

Factors Associated With Medical Students' Career Choices Regarding Internal Medicine

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THE AGING OF THE BABY BOOM generation in the United States portends a shortfall in clinicians to care for the increasing numbers of older patients seeking care. Older patients frequently have chronic health conditions requiring skilled clinicians to coordinate complex management.¹ The number of older adults in the United States is expected to nearly double between the years 2005 and 2030,¹ and one planning model predicts that the United States will have 200 000 too few physicians by 2020.² However, the primary care workforce, including general internal medicine (IM), family medicine, and general pediatrics, is currently facing critical challenges related to reimbursement, physician satisfaction, and patient access.³ Although a strong primary care infrastructure is a common denominator of high-functioning health systems in developed countries, the US health care

See also pp 1131, 1174 and 1205.

Context Shortfalls in the US physician workforce are anticipated as the population ages and medical students' interest in careers in internal medicine (IM) has declined (particularly general IM, the primary specialty serving older adults). The factors influencing current students' career choices regarding IM are unclear.

Objectives To describe medical students' career decision making regarding IM and to identify modifiable factors related to this decision making.

Design, Setting, and Participants Web-based cross-sectional survey of 1177 fourth-year medical students (82% response rate) at 11 US medical schools in spring 2007.

Main Outcome Measures Demographics, debt, educational experiences, and number who chose or considered IM careers were measured. Factor analysis was performed to assess influences on career chosen. Logistic regression analysis was conducted to assess independent association of variables with IM career choice.

Results Of 1177 respondents, 274 (23.2%) planned careers in IM, including 24 (2.0%) in general IM. Only 228 (19.4%) responded that their core IM clerkship made a career in general IM seem more attractive, whereas 574 (48.8%) responded that it made a career in subspecialty IM more attractive. Three factors influenced career choice regarding IM: educational experiences in IM, the nature of patient care in IM, and lifestyle. Students were more likely to pursue careers in IM if they were male (odds ratio [OR] 1.75; 95% confidence interval [CI], 1.20-2.56), were attending a private school (OR, 1.88; 95% CI, 1.26-2.83), were favorably impressed with their educational experience in IM (OR, 4.57; 95% CI, 3.01-6.93), reported favorable feelings about caring for IM patients (OR, 8.72; 95% CI, 6.03-12.62), or reported a favorable impression of internists' lifestyle (OR, 2.00; 95% CI, 1.39-2.87).

Conclusions Medical students valued the teaching during IM clerkships but expressed serious reservations about IM as a career. Students who reported more favorable impressions of the patients cared for by internists, the IM practice environment, and internists' lifestyle were more likely to pursue a career in IM.

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system achieves worse quality and efficiency of care with lower patient satisfaction than other industrialized countries.⁴ Even at the medical school level, students' attitudes toward primary care and chronically ill patients become more negative during training, and these attitudes can influence students' choice of medical specialty.^{5,6}

Internists in primary care and subspecialty practice provide a large portion of the chronic care for older and medically complex patients. However, National Resident Matching Pro-

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gram (NRMP) data show that the number of US medical students matching into IM residency positions has declined from 3884 in 1985 to 2660 in 2008.⁷ The number of students choosing residency training in general IM has declined even more precipitously, from 575 in 1999 to 264 in 2008. Furthermore, young physicians are leaving general IM, suggesting that projected shortfalls may greatly underestimate the future problem.^{8,9}

Current students' perceptions about IM careers, and the factors that motivate them to choose the field, are not clear. In the 1980s and 1990s, studies examined students' career decision making regarding general IM, family medicine, and pediatrics. Working with a generalist faculty teacher was associated with choosing a primary care career in some¹⁰⁻¹² but not all^{13,14} studies. Structural changes to the curriculum to facilitate more primary care experiences promoted student interest in primary care,^{15,16} but income, debt, and work hours dissuaded students from this path.¹⁷ In a large survey of medical students conducted in 1990, the time and workload demands of IM, perceived physician satisfaction in the field, and types of patients seen were important deterrents from IM.¹⁸ More recent changes to the training and practice environment also influence career choice: duty hours limitations designed in part to improve the work satisfaction of house officers who supervise students,¹⁹ shorter length of stay for hospitalized patients, the emergence of hospitalist careers that allow for shift work,²⁰ and skyrocketing student debt.²¹

Students increasingly prioritize lifestyle issues when choosing careers. Dorsey et al²² found that controllable lifestyle accounted for more than 55% of the variance in students' specialty choices from 1996 through 2002. In that study, IM was classified as a specialty with uncontrollable lifestyle due to physicians' lack of control over work hours and patient care duties. Residents, who also prioritize lifestyle in their career planning, were willing to

trade income for lifestyle benefits of more vacation time and a more predictable weekly schedule.²³

Many of the factors that may affect students' perceptions of IM and influence their decisions have changed in complex ways since the earlier studies. We designed this study to inform educators, practitioners, and those with a policy interest in the physician workforce. We sought to understand current students' impressions and concerns about careers in IM and to identify potentially modifiable factors in their decision making in a national sample.

METHODS

The Clerkship Directors in Internal Medicine (CDIM) Task Force on Enhancing Student Interest in IM Careers conducted a cross-sectional study of fourth-year medical students in spring 2007 at 11 US medical schools (George Washington University, Washington, DC; New York University, New York; Uniformed Services University of the Health Sciences, Bethesda, Maryland; University of California, San Francisco; University of Chicago, Chicago, Illinois; University of Florida, Gainesville; University of Pittsburgh, Pittsburgh, Pennsylvania; University of Utah, Salt Lake City; Warren Alpert Medical School of Brown University, Providence, Rhode Island; Washington University in St Louis, St Louis, Missouri; and Yale University, New Haven, Connecticut). Five of 11 schools were selected because task force members from those schools agreed to participate in the survey; the other 6 schools were invited to achieve a range of regions, public/private status, research funding, and percentage of students matching in IM. No invited schools declined to participate, although 1 task force member withdrew before survey development was completed. At each participating school, the site investigator participated in the study as a coauthor. The survey was distributed after students submitted their residency match lists but before match day to confirm that students had finalized a specialty choice and minimize

bias based on students' satisfaction with their match results.

Through a series of conference calls and in-person meetings, 7 members of the CDIM Task Force representing 7 different institutions developed and revised the survey items. Items on perceptions of IM and factors influencing career choice were identified from a comprehensive literature review and a 1990 survey of medical students.¹⁸ Researchers conducted 7 focus groups at 7 participating schools with 43 students to elicit current issues influencing their career choices. The CDIM Task Force revised the survey items after reviewing transcripts from student focus groups. Prior to distribution, the final survey was pilot-tested for clarity and completeness by CDIM Task Force members.

The survey (eAppendix, available at <http://www.jama.com>) included 24 questions about demographics, debt, experiences on the core IM clerkship and subinternship (type of hospital, presence of inpatient/outpatient experience, grades), IM interest group participation, and specialties chosen or considered. Demographic questions included race and ethnicity because studies have suggested an association between these characteristics and career decision making^{21,24}; students self-reported this information using options defined by the investigators on the survey. Twenty-four questions addressed students' perceptions of IM compared with other specialties they had chosen or considered (1=this issue is much less in IM than other specialties, 2=somewhat less in IM, 3=same, 4=somewhat more in IM, 5=much more in IM, 6=don't know/no opinion). Thirty-two questions asked students to rate items that influenced their career decisions regarding IM (1=very much pushed me away from IM, 2=somewhat pushed me away, 3=no influence, 4=somewhat attracted me toward, 5=very much attracted me toward IM). The primary outcome was student career choice, selected from a list of 46 specialties as defined by the NRMP.

The survey was distributed through an online survey software system. Each site investigator obtained students' email addresses from the school's Office of Curricular/Student Affairs. Students were invited to participate via email. Nonresponders were sent up to 5 follow-up emails. Participants received a \$15 online gift certificate as an incentive. Because of Department of Defense policy, Uniformed Services University did not offer incentives. A cover information sheet served as waiver of documentation of informed consent. Each participating school's institutional review board approved the study.

Data Analysis

Descriptive statistics were calculated for all participants; continuously scaled variables were normally distributed. Internal medicine career choice was defined as IM, general IM, or any combination of IM and another specialty recognized as IM by the American Board of Internal Medicine (IM with dermatology, emergency medicine, family medicine, medical genetics, neurology, pediatrics, or psychiatry). Results were similar when we excluded the 27 students choosing combined IM specialties, and we thus report analyses with the broader definition. Students choosing other specialties were grouped into 4 specialty groups: family medicine, pediatrics, surgical (general surgery, neurosurgery, obstetrics/gynecology, ophthalmology, orthopedics, otolaryngology, plastic surgery, urology), and other. χ^2 Analyses were used to compare the specialties across demographic characteristics.

Factor Analysis

We conducted principal components analysis with varimax rotation to determine the underlying latent clusters within the 24 items about perceptions of IM and within the 32 items about influences on career choice. Factors were retained based on Eigenvalues greater than 1. Items were assigned to factors based on their largest loading; simple structure was obtained using factor

loadings greater than 0.35 for this assignment. Four of us (K.E.H., S.J.D., P.S.O., M.D.S.) reviewed the factors derived for interpretability and labeled the underlying constructs. We calculated the Cronbach α coefficient for each factor to determine its scale reliability and determined a mean score for each factor. To aid interpretation, perceptions and influences factor scores were dichotomized at the midpoint on a 5-point scale (below 3.0 vs 3.0 or greater) and reported as proportions as well as means.

We calculated the effect sizes for perceptions and influences factors to show the practical significance of the magnitude of differences in means between students choosing IM and those not choosing IM. Unlike statistical significance, which is influenced by our large sample size, effect size is independent of the sample size. We used the Cohen *d* statistic, which is the ratio of the difference between the 2 means to the pooled standard deviation.^{25,26} An effect size at or exceeding 0.8 is considered a large effect, suggesting practical importance. Among the students not choosing IM, we compared those reporting they had seriously considered IM (general IM, subspecialty IM, hospitalist medicine) with those who had not, using *t* tests for the perceptions and influences factors.

A 1-way analysis of variance was done to compare the 5 specialty groups for each of the 5 perceptions and 3 influences factors. Significant omnibus *F* tests were followed by Scheffé post hoc tests with the significance set at .05. The Scheffé tests were chosen to address the uneven number of respondents in each group. Additionally, the analysis calculated a partial η^2 , which is an effect-size estimate for analysis of variance and approximates the percentage of variance in the dependent variable accounted for by the differences in responses according to specialty groups.

Logistic Regression

We conducted a logistic regression analysis to determine the association of demographic items and the influences

variables derived from the factor analysis on IM career choice. The perceptions factors were not included in the logistic regression because these factor constructs overlapped significantly with the influences factors and because students reported their perceptions relative to other specialties they had individually considered, not relative to an absolute standard. Demographic predictors were screened first for model selection by comparing students who chose IM vs those who did not, using χ^2 tests for categorical predictors and *t* tests for continuously scaled variables. To adjust for the nested structure of the data, 2 exploratory data analyses were conducted: the generalized estimating equation technique and the logistic regression model with the site variable included.²⁷ There were no systematic differences across the 11 schools. Given the lack of variability across sites and the limitations of the small cluster size, a public/private school variable was chosen as the optimal model to control for potential school-level variability.

A first logistic regression model included the dependent variable of IM career choice and the independent demographic variables that in the literature have been associated with career choice: school type (public/private), age, sex, ethnicity (underrepresented minority or not), marital status, children, having had an ambulatory IM clinical experience, satisfaction with the core IM clerkship, attendance at an IM interest group event, additional degrees on medical school graduation, debt (dichotomized at greater than \$120 000 based on average total educational debt reported on the 2007 Association of American Medical Colleges [AAMC] Graduation Questionnaire²⁸), and receiving honors or an A grade in the core IM clerkship. In a second logistic regression model, the 3 influences factors were added to expand the ability to explain career choices. We examined the interaction effect of key variables on the dependent variable (IM career choice). Only 1 interaction term was

marginally significant, and we decided not to include it in the second model given the disproportionate distribution of the independent variable. We considered the logistic odds ratios significant at $P < .01$ to reduce the likelihood of type 1 error resulting from the numerous predictor variables considered in the logistic regression. We used SPSS statistical software version 16 (SPSS Inc, Chicago, Illinois) for all data analyses.

RESULTS

The survey response rate was 1177 of 1439 (82%) and ranged from 67% (113/169) to 91% (83/91) at each school. Characteristics of participants are shown in TABLE 1. Participants had a mean (SD) age of 27.7 (3.2) years, with 79.0% aged 24 to 29 years, and 48.4% were male. These results are comparable with all US medical students completing the AAMC Graduation Questionnaire in 2007, among whom 82.9%

were aged 24 to 29 years and 49.6% were male.²⁸

Overall, 274 students (23.2%) reported they were most likely to enter careers in IM, including 24 (2.0% of the total sample) in general IM and 27 (2.3% of the total sample) in IM combined programs, most commonly medicine-pediatrics. The next most commonly selected specialties were surgical subspecialties (orthopedics, otolaryngology, ophthalmology, plas-

Table 1. Characteristics of 1177 Fourth-Year Medical Students at 11 Medical Schools by Intended Specialty

	No. (%)					
	IM (n = 274) ^a	Family Medicine (n = 58)	Pediatrics (n = 138)	Surgical Fields (n = 294) ^b	Other Specialties (n = 413) ^c	P Value ^d
Student Characteristics						
Age, mean (SD), y	27.9 (3.6)	28.9 (3.8)	27.3 (2.4)	27.4 (2.7)	27.5 (3.3)	.01
Male	135 (49)	19 (33)	34 (25)	164 (56)	218 (53)	<.001
Underrepresented minority ^e	24 (9)	10 (18)	14 (11)	38 (14)	44 (11)	.28
Married	96 (35)	30 (52)	53 (38)	91 (31)	139 (34)	.04
MD degree is only graduate degree on graduation	217 (79)	44 (76)	110 (80)	237 (81)	347 (84)	.38
No children	246 (90)	123 (89)	45 (78)	258 (88)	356 (86)	.12
School Characteristics and Experiences						
Private school	169 (62)	18 (31)	80 (58)	165 (56)	204 (49)	<.001
Received honors, A grade, or equivalent highest grade in IM clerkship	150 (55)	15 (26)	51 (37)	147 (50)	174 (42)	<.001
Ambulatory IM part of the core IM clerkship	175 (68)	35 (70)	87 (66)	173 (63)	266 (68)	.62
Had an outpatient IM clinical clerkship or preceptorship	257 (94)	50 (86)	131 (95)	276 (94)	393 (95)	.11
Satisfied with core IM clerkship	237 (86)	47 (81)	108 (78)	225 (77)	305 (74)	.003
Attendance at 1 or more IM interest group events	125 (46)	15 (26)	40 (29)	72 (25)	118 (29)	<.001
Medical school experience provided me with enough insight into what an internist does to make an informed decision	209 (76)	40 (69)	110 (80)	231 (79)	330 (80)	.46
Debt more than \$120000	111 (41)	25 (43)	64 (46)	125 (43)	196 (47)	.42
Timing of career choice						
Prior to core clerkship year	33 (12)	34 (25)	11 (19)	65 (20)	65 (17)	<.001
During core clerkship year	129 (47)	70 (51)	21 (36)	170 (53)	167 (44)	
After core clerkship year	112 (41)	34 (25)	26 (45)	84 (26)	150 (39)	

Abbreviation: IM, internal medicine.

^aIncluded categorical or general IM or IM combined with dermatology, emergency medicine, family medicine, medical genetics, neurology, pediatrics, or psychiatry.

^bIncluded general surgery, neurosurgery, obstetrics/gynecology, ophthalmology, orthopedics, otolaryngology, plastic surgery, and urology.

^cIncluded anesthesiology, dermatology, emergency medicine, neurology, pathology, preventive medicine, physical medicine and rehabilitation, psychiatry/neurology, radiation oncology, radiology/diagnostic, and internship only (transitional, preliminary medicine, preliminary surgery).

^dRepresents statistical significance based on χ^2 test for proportional distribution.

^eSelf-identified as African American or Native American race or Hispanic/Latino ethnicity.

tic surgery, urology) (13.8%), pediatrics (11.7%), emergency medicine (7.0%), anesthesiology (6.4%), general surgery (4.9%), family medicine (4.9%), and obstetrics/gynecology (4.2%). These percentages are similar to NRMP match data for US students in 2007, which show 22.3% in IM or

IM combined fields; 6.6% in surgical subspecialties, excluding ophthalmology, which has a separate match; 12.5% in pediatrics; 7.2% in emergency medicine; 3.2% in anesthesiology; 5.8% in general surgery; 7.7% in family medicine; and 5.9% in obstetrics/gynecology.⁷ Median debt category was

\$100 001 to \$110 000 (interquartile range from \$10 001-\$20 000 category to \$160 001-\$170 000).

The majority of respondents (78.3%) agreed or strongly agreed with the statement "I was satisfied with my core IM clerkship." Only 228 of all respondents (19.4%) felt that their core IM clerk-

Table 2. Factor Analysis of Perceptions of Internal Medicine Careers Compared With Other Specialties Chosen or Considered Among Fourth-Year Medical Students^a

Factor and Corresponding Survey Items (Cronbach α Coefficient)	Students Choosing IM	Family Medicine	Pediatrics	Surgical Fields	Other Specialties	Effect Size	P Value	All Students Not Choosing IM	Effect Size: IM vs All Non-IM	P Value Comparing IM With All Non-IM ^b
Intellectual challenge (.63) ^c										
No.	266	50	131	261	376			818		
Mean	4.19 ^d	3.28	3.34	3.48	3.36	0.27	<.001	3.39	1.19	<.001
95% CI	4.12-4.26	3.14-3.42	3.25-3.42	3.41-3.55	3.30-3.43			3.35-3.43		
Commitment to patient care (.61) ^e										
No.	258	52	123	245	353			773		
Mean	3.67 ^d	3.00 ^{f,g}	2.88 ^f	3.18 ^{g,h}	3.31 ^h	0.18	<.001	3.18	0.80	<.001
95% CI	3.61-3.72	2.88-3.13	2.82-2.95	3.12-3.24	3.24-3.38			3.14-3.22		
Prestige of IM (.62) ⁱ										
No.	228	46	113	218	332			709		
Mean	3.04	2.92	2.93	2.96	3.04	0.02	.004	2.99	0.14	.07
95% CI	3.00-3.09	2.84-3.00	2.88-2.98	2.91-3.02	3.00-3.09			2.96-3.02		
Role models (.72) ^j										
No.	247	49	127	256	362			794		
Mean	3.46 ^d	2.58 ^{k,l}	2.54 ^k	2.80 ^l	2.63 ^{k,l}	0.23	<.001	2.67	1.10	<.001
95% CI	3.37-3.54	2.39-2.76	2.44-2.65	2.72-2.87	2.57-2.69			2.62-2.71		
Personal/professional satisfaction (.89) ^m										
No.	222	48	113	240	322			723		
Mean	2.79 ⁿ	2.73 ^{k,n}	2.63 ^k	2.49 ^o	2.62 ^k	0.10	<.001	2.59	0.61	<.001
95% CI	2.75-2.82	2.66-2.79	2.59-2.68	2.45-2.53	2.58-2.66			2.56-2.61		

Abbreviations: CI, confidence interval; IM, internal medicine.

^aScale for responses: 1 = this issue is much less in IM than other specialties, 2 = somewhat less in IM, 3 = the same in IM, 4 = somewhat more in IM, and 5 = much more in IM.

^bExcludes students selecting 6 = don't know/no opinion for each item.

^cP value calculated from a t test comparing the means of the 2 groups, students choosing IM vs students not choosing IM.

^dIncludes intellectual challenge in IM, breadth of knowledge needed by an internist, and opportunities to do research in IM.

^eDiffered significantly from the 4 other specialty groups based on post hoc Scheffé tests.

^fIncludes internists' ability to have meaningful relationships with patients, internists' ability to spend enough time with his/her patients, time an internist spends thinking about patients outside of work, and opportunities to feel competent in what I do in IM.

^gDiffered significantly from the IM, surgical fields, and other specialty groups based on post hoc Scheffé tests.

^hDiffered significantly from the IM, pediatrics, and other specialty groups based on post hoc Scheffé tests.

ⁱDiffered significantly from the IM, family medicine, and pediatrics specialty groups based on post hoc Scheffé tests.

^jIncludes income potential in IM, paperwork in IM, prestige of IM at my medical school, ease of getting into an IM residency, and time an internist spends on reimbursement and insurance issues. (The items income potential in IM and prestige of IM at my medical school were reverse scored.)

^kIncludes enthusiasm internists have shown for mentoring medical students, the effort IM residents and attendings invested in recruiting me to IM, level of satisfaction among IM residents, and satisfaction among practicing internists/attendings.

^lDiffered significantly from the IM and surgical fields specialty groups based on post hoc Scheffé tests.

^mDiffered significantly from the IM and pediatrics specialty groups based on post hoc Scheffé tests.

ⁿIncludes free time away from work an internist has, workload during IM residency, degree of stress among IM residents, control an internist has over his/her schedule, likelihood of having the kind of family life I want as an internist, and frequency with which internists work too hard while at their jobs. (The items free time away from work an internist has, control an internist has over his/her schedule, and likelihood of having the kind of family life I want as an internist were reverse scored.)

^oDiffered significantly from the pediatrics, surgical fields, and other specialty groups based on post hoc Scheffé tests.

^pDiffered significantly from the IM, family medicine, pediatrics, and other specialty groups based on post hoc Scheffé tests.

ship made a career in general IM seem more attractive, whereas 574 (48.8%) felt it made a career in subspecialty IM more attractive. Of those who had had an outpatient IM clerkship or preceptorship, 365 (33.0%) felt it made a career in outpatient general IM seem less attractive, but a similar proportion (346, 32.1%) felt it made such a career seem more attractive. Most students (1020, 78.2%) agreed or strongly agreed that their medical school experience provided them enough insight into what an internist does to make an informed decision about IM as a career.

Comparisons across the 5 specialty groups revealed that students choosing family medicine were slightly older and more likely to be married, and family medicine and pediatrics had a higher proportion of women (Table 1). Students choosing IM were more likely to be attending a private school, report receiving an honors grade in their IM clerkship, report high satisfaction with the IM clerkship, and have attended at least 1 IM interest group event.

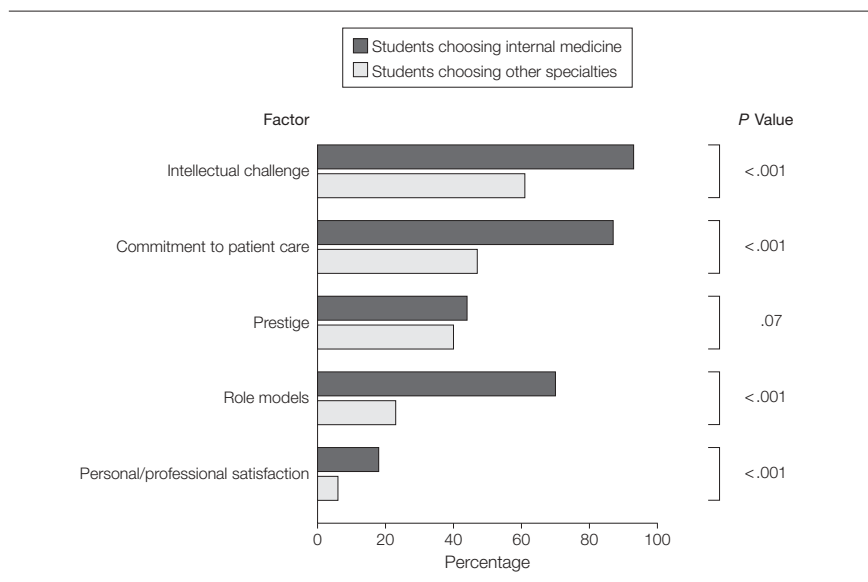
Perceptions of IM Training and Careers

Compared with other specialties they had chosen or considered, students perceived IM as requiring more paperwork (800, 68.0% of respondents), requiring a greater breadth of knowledge (731, 62.1%), and having a lower income potential (760, 64.6%). Many also perceived that the IM residency selection process was less competitive (680, 57.8%) and that IM residents were less satisfied (602, 51.1%) than residents in other specialties.

Career Choice Influences

The items most frequently cited as somewhat or very much attracting students toward IM careers were the intellectual challenge of IM (770, 65.4% of all respondents), teaching on the IM rotation (748, 63.6%), the continuity of care in IM (703, 59.7%), the competence of IM residents (670, 56.9%), and the responsibility for patient care during the core IM clerkship and sub-internship (660, 56.1%). Conversely,

Figure 1. Perceptions of Internal Medicine Compared With Other Specialties Chosen or Considered Among Fourth-Year Medical Students



Among 1177 fourth-year medical students, comparisons were between those who chose internal medicine (IM) (n=274) versus those who chose other specialties (n=903). Bars indicate the percentage of students who perceived that this factor is greater in IM than other specialties chosen or considered. The P value reflects the comparison of the percentage of students planning careers in IM versus all other specialties with a mean score greater than 3.0 on the 5-point scale for each factor.

the items most frequently cited as somewhat or very much pushing students away from IM careers were paperwork and charting in IM (748, 63.6%), attractiveness of other (non-IM) specialties (575, 48.8%), types of patients an internist sees (534, 45.4%), the need to bring work home as an internist (497, 42.2%), and the appeal of being a primary care physician (486, 41.3%). The item on debt, “the loans I have to repay,” pushed 26.1% of students (307) away from the field.

Factor Analysis

Perceptions. Principal components analysis of the perceptions items yielded 5 underlying factors that explained 58.4% of the variance in responses (TABLE 2). Cronbach α for the scales ranged from .61 to .89. As shown by mean scores and effect sizes in Table 2 and in dichotomized factor scores (percentage above 3.0) in FIGURE 1, students choosing IM were more likely to report that intellectual challenge, commitment to patient care, role models, and personal/professional satisfaction

were more favorable in IM than all students choosing other specialties. Students choosing IM and those choosing other fields reported similar perceptions of the prestige of IM compared with other fields they had considered. However, even students choosing IM felt that personal/professional satisfaction was greater in other fields they had considered, as reflected by the mean score of less than 3.0 (Table 2). The large effect sizes for perceptions of intellectual challenge, commitment to patient care, and role models for those choosing IM suggest the practical importance of these factors.

The perception factor scores were also compared across all 5 specialty groups. Students choosing IM were significantly more likely than the other 4 specialty groups to report that intellectual challenge, commitment to patient care, and role models were more favorable in IM than other specialties considered. Prestige of IM was not significantly different across the 5 groups. Students choosing IM and family medicine felt more favor-

ably about personal/professional satisfaction in IM than students choosing surgery, but even the students choosing IM and family medicine felt that personal/professional satisfaction was greater in other fields they had considered than in IM.

Influences. Principal components analysis of the influences items yielded 5 underlying factors; 2 were dropped due to low reliability. The remaining 3 factors (TABLE 3) accounted for 46.1% of the variance in responses. Cronbach α for the scales ranged from .79 to .80. As shown by mean scores and effect sizes in Table 3 and in dichotomized factor scores (percentage above 3.0) in FIGURE 2, students choosing IM were more likely to be attracted to IM by the educational experience, nature of patient care, and lifestyle factors than students choosing other specialties. The large effect sizes for educational experiences and nature of patient care suggest the practical importance of these factors.

The influence factor scores were also compared across all 5 specialty groups. Students choosing IM were significantly more likely than the other 4 specialty groups to report that their educational experiences attracted them toward IM. The nature of patient care was a stronger influence attracting students toward IM among those choosing IM compared with the other 4 specialty groups. Those choosing IM and surgical fields were significantly more likely to report that the lifestyle in IM attracted them toward the field than students entering the other specialties. Students choosing family medicine and pediatrics scored the lifestyle in IM as more favorable than students choosing the remaining specialties grouped as "other."

Among students not choosing IM, 399 (44.2%) had seriously considered it and 504 (55.8%) had not. Comparing students who had considered IM vs those who had not, those who had considered IM perceived that personal/

professional satisfaction (mean score, 2.62 vs 2.56; 95% confidence interval [CI] for difference in means, 0.01-0.11; effect size, 0.19) and role models (2.73 vs 2.61; 95% CI, 0.04-0.21; effect size, 0.10) were not as unfavorable in IM than other fields they had chosen or considered. However, the effect sizes were small, and both groups felt that these factors were more favorable in other fields, reflected by the mean factor scores of less than 3.0. When asked about influences on their career choice, those who had considered IM were more likely to report that their educational experiences (3.50 vs 3.21; 95% CI for difference in means, 0.22-0.36; effect size, 0.54) and nature of patient care (2.84 vs 2.66; 95% CI, 0.10-0.25; effect size, 0.32) in IM had attracted them toward the field. Educational experiences attracted both groups toward IM, reflected by the mean score greater than 3.0, and the nature of patient care pushed both groups away from the field. The effect size was mod-

Table 3. Factor Analysis of Influences on Fourth-Year Medical Students' Career Choice Regarding Internal Medicine^a

Factor and Corresponding Survey Items (Cronbach α Coefficient)	Students Choosing IM (n = 274)	Family Medicine (n = 58)	Pediatrics (n = 138)	Surgical Fields (n = 293)	Other Specialties (n = 413)	Effect Size	P Value	All Students Not Choosing IM (n = 902) ^b	Effect Size: IM vs All Non-IM	P Value Comparing IM With All Non-IM ^c
Educational experiences (.80) ^d										
Mean	3.94 ^e	3.42	3.32	3.29	3.36	0.19	<.001	3.33	1.03	<.001
95% CI	3.88-4.00	3.29-3.54	3.22-3.41	3.23-3.36	3.31-3.41					
Nature of patient care (.79) ^f										
Mean	3.57 ^e	3.24 ^g	2.65 ^h	2.62 ^h	2.78 ^h	0.31	<.001	2.74	1.24	<.001
95% CI	3.50-3.64	3.09-3.39	2.57-2.72	2.56-2.69	2.73-2.84					
Lifestyle (.80) ⁱ										
Mean	3.14 ^j	2.86 ^k	2.96 ^k	3.16 ^j	2.60 ^e	0.21	<.001	2.86	0.52	<.001
95% CI	3.07-3.21	2.74-2.98	2.91-3.01	3.10-3.22	2.56-2.65					

Abbreviations: CI, confidence interval; IM, internal medicine.

^aScale for responses: 1 = very much pushed me away from IM, 2 = somewhat pushed me away, 3 = no influence, 4 = somewhat attracted me toward, and 5 = very much attracted me toward IM.

^bOne person did not answer this part of the questionnaire.

^cP value calculated from a t test comparing the means of the 2 groups, students choosing IM vs students not choosing IM.

^dIncludes teaching on the IM rotation, competence of the IM residents I worked with, responsibility for patient care I had in my IM core clerkship and subinternship, status of IM at my medical school, efforts internists made to recruit me to IM, intellectual challenge of IM, and opportunities to feel competent in what I do as an internist.

^eDiffered significantly from the 4 other specialty groups based on post hoc Scheffé tests.

^fIncludes my feelings about taking care of chronically ill patients; my feelings about treating terminally ill, dying patients; my feelings about taking care of elderly patients; types of patients an internist sees; my feelings about treating alcoholic and drug-abusing patients; appeal of being a primary care physician; and continuity of care in IM.

^gDiffered significantly from the IM, pediatrics, surgical fields, and other specialty groups based on post hoc Scheffé tests.

^hDiffered significantly from the IM and family medicine specialty groups based on post hoc Scheffé tests.

ⁱIncludes time and workload demands of an IM career, free time away from work I would have as an internist, time and workload demands of IM residency, how internists role model a satisfying family life, and length of IM residency and fellowship.

^jDiffered significantly from the family medicine, pediatrics, and other specialty groups based on post hoc Scheffé tests.

^kDiffered significantly from the IM, surgical fields, and other specialty groups based on post hoc Scheffé tests.

erate for educational experiences and small for the nature of patient care.

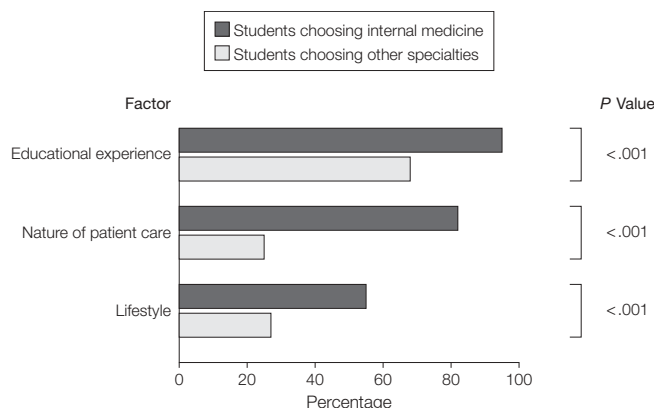
Logistic Regression

Results of logistic regression analyses are shown in TABLE 4. Significant predictors were reported in the final model with a *P* value <.01. In the model with only demographic variables, private school (odds ratio [OR], 1.72; 95% CI, 1.25-2.36), satisfaction with IM clerkship (OR, 2.06; 95% CI, 1.36-3.11), and attendance in IM interest group events (OR, 2.49; 95% CI, 1.84-3.35) were all significantly associated with IM career choice. In the model with influences factors, male sex (OR, 1.75; 95% CI, 1.20-2.56), private school (OR, 1.88; 95% CI, 1.26-2.83), and all 3 influences factors (favorable impressions of their educational experiences in IM [OR, 4.57; 95% CI, 3.01-6.93], favorable feelings about caring for IM patients [OR, 8.72; 95% CI, 6.03-12.62], favorable impressions of internists' lifestyle [OR, 2.00; 95% CI, 1.39-2.87]) were significantly associated with IM career choice. These findings indicate that, for example, a 1-unit shift higher on the Likert scale on the nature of patient care factor (showing that students indicated more favorable feelings about caring for IM patients) is associated with 9-fold greater odds of being attracted toward an IM career.

COMMENT

The United States is confronting a potential crisis in health care for older adults, with projected increases in the aging population and declines in IM specialty choice, the primary specialty treating complex elderly patients. Recognizing that studies addressing specialties that treat older adults have broad implications for US health care, we surveyed graduating students and found that they were satisfied with their IM educational experiences but reported serious reservations about the quality of life and rewards of IM compared with other specialties. Unfortunately, students were discouraged by the challenges of caring for the types of patients in IM.

Figure 2. Influences on Career Choice Regarding Internal Medicine Among Fourth-Year Medical Students



Among 1177 fourth-year medical students, comparisons were between those who chose internal medicine (IM) (n=274) versus those who chose other specialties (n=903). Bars indicate the percentage of students who reported that this factor attracted them toward an IM career. The *P* value reflects the comparison of the percentage of students planning careers in IM versus all other specialties with a mean score greater than 3.0 on the 5-point scale for each factor.

Students were dissuaded from IM by their experiences with elderly and chronically ill patients. Other studies have shown that students' attitudes about caring for elderly and chronically ill patients decline during training.^{5,29} The high OR we found for the nature of patient care in IM suggests that educational efforts to enhance students' experiences with such patients could motivate more career interest in IM. However, paradoxically, almost two-thirds of our participants identified continuity of care as an attractive feature of IM, suggesting that they desire meaningful patient relationships but not the burden of responsibility for IM patients in the current practice environment.³⁰ Simply providing more exposure to IM patients may worsen attitudes, and consensus is lacking about optimal curricular methods of teaching chronic illness care.³¹ Curricula and faculty development are needed that empower students to coordinate the complex care of patients with multiple chronic diseases. Such educational innovations might counteract the decline in students' attitudes toward these challenging patients.

Male students were more likely to pursue IM, but other student charac-

teristics were not associated with choosing IM. Others have found that being female, being married, and having children were associated with choosing IM.^{14,18,32} In our study, the positive relationship between male sex and IM career choice was revealed after controlling for differences in the attraction to the nature of patient care in choosing IM, and earlier studies may not have adequately considered mediating variables. The most salient demographic factor for our participants may be their generation. Current students comprise the Generation X and Millennium groups, and characteristics attributed to these groups have included less emphasis on devotion to work and more on personal satisfaction and fulfillment outside of work.³³

Few students planned careers in general IM and the influence of an ambulatory IM experience during medical school was mixed. In contrast, earlier studies supported an ambulatory general IM experience as a powerful curricular mechanism to attract students to the field.³⁴ More recently, frustrations in the practice environment have led general internists to bemoan the field, and in some cases, to leave it.³⁵ For residents, exposure to hectic primary

Table 4. Predictors of Choosing Internal Medicine as a Career Among 1177 Fourth-Year Medical Students Based on Demographics and Influence Factors

Variable ^a	Model With Demographic Variables Only		Model With Demographic Variables and Influence Factors	
	OR (CI)	P Value	OR (CI)	P Value
Private school	1.72 (1.25-2.36)	.001	1.88 (1.26-2.83)	.002
Underrepresented minority ^b	0.72 (0.44-1.17)	.18	0.52 (0.28-0.98)	.04
Married	1.13 (0.81-1.58)	.47	0.99 (0.65-1.52)	.97
No children	1.71 (0.98-3.00)	.06	1.34 (0.66-2.75)	.42
Received honors or A grade in core IM clerkship	0.77 (0.57-1.04)	.09	0.89 (0.60-1.32)	.57
Satisfied with core IM clerkship	2.06 (1.36-3.11)	.001	0.94 (0.55-1.62)	.83
Attendance at 1 or more IM interest group events	2.49 (1.84-3.35)	<.001	1.15 (0.78-1.70)	.49
MD degree only graduate degree on graduation	0.97 (0.66-1.42)	.87	0.79 (0.49-1.28)	.34
Debt more than \$120 000	0.88 (0.65-1.17)	.37	0.78 (0.54-1.14)	.20
Male	1.00 (0.75-1.34)	.99	1.75 (1.20-2.56)	.004
Had outpatient IM clerkship/preceptorship during medical school	1.53 (0.82-2.85)	.18	1.35 (0.60-3.01)	.47
Age ^c	1.06 (1.00-1.11)	.04	1.01 (0.94-1.08)	.87
Influence ^d				
Educational experiences			4.57 (3.01-6.93)	<.001
Nature of patient care			8.72 (6.03-12.62)	<.001
Lifestyle			2.00 (1.39-2.87)	<.001

Abbreviations: CI, confidence interval; IM, internal medicine; OR, odds ratio.
^aAll variables were dichotomized except for age and 3 influence factor variables.
^bSelf-identified as African American or Native American race or Hispanic/Latino ethnicity.
^cOdds ratio for age corresponds to change in 1 y.
^dOdds ratios for 3 influence factors correspond to change in 1 unit on a 5-point Likert scale.

care clinics with inadequate administrative and technology support may entice them toward subspecialties and away from generalist careers.^{36,37} Exposing students to effective team-based care could inspire students by showing how social workers, nutritionists, and other health care professionals can manage many aspects of practice and allow physicians to focus on the patient care they are trained to address.³⁸ Ambulatory subspecialty experiences might have a more desirable effect on current students' perceptions of IM careers.

Unexpectedly, debt was not related to specialty choice, despite the disparity in average compensation among specialties. In our sample, approximately 40% of students graduated with debts greater than \$130 000. However, recent studies have yielded

conflicting results regarding the impact of debt on career choice, even within primary care.^{21,39} The income generated in primary care compares unfavorably with procedure-based medical specialties and other professions.⁴⁰ In our study, interest in general IM was quite low regardless of debt level. The fact that IM is typically classified as a primary care specialty but can lead to a diversity of career paths, including high-income procedural subspecialty practice, may explain discrepant associations between debt and career choice for this particular specialty. The medical home model and comprehensive health care reform may address students' broader concerns about lifestyle and work satisfaction in IM more completely than efforts to address physician reimbursement alone.⁴¹

Lifestyle was predictive of IM career choice in our study, but with a smaller effect size than the nature of patient care or educational experiences factors. Our measures suggest that students believe that internists and IM residents face expectations to work intensively. Duty hours restrictions for residents have compressed residents' workload into fewer hours, requiring them to work at a hectic pace.⁴² In a recent study, IM clerkship directors asked to identify the factors influencing their students' career choices regarding IM identified the practice environment as the most important disincentive to choosing IM.⁴³ Similarly, in our study, students perceived paperwork and charting as well as reimbursement and insurance requirements as greater in IM than other fields. Lifestyle is a prominent driver of career choice,²² and the fact that more than 40% of our participants selected specialties with controllable lifestyles suggests that lifestyle may be a stronger factor in attracting students toward other fields than away from IM.

Other findings from this study also suggest that students may be more turned on by other specialties than turned off by IM, somewhat in contrast to prior literature.¹⁸ Our participants' attitudes toward the intellectual tradition of IM and continuity with patients were positive. To rebuild and sustain the US generalist physician workforce, improving students' experience of IM in medical school may no longer be sufficient. Although the IM clerkship is consistently rated highly by graduating medical students nationally,²⁸ our participants reported that role modeling by internists, as manifested by encouraging students to choose the field and job satisfaction, was less favorable than role modeling in other specialties they considered, as shown in Table 2. Current students recognize the increasing demands on internists, particularly primary care physicians, to accomplish large numbers of preventive and therapeutic interventions during short visits with chronically ill patients while also managing increasing

administrative expectations.³ Internal medicine, along with family medicine and surgery, was identified as a specialty students were most likely not to choose based on “bad-mouthing” of the discipline by physicians and other students.⁴⁴

This study has limitations. We did not survey all US medical students, although we had a large sample size and high response rate from a diverse sample of medical schools with similar demographics and a similar proportion of specialty choices compared with all US medical students. Because we did not study students longitudinally, recall bias may have influenced responses regarding specialties previously considered but not chosen, and we cannot determine whether students will change their specialties later or subspecialize within IM. Data were based on self-report, and we did not correlate students' stated specialty preferences with match results. Although students reported feeling adequately informed about IM careers, we cannot determine the accuracy of their knowledge of the field. Our findings represent associations with selection of IM as a career choice and may not be causal.

Our large sample of US medical students expressed reservations about careers in IM because of patient complexity, the practice environment, and the lifestyle compared with other specialties. Students' career choices regarding IM result from the interplay of lifestyle, personal and professional satisfaction, and the challenges of caring for the chronically ill in a health care system that still focuses on acute care. Given the aging population with increasing needs for internists' care, research is needed to learn more about these attitudes and strategies to improve the attractiveness of generalist IM practice. Career interest in general IM is particularly low, reflecting the challenges in the primary care practice environment. A national effort to address the factors affecting students' career choice regarding IM is needed and should include interventions to

modify the nature of work and lifestyle in the field.

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Study concept and design: Hauer, Durning, Kernan, Fagan, Mintz, Schwartz.

Acquisition of data: Hauer, Durning, Kernan, Fagan, Mintz, Battistone, DeFer, Elnicki, Harrell, Reddy, Schwartz.

Analysis and interpretation of data: Hauer, Durning, Kernan, Fagan, Mintz, O'Sullivan, Battistone, DeFer, Harrell, Boscardin, Schwartz.

Drafting of the manuscript: Hauer.

Critical revision of the manuscript for important intellectual content: Hauer, Durning, Kernan, Fagan, Mintz, O'Sullivan, Battistone, DeFer, Elnicki, Harrell, Reddy, Boscardin, Schwartz.

Statistical analysis: Hauer, Durning, O'Sullivan, Boscardin, Schwartz.

Obtained funding: Hauer, Elnicki.

Administrative, technical, or material support: Hauer, Kernan, Fagan, Mintz, Battistone, DeFer, Harrell, Reddy, Schwartz.

Study supervision: Hauer, Durning, Schwartz.

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Additional Information: The eAppendix is available at <http://www.jama.com>.

Additional Contributions: Charles McCulloch, PhD, University of California, San Francisco (UCSF), assisted with data analysis. The staff of the Clerkship Directors in Internal Medicine and Kathleen Kerr, BA, UCSF, helped with data collection and management, and Salina Ng, BA, UCSF, helped with data organization. Dr McCulloch received a consulting fee. None of the other individuals received any compensation for their contributions.

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I never taught language for the purpose of teaching it; but invariably used language as a medium for the communication of thought; thus learning of language was coincident with the acquisition of knowledge.

—Anne Sullivan (1866-1936)