A Multivariate Model for Specialty Preference by Medical Students

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Background. Numerous studies have demonstrated differences among students regarding their preference of a medical specialty. The goal of the present research was to develop a model for the selection of a primary care specialty (ie, family practice, general internal medicine, medicine/pediatrics, and general pediatrics).

Methods. A self-administered questionnaire was mailed to 822 first-year through fourth-year medical students at the University of Michigan Medical School in Ann Arbor. Students listed their first preference for medical specialty, anticipated income and work hours, and the influence of attitudinal and social factors on their preference. A total of 645 (78.5%) students responded. Average age was 25; 58% were male, and 77% resided in Michigan.

Results. Overall, 34.3% of the medical students who responded to the questionnaire expressed a preference for a surgical specialty; 27.3%, primary care; 19.9%, a hospital-based practice; and 18.5%, nonprimary care and non-hospital based practice. A multiple logistic regression model developed on preference for a primary care specialty achieved a classification accuracy of 82%. The most important factors influencing specialty preference were sex, expected income, attitudes about general medicine issues, attitudes about surgery, and the influence of other people.

Conclusions. No single factor dominates a student's preference for primary care. Students preferring primary care were most strongly influenced by their perceptions of practice variations. Students preferring nonprimary care specialties were more interested in income, prestige, and hospital-based practice. Medical school faculty had no significant impact on the preferences of either group of students.

Key words. Primary health care; medical specialties; logistic models; career choice. (*J Fam Pract 1994; 39:570-576*)

In the current climate of change for the United States health care system, a great deal of emphasis has been placed on access to care, cost of care, and distribution of providers. A common theme in the discussion of these issues is the need to increase the number of primary care physicians.[1] Possible strategies to produce more primary care physicians include retraining specialists, increasing the number of medical students entering primary care residencies, and increasing the number of alternative primary care providers, such as physician assistants and nurse practitioners. Retraining specialists and increasing the number of medical students entering primary care residencies would require a greater understanding of how medical students choose among specialties. Without adequate knowledge about this process, it is unlikely that current efforts to increase the number of primary care physicians would be successful.

There are numerous articles in the medical literature concerning factors that influence choice of medical specialty.[2] The majority of these articles examine how income and debt,[3–7] demographics, and attitudes[8–12] influence specialty choice. Other studies have evaluated the effect of undergraduate experience,[13,14] personality profiles,[15,16] tolerance for ambiguity,[17,18] the influence of other people,[19] and academic performance[20,21] on the specialty decision. A consistent finding in many studies is that psy-

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chosocial and continuity-of-care issues influence the choice of a primary care specialty, and that income and prestige influence the choice of a nonprimary care specialty.[22,23] Much of the research to date has focused on the effect of single factors. This type of analysis does not accurately reflect the interaction of multiple influences on medical students' specialty selection decisions.

Variables that affect medical students' specialty selection decisions can be categorized in two ways: (1) medical student characteristics, expectations, and attitudes; and (2) social influences affecting the medical student. The majority of research has focused on the first category, while few have addressed social influences. These include the effect of others (eg, parent and other family members, spouses, friends, patients, residents, faculty, nurses, and physicians), the medical school environment, perceived and actual demands from society, characteristics of the current health care system, and expectations for the future.

It is unclear why students make certain career choices and how society can encourage a change in this decision-making process. Some authors have attempted to address the decision-making process by using techniques that include multiple factors. Funkenstein's[24] longitudinal, prospective study of medical student specialty choice represents the most extensive evaluation considering multiple factors and introduces a theoretical model for this career decision. He found that career choices seem to be related more to general social atmosphere at the time the choice is made than to any other effects of undergraduate or medical school education. In the early 1970s, students with a biosocial orientation as opposed to a bioscientific orientation were more likely to enter primary care. These same students were more influenced by external factors, such as societal emphasis on primary care specialty, than by the medical school curriculum or faculty.

There is a clear need to build upon the decision-making theoretical framework as developed by Funkenstein[24] to understand the impact and interactions of the various factors affecting career choice decisions by medical students. Three articles have used a theoretical framework to explore this decision-making process.[25–27] Nieman and colleagues[25] used the theories of Janis and Mann,[28] which describe optimal decision-making as a rational process involving the investigation of a variety of information sources and individual opinions. A study conducted by Janis and Mann,[28] who theorized that decision-makers pass through five stages of decision-making, focused on first-year medical students preferring family practice. These students were at an early stage of career decision-making[25] that primarily involves considering the range of alternatives rather than carefully evaluating the advantages of each. Students choosing family practice were found to have lower self-approval and personal involvement scores than those who preferred other specialties.[25] In concordance with Funkenstein's findings,[24] these students attributed more importance to being socially appealing than to satisfying their own egos.

Montano and colleagues[26] used the theory of reasoned action[29] as a framework to measure medical students' attitudes toward a career in family medicine. The theory of reasoned action allows one to determine the interrelationship of beliefs, attitudes, and behaviors, and specifies that the single best predictor of behavior is the behavioral intention on which it is based.[29] Behavioral intention is a function of two factors: (1) the person's attitude toward the behavior; and (2) the person's subjective norm with respect to the behavior. The person's attitude about a behavior is composed of the salient beliefs concerning performance of that behavior, including the *likelihood* that the behavior will produce certain outcomes, and the evaluation or *importance* of the outcomes. The subjective norm is composed of the person's perception that certain people approve or disapprove of the behavior, and the person's motivation to comply with the perceived preferences of these significant others. Montano and colleagues[26] developed two reliable scales for student attitudes and social supports. Only the attitude scale was successful in discriminating between choices of family medicine and other clinical careers. The authors, however, did not take the model to completion in terms of combining the outcome likelihood and importance scales and did not examine the impact of those scores on specialty preference. Thus, the results did not build on the theoretical framework of reasoned action.

Chandarana and colleagues[27] used the theory of reasoned action to assess first-year medical students' intention to specialize in psychiatry. A univariate analysis found that sociodemographic and personality variables were significantly related to the intention to enter psychiatry. However, it was the students' attitudes toward psychiatry and their social influence factors that revealed the relation between these variables and the intention to specialize in psychiatry. Chandarana's study demonstrates the need to carry out the theoretical model to completion in the analysis of data related to medical specialty choices.

The present research employed the theory of reasoned action to examine the impact of multiple factors on medical student specialty preference. We used the theoretical framework of reasoned action (Figure) to provide insight into how demographics, attitudes, social influence, and anticipated income and debt influence student preference for primary care over nonprimary care specialties.

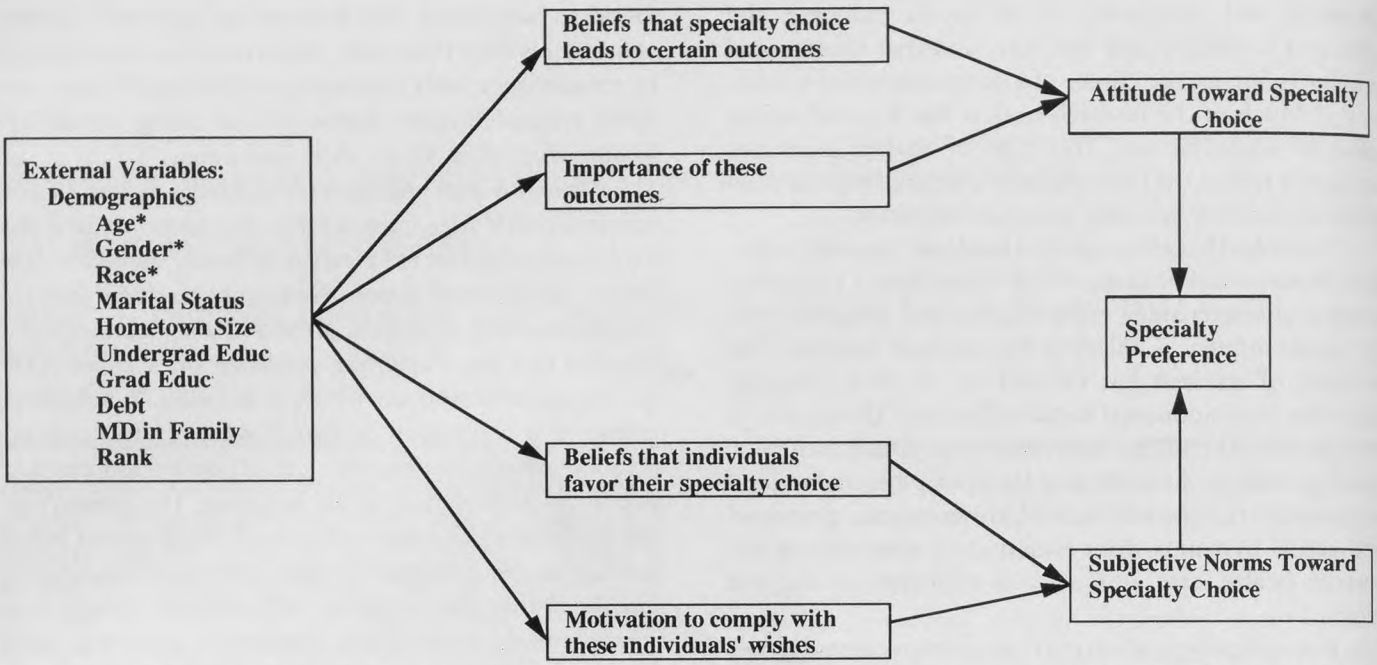

Figure. Proposed model of medical student specialty choice based on the theory of reasoned action (Ajzen I, Fishbein M. Understanding attitudes and predicting social behavior. Englewoods Cliffs, NJ: Prentice-Hall, 1980). Data designated by * were gathered from the dean's office records at the University of Michigan Medical School in Ann Arbor. All other data were obtained by means of questionnaire completed by the students.

Methods

Sample

The sample was obtained from a mailing list of 822 medical students at the University of Michigan. Distribution by class was 196 first-year, 222 second-year, 209 third-year, and 195 fourth-year students.

Questionnaire

Initially, each questionnaire asked students to rate the degree to which they are considering a career in each of 24 specialties. These ratings were made on a 7-point scale ranging from "never even consider this specialty" (1) to "very strongly considering this specialty" (7). Students were then asked to list the specialty they would most prefer at the present time as a career choice, followed by their second choice of specialty.

Following the methods of Azjen and Fishbein,[29] a list of 25 potential outcomes of choosing a career in medicine was generated. Students were asked to rate the likelihood that their first specialty preference would produce each respective outcome. These likelihood ratings were made on a 7-point scale ranging from "very unlikely" (1) to "very likely" (7). Students were then asked to rate the personal importance of each outcome on a 7-point scale ranging from "very unimportant" (1) to "very important" (7).

To measure the influence of significant others (subjective norm), a list of 14 sources of influence was generated. Using a method similar to that for rating outcome, students were asked to rate on a 7-point scale the likelihood that the most influential individual within each group would favor the students' first specialty preference and to rate their intention to comply with the wishes of that individual.

Next, students estimated the average yearly income and weekly work hours for a typical physician practicing in their specialty preference, followed by estimates of their own income and hours, given the same level of experience as the person in the previous ratings. They also reported the school-related and miscellaneous debts they expected to have after medical school, whether any family members were physicians, their perceived medical school class rank, marital status, undergraduate institution and major, and size of the city or town where they grew up.

The questionnaire was piloted on 20 residents, interns, and medical students to evaluate format, phrasing, and clarity of the questions and rating scales.

Procedure

The survey was conducted from January through March of 1993. Questionnaires were mailed with a stamped return envelope, followed by a reminder postcard 10 days later. At 21 days from first mailing, a second mailing was

Table 1. Medical Students' First Preference of Specialty, By Year in School (N=645)

Year in Medical School	Specialty Type			
	Primary Care, %	Surgical, %	Nonprimary Care, Nonsurgical,* %	Hospital-Based,† %
First	23.8	40.8	19.7	15.6
Second	29.7	32.6	24.3	14.4
Third	33.5	33.5	10.8	22.2
Fourth	22.4	30.9	18.4	28.3
Total	27.3	34.3	18.5	19.9

NOTE: *Some percentages do not add to 100 because of rounding.*
**For example, neurology, dermatology.*
†*For example, anesthesiology, emergency medicare, pathology.*

made to all nonrespondents, followed by a final postcard reminder 10 days later. As an incentive, students were informed in each mailing that those who returned the questionnaire would be entered into a drawing for prizes (restaurant and pizza certificates).

Analysis

Initially, frequencies were calculated on all variables, and differences between responders and nonresponders were determined on demographic variables. Four categories of specialty preference were then created, based on responses to the forced-choice item: (1) primary care (family practice, general internal medicine, medicine/pediatrics, general pediatrics); (2) surgical (neurosurgery, obstetrics and gynecology, ophthalmology, orthopedic surgery, otolaryngology, urology, general and subspecialty surgery); (3) nonprimary care nonsurgical (dermatology, internal medicine subspecialty, neurology, pediatrics subspecialty, physical medicine and rehabilitation, preventive and public health, psychiatry, research); (4) hospital-based (anesthesiology, emergency medicine, pathology, radiology, radiation oncology). Student preferences among the four specialty groups were compared with year in school using a chi-square test. Principal component factor analysis was then performed on the outcome and social influence scales, respectively. Using the Carnegie Foundation's classification of colleges and universities,[30] undergraduate institution was classified into one of five categories: (1) research universities, (2) doctorate-granting universities, (3) comprehensive colleges and universities, (4) liberal arts colleges, and (5) 2-year colleges, institutes, and professional schools. Undergraduate major was collapsed into two categories: premedical studies (eg, biology, chemistry, pharmacy, biomedical science, anthropology, zoology, physiology, kinesiology, nursing, health policy, physical education, premedical) and nonpremedical studies (eg, psychology, sociology, engineering, physics, English, math, education, history, political science, economics, art, business, general studies, computer science).

Using *t* tests and chi-square as appropriate, comparisons between students preferring a primary care vs nonprimary care specialty were performed on all scales, demographic variables, institution, premedical major, and estimates of income, work hours, and class rank. A multiple logistic regression model was developed for primary care preference.

Results

Sample

The overall response rate was 78.5% (n=645), with no significant difference in response rate among the four classes. The average age of respondents was 25; 58% were male, and 77% lived in Michigan. The sample consisted of 63% white, 19% Asian, 7% black, 6% Hispanic, and 5% other or not specified. The only significant demographic difference between responders and nonresponders was race, primarily because the response rate among black students was 52%, compared with an 83% response rate from whites, 80% from Asians, 79% from Hispanics, and 67% from other and not specified.

Specialty Preference

Specialty preferences by year in school are shown in Table 1. A chi-square test revealed a significant relationship, $\chi^2(9)=25.35$, $P<.01$. Between third-year and fourth-year students, primary care interest was lower for the fourth-year students, while choice of the nonprimary care and nonsurgical and hospital-based specialties was higher.

Scales

Principal component factor analysis was performed on the product scores from the 25 outcomes and the 14 social influence items, respectively (ie, the score is obtained by multiplying likelihood by importance for the outcome section and by multiplying likelihood of approval by motivation to comply for the social influence section).

OUTCOMES. Factor analysis on the 25 outcomes revealed three orthogonal, psychologically meaningful factors. The first factor (General) consists of nine items centered on general care. Items loading on the General scale were: providing health care to children, women, and elderly; delivering babies; providing preventive health care; practicing in a rural community; dealing with patients' psychosocial problems; and providing health care

to the underserved. Minimal direct patient contact loaded in a negative direction.

The second factor (Surgical) is made up of 10 items, involving tertiary care and surgical issues. Items loading on the Surgical scale were hospital-based practice, operating on patients, concerns about malpractice, providing acute and emergency health care, dealing with a narrow range of patient problems, repaying medical school debt within 10 years, generating an income that will provide an enjoyable lifestyle, being a member of a prestigious specialty, utilizing state-of-the-art technology, and having more income relative to physicians in other medical fields.

The third factor (Lifestyle) is composed of five items which involve lifestyle issues. Items loading on the Lifestyle scale are: regular work hours, a relatively short residency, minimal exposure to HIV, working with basically healthy patients, and providing time for family or other personal interests. All three scales were normally distributed, with satisfactory[31] measures of internal consistency (α=.72, .71, and .69, for General, Surgery, and Lifestyle, respectively). One item, "Emphasize pathophysiology of disease," was excluded from further analysis because it did not correlate with any of the factors.

SOCIAL INFLUENCE. Factor analysis on the 14 social influence items revealed four factors. The first factor (Various) is composed of six items which involve various influential people. The items on the Various scale are: undergraduate school faculty, physicians not at the University of Michigan, patients, friends in medical school, friends not in medical school, and nurses. The second factor (Family) consists of four family influence items: spouse or significant other, parents, siblings, and other family members. The third factor (In-specialty) has two items which center on influences from within the students' specialty choice: medical school faculty in my specialty, and residents in my chosen specialty. The fourth factor (Out-specialty) is composed of two items involving influence from outside the students' specialty: medical school faculty not in my chosen specialty, and residents not in my chosen specialty. The measures of internal consistency for the Various, Family, In-specialty, and Out-specialty scales were .82, .68, .82, and .77, respectively.

Primary Care vs Nonprimary Care

Compared with students who expressed a preference for nonprimary care specialties, students who preferred a primary care specialty estimated for themselves a significantly lower annual income, fewer work hours, and a lower class rank (Table 2). Female and white students were more likely to prefer a primary care specialty.

The presence of a physician in the immediate family was associated with a significantly higher preference for nonprimary care specialties. Thirty percent of white students preferred primary care, as compared with 24% of Asians, 17% of blacks, 25% of Hispanics, and 17% of other or not specified. As one might expect, students preferring a primary care specialty had more favorable attitudes on the General and Lifestyle scales, and a lower score on the Surgery scale. Primary care students also listed a significantly higher influence from Various, Family, and In-specialty sources. Hometown size also had a significant effect ($P<.001$). Forty-six percent of students from communities with a population <10,000 expressed a preference for primary care, whereas 85% of those from areas with a population >250,000 expressed a preference for nonprimary care specialties. Eighty percent of the students came from a research university. There was no significant effect for type of undergraduate institution.

Table 2. A Comparison of Medical School Students Who Prefer Primary Care Specialties With Those Who Prefer Nonprimary Care Specialties

Variables	Prefer Primary Care	Prefer Nonprimary Care	*P* Value
Other's income, $	91,751	153,430	<.001
My income, $	89,266	153,634	<.001
Other's weekly hours	60	62	NS
My weekly hours	57	62	<.001
School-related debt, $	45,650	48,030	NS
Physician in family, %	22	33	.008
High class rank, %	66	70	.025
Female, %	52	39	.003
Nonwhite, %	29	39	.018
Premedical major, %	80	76	NS
General*	31	23	<.001
Surgery*	16	23	<.001
Lifestyle*	23	21	.004
Various*	15	12	<.001
Family*	20	16	<.001
In-specialty*	19	16	.024
Out-specialty*	9	9	NS

**Numbers are means on a 1 to 49 scale, with larger numbers reflecting a more favorable rating.*

To determine the combined effects of the demographics and the variables in the questionnaire, a multiple logistic regression model was developed for primary care preference (using a backward stepwise method). The final logistic model is shown in Table 3. It appears that attitudes toward general care and the influence from various others had a positive impact on preference for primary care, while being male, having greater income expectations, and having positive attitudes toward surgical practice influenced a nonprimary care specialty preference.

Discussion

The results of the present research indicate that specialty preference by medical students is a complex decision pro-

Table 3. Logistic Regression Model for Primary Care Specialty Preference

Variable	OR	95% CI	*P* Value
Sex	.39	.229–.695	.001
My income	.99	.99–.99	<.001
General	1.09	1.06–1.13	<.001
Surgery	.85	.812–.902	<.001
Various	1.05	1.02–1.08	.001
Constant	—	—	<.001

Overall correct classification= 82%; sensitivity= 63%; specificity= 90%; positive predictive value= 70%, negative predictive value= 86%.
OR denotes odds ratio; 95% CI, 95% confidence interval.

cess affected by a combination of demographic, attitudinal, social influence, and income expectation variables. Students preferring a primary care specialty tended to be female; to have lower income expectations, more positive attitudes toward general practice issues, and negative attitudes toward surgical practice issues; and to be positively influenced by a variety of other people. Clearly, to examine specialty preference using only one or two factors, as has been done in the past, is far too simplistic and unrealistic.

While previous research has evaluated the impact of many of our 25 outcome ratings on specialty preference as a single significant factor, our results demonstrate that this pool of items reflected three core issues. The resulting attitude scales appear to be useful measures for assessing student attitudes toward practice and lifestyle issues surrounding their specialty preference. As reflected in higher scores on the general practice attitude scale, students preferring a primary care specialty are more interested in caring for a diverse patient population (women, men, children, the elderly, and the underserved); dealing with diverse medical problems, healthy patients, and prevention; working in diverse settings of practice (rural), and having direct contact with patients. As reflected by lower scores on the surgery attitude scale, this group is also less concerned about hospital-based medicine, malpractice, surgery, income, and prestige. This is in contrast to students preferring nonprimary care specialties who place greater importance on these latter variables (eg, having greater income relative to other medical fields, having an income that will provide an enjoyable lifestyle, dealing with a narrow range of patient problems, being a member of a prestigious specialty, being concerned about malpractice).

Similar to the outcome ratings, the list of 14 social influences centered on four issues: influences from family, other people, and faculty and residents both within and outside the students' preferred specialty. Scores on the Various scale relate to preference for a primary care specialty and reflect the impact of friends (in and not in medical school) and physicians not at the University of Michigan. Other influences, such as medical school faculty, residents, parents, and spouse or significant other, were not related to specialty preference. While confirming Funkenstein's study, this is in direct contrast to the belief of many medical school faculty and the findings of other studies.[13–15,20,21,23]

Consistent with previous research, income was a significant predictor of specialty preference. Although income was included in the model, it was not the largest contributor. While some authors suggest that the issue of monetary rewards must be addressed if primary care fields are to become more attractive to students,[22] our results suggest that students possess a realistic expectation of the income resulting from their preference, and that specialty preference is more strongly influenced by their perceptions of practice differences, desires for different lifestyles, and influence from significant others.

Given the many factors included in our results, it appears that individual differences exist between students preferring a primary care vs a nonprimary care specialty. Based on the results of the logistic regression, it appears that attitudes toward general practice issues and the influence of various other people have the most impact on a student's preference for a primary care specialty. Sex and attitudes toward surgery were the strongest negative predictors, with male students having a lower relative odds of preferring primary care. Little can be done to change these variables once a student is in medical school, but these issues can be factored into the medical student selection process. In evaluating medical school applicants, an admissions committee could examine the outside influences (eg, sources of reference letters) and interests in generalist issues. Income issues seem to be the only variable that can be altered to affect preference once a student is in medical school.[32]

The present research has several limitations that deserve consideration. First, this study was conducted at an institution whose historical mission has not included the production of primary care physicians.[33] Given that 80% of the students were from undergraduate institutions classified as "research" universities, the generalizability of our results may be limited. Second, although there was a significant univariate effect of race on primary care preference, the distinction of white vs nonwhite is limited, especially when one considers that the proportions of black and Hispanic students in our sample were nearly equal. It is likely that cultural differences, which were not measured in the present research, would account for variability in specialty preference. Further, the sensitivity of the logistic regression model suggests that other variables that were not measured in this study may contribute to the preference of a primary care specialty. Higher sensitivity may be achieved by testing the logistic model at a medical school with a higher proportion of students preferring a primary

care specialty. Finally, the use of match data would be more accurate for model development than a listing of first choice. It would be useful to examine how the relationship between first preference and actual match changes across the 4 years of medical school. Although the present study is continuing, it will be 3 years before this comparison can be made.

The results of this research reinforce the utility of using a theoretical framework that incorporates numerous factors for examining career decisions. It seems likely that such models could be advanced by a more detailed understanding of the relative importance of the different predictors, as well as how the attitudinal and social influence factors develop and change across the 4 years of medical school. Given the current potential change in the social influence on primary care specialties, a longitudinal study of the impact of these variables would provide new insights and an opportunity to reexamine Funkenstein's[24] observations. If social influence is a signal contributor to specialty choice, then society must determine how to balance this influence over time and to avoid major fluctuations that appear to create periods of need.

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