
500,000 to 1 million	31	21 (67.7)	
> 1 million	55	34 (61.8)	
Time of decision to become doctor			
After another career	31	24 (77.4)	.20
Other time	173	110 (63.6)	
Educational loan debt			
> \$100,000	18	15 (83.3)	.001*
\$50 to 100,000	79	55 (69.3)	
< \$50,000	62	45 (72.6)	
None	45	19 (42.2)	
Perceived potential income of General Internists			
Lower	158	109 (69.0)	.08
Same or higher	45	24 (53.3)	

*P value is for linear trend.

95% CI, 0.94 to 1.00 per scale point; $P=.07$). Sex, age, class rank, calendar year of graduation, and other factors did not predict future career.

Table 3. Mean Scores (\pm SD) on Attitudinal Inventories

Scale	General Internists (n=131)	Subspecialists (n=68)	P Value
Authoritarianism	20.8 \pm 7.5	22.9 \pm 7.7	.06
Machiavellianism	12.4 \pm 4.5	13.6 \pm 5.2	.09
Reliance on high technology	17.6 \pm 6.0	18.1 \pm 7.2	.66
Negative orientation to patients with psychological problems	31.0 \pm 9.4	34.1 \pm 12.0	.07
Intolerance of ambiguity	29.7 \pm 8.2	30.9 \pm 9.9	.41

Table 4. Adjusted Relative Risks for a Career Decision of General Internal Medicine

Variable	Relative Risk (95% CI)	P Value
Medical school (U.S.)	3.02 (1.00 to 9.10)	.05
Sex (female)	1.75 (0.90 to 3.39)	.10
Loan debt (per level)	1.27 (1.00 to 1.62)	.05
Perception of lower income (per level)	1.65 (1.06 to 2.56)	.03
Negative orientation to patients with psychological problems (per scale point)	0.97 (0.94 to 1.00)	.07

Variables not entering the regression ($P > .10$): age at medical school graduation, calendar year of medical school graduation, class rank, timing of decision to become doctor, score on Authoritarianism scale, and score on Machiavellianism scale.
CI, confidence interval.

DISCUSSION

In contrast to a substantial literature regarding residency selection by medical students,⁶ little is known about factors that predict the career paths of internal medicine residents. Most research to date has surveyed residents during their final training year,¹⁴⁻¹⁷ rather than determining actual careers following residency. A recent retrospective cohort study, based on the tracking program of the American Board of Internal Medicine (ABIM), identified several demographic factors that distinguish future General Internists from medicine subspecialists.¹⁸ We believe ours is the first prospective cohort study to relate detailed baseline data to actual clinical practice 4 or more years following residency.

The factor most strongly associated with a career in an internal medicine subspecialty was graduation from an international medical school. Only a third of IMGs became General Internists, in contrast to more than 70% of American graduates. In the adjusted analysis, U.S. graduates were 3 times more likely to practice general internal medicine. This confirms the findings of Nelson et al.,¹⁵ who reported an adjusted OR of 2.71, and Grosso et al.,¹⁸ who found that IMGs consistently entered subspecialty training at a higher rate than U.S. graduates between 1992 and 1998. In a survey of residency program directors, Andersen et al.¹⁹ found that programs having higher percentages of IMGs sent fewer graduates into general internal medicine. In contrast, a recent survey of medicine residents found that IMGs were only slightly more likely to choose subspecialty training.¹⁷ While our data do not shed light on the reasons IMGs subspecialize, we speculate that such decisions may be related to cultural expectations, a desire to prolong medical training in the United States, or the fact that the home countries of many IMGs lack General Internist models. Our findings are of particular interest because there are more IMGs enrolled in internal medicine residency programs now than there were during the time period of our study.

We hypothesized that sociodemographic factors found to predict primary care careers in medical students would act similarly in medicine residents. Indeed, we found that residency graduates now practicing general medicine were, on average, 1 year older than their peers who entered subspecialty practice, although this difference failed to reach statistical significance. Others similarly have reported generalists to be

slightly older during residency than subspecialists,^{14,16,18} with 1 report to the contrary.¹⁵ As hypothesized, we also found that a slightly higher proportion of women became General Internists, although the difference was not significant. Most surveys have found that men more often enter subspecialty fellowships,¹⁶⁻¹⁸ although research based on mail questionnaires has not confirmed this.¹⁴⁻¹⁵ Marital status was not a predictor in our cohort or in the early study of Weil et al.¹⁴; another found unmarried residents more likely to plan a career in general medicine.¹⁵ Like others,^{14,16} we failed to find race or ethnicity to be a factor, nor did we find college major, college or medical school category (public vs private), size of the resident's hometown, or timing of the decision to become a doctor to predict future practice.

In an unadjusted analysis, we found a significant inverse relationship between self-reported medical school class rank and a decision to enter general medicine. Similarly, Grosso et al.¹⁸ found that those entering subspecialty fellowships had higher scores on the ABIM certifying examination, although Valente et al.¹⁶ found no relationship with scores on the Medical College Admission Test. In the adjusted analysis, we found no relation of class rank to career choice. A relationship of final practice with calendar year of medical school graduation, using 1993 as the cut point, was no longer significant in the logistic model. We suspect the univariate result was confounded by more IMGs having graduated from medical school several years before moving to the United States to begin residency.

Many presume that the prospect of lower practice income inhibits medical students from choosing a career in primary care,²⁰ although research findings on this issue have been mixed.⁶ Perhaps unexpectedly, we found that residents who perceived General Internists to have lower incomes than subspecialists were more likely to enter general medicine practice than those who perceived no income inequities, a finding that remained statistically significant in the adjusted analysis. Similarly, we found that high loan debt during residency did not adversely influence the choice of general medicine. In fact, higher total debt was positively related to a decision for general medicine, although it failed to reach statistical significance in the logistic model. These findings should be interpreted cautiously given the possibility of collinearity or confounding. Previous studies have found no consistent relation of educational debt levels to career choice by medical students.²¹ Research in medicine residents has generally shown no relation of indebtedness to career selection,^{15,16} although Weil et al.¹⁴ also found higher debt burden to be associated with a choice for general medicine. Residents with substantial debts may feel pressure to enter practice immediately following residency to facilitate loan repayment, rather than continuing to receive low compensation during fellowship.

Personality factors have long been thought to influence the career decisions of medical students.⁶ Short instruments measuring authoritarianism, Machiavellianism, reliance on high technology, negative orientation to patients with psychological problems, and intolerance of ambiguity have successfully discriminated senior students selecting primary care residencies from students matching to other disciplines, including surgery and its subspecialties.⁷⁻¹² As hypothesized, we found residents who became generalists had lower mean scores on all 5 inventories; for 3, the difference was of borderline statistical significance. In the adjusted model, scores on the scale measuring discomfort with patients

suffering psychological problems had a borderline association with career choice, suggesting that residents who are less comfortable caring for such patients are more likely to subspecialize. Given that our findings regarding the 5 personality measures were uniformly in the direction hypothesized, we believe it likely that these personality attributes are more characteristic of future subspecialists than generalists. Nevertheless, our findings require confirmation by others using alternate measures of personality.

Our methods have several strengths. Detailed baseline data were gathered prospectively. The rate of subject participation was high, and follow-up was virtually complete. Rather than measuring career intentions, we determined actual career practice at least 4 years following residency. Our statistical analysis adjusted for potential confounding variables. Nevertheless, our methods have important limitations. The study was performed at 2 residencies in the southwestern U.S. that served as the sole internal medicine programs for their public medical schools. These residencies encompassed less than 1% of residents training during the period of the research. Their proportion of IMG residents was below the average for U.S. internal medicine programs, and their relatively large proportion of IMGs from Latin America was not typical of residencies in other areas of the country. Hence, our findings are not necessarily generalizable to the broader universe of American residency programs. In addition, the relatively small number of subjects compromised the study's statistical power, which may account for findings of borderline statistical significance.

Although the majority of U.S. internal medicine residents entered general medicine during the time period of our research,¹⁸ recent data indicate that almost two-thirds now pursue subspecialty training.^{17,22} Accurate prediction of physician supply and demand is notoriously difficult,²³ but this trend, if sustained, may lead to important declines in the number of practicing General Internists and exacerbate shortfalls that already exist in some areas.⁵ In response, residency programs may choose to adopt measures that will enhance the proportion of their trainees who enter practice as generalists. Our findings indicate that recruitment of IMGs is unlikely to solve manpower shortages in general internal medicine. Perhaps surprisingly, large loan debt and perceptions of lower future income do not discourage residents from entering practice as General Internists. Finally, certain attitudes and aspects of personality may be linked to decisions to pursue a subspecialty. If increasing future generalist manpower is an explicit goal, program directors should consider weighing personal attributes during the resident selection process.

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