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Addressing the Need for Primary Care Physicians:

Factors Associated with Medical Student Residency Choice

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ABSTRACT

Context

With projected shortages of primary care physicians and specific specialists, the needs of society are clear; however, factors influencing medical student residency choice and career goals are not well defined or understood.

Objectives

This study analyzed residency and specialty preferences for two cohorts of fourth year osteopathic medical students (OMSIV) to determine the percentage of students selecting a primary care specialty or a needed specialty. It further investigated determinants of residency choices and residency program matches in order to better structure undergraduate medical education programs.

Design

A survey-based observational cohort study.

Setting

A.T. Still University's School of Osteopathic Medicine in Arizona (ATSU SOMA), from March 2011 through August 2013.

Participants

Participants were 175 graduating OMSIV students from the school's inaugural and second cohorts, the classes of 2011 and 2012.

Measurements

Measures included a 52-item graduation exit questionnaire. Exit survey data were merged with academic and admissions records to investigate factors bearing on residency match outcomes.

Results

The combined exit survey response rate was 95%. A majority (78.3%) of survey respondents matched with a primary care (58.3%) or a needed specialty in medicine (20%). Students reported advisors and clinical experiences influenced choice of residency. Students wishing to work in underserved areas were more likely to match with a primary care residency (p=0.02). Students with dependents were more likely to match with a needed specialty (p = 0.03).

Limitations

This study included a sample of two graduating classes from one Osteopathic medical school with a specific mission. The results cannot be generalized to other populations of students.

Conclusions

Pre-admission social factors and performance in school were not associated with residency choice. Student desire to work in a medically underserved area was associated with a match in primary care.

Keywords:

Medically underserved area

Primary care

Residencies, medical

Specialties, medical

medical education

1. INTRODUCTION

Academic sources and national media point to the shortage of primary care practitioners.[1, 2,3,4] Recent reports from the Agency for Healthcare Research and Quality (AHRQ) state that while one-third of practicing physicians are primary care, only one-fourth of current medical school graduates enter primary care. Without intervention, this percentage could soon dwindle to one-fifth.[5,6] With the Affordable Care Act and more health care coverage, we expect increased demand for primary care services in the United States. With current trends, the present shortage is expected to worsen.

The factors influencing medical students' career goals and residency choices are not well defined. The best approach for ensuring an adequate number of residency positions for medical school graduates is a matter of debate. What is clear, is the nation will soon face a significant shortage of primary care physicians. According to the Association of American Medical Colleges (AAMC) Center for Workforce Studies, "there will be 45,000 too few primary care physicians – and a shortage of 46,000 surgeons and medical specialists – in the next decade."[1, p.1] By 2015, it is expected there will be deficits of 63,000 family medicine physicians and 33,100 physicians in specialties including cardiology, oncology, and emergency medicine.[1] Physician shortages will be particularly acute in medically underserved areas (MUAs) as defined by the Health Resources and Services Administration (HRSA).[7] To address this shortfall, medical schools must train more physicians for primary care and needed specialties. The relationships between individual student characteristics and graduating medical student choice of residency program location and specialty are not well established.[8,9]

While the need is alarmingly clear, it is rare to find American medical schools that specify the mission of training physicians for medically underserved populations. A.T. Still

University, School of Osteopathic Medicine in Arizona (SOMA) established a community health center-based curriculum in collaboration with the National Association of Community Health Centers (NACHC). The expressed purpose is to prepare excellent osteopathic physicians to serve the needs of society. This is interpreted as a need to train physicians who will serve the underserved and who will focus on primary care and needed specialties. The importance of such a mission is considered in the report: *"The Social Mission of Medical Education: Ranking the Schools.*[10] In 2007, SOMA admitted an inaugural class of students who expressed a commitment to this mission. Subsequent admission cohorts have continued to express an interest in serving the underserved. Given the projected physician shortages and SOMA priorities, we developed a system to track the trajectory of graduating classes to determine whether residency selections and residency program matches aligned with the school's mission of training osteopathic physicians wanting to specialize in primary care or needed specialties. Further, we wished to explore whether a desire to work with underserved populations was present at graduation and if this aspiration correlated with students' choices of residency programs. As part of this initiative, we sought to identify the most salient attributes of medical students who retained a service orientation through four years of medical school and who were dedicated to a career in primary care or a needed specialty. These analyses will allow for continuous improvement in the admissions process and in the curriculum.

According to the literature, the first shortfall is with regard to primary care physicians, which includes physicians trained in family medicine, internal medicine, pediatrics and obstetrics/gynecology.[1,11-13] Furthermore, the nation requires additional physicians in non-primary care specialties. These needed specialties include cardiology, oncology, emergency medicine, thoracic surgery, urology, psychiatry, and general surgery.[1-2,7,14-17]

Prior research[18,19] has identified important domains that could influence the residency and career choices of graduating physicians. A study involving post-graduates who were five years out from their undergraduate medical training indicated for 77% of respondents, career choice was most affected by graduate experience.[18] Another 1997 study involving data from 121 undergraduate medical schools indicated the best predictor of selection for family medicine or primary care was a student's choice at matriculation.[19] This study explored the characteristics of the medical schools, but did not include a survey of the graduates. These researchers reported additional relevant factors such as the number of weeks in primary care rotations in Years 3 and 4, the percentage of rural students, the school's mission to produce primary care physicians, special programs for primary care, and the percentage of women students. The authors concluded "... schools that attract students interested in family medicine and provide them opportunities to experience this specialty are more likely to produce graduates who will practice family medicine".[19, p.531]

Jeffe et al[12] evaluated the career choices and potential influential factors for graduates of allopathic medical schools between 1997 and 2006.[12] They found females were more likely than males to choose primary care residencies. Additionally, they found graduates with higher debt were less likely to choose internal medicine or pediatrics specialties.

From the American Association of Colleges of Osteopathic Medicine (AACOM) *2009-10 Academic Year Survey of Graduating Seniors*, additional variables potentially associated with student residency choice were identified. These include: debt load, parental educational background, scholarship and pre-enrollment intent to practice in an underserved area.[20]

It has been observed that osteopathic physicians are more likely to provide primary care than allopathic physicians.[21] The tenets of osteopathic medicine have been highlighted as reasons

why osteopaths are drawn to primary care.[22] The values and principles of the osteopathic philosophy imparted through teaching and the frameworks for thinking and practicing have been cited as positive influences toward careers in primary care.[22]

While prior research[12,18,19,20,22] suggests several major domains to consider, the influences of each factor on a cohort of medical students specifically chosen for their desire to serve the underserved remained unknown.

This observational cohort study examines the relationships between student characteristics and residency selection. Factors potentially associated with student residency selection in primary care or needed specialties were evaluated. Additionally, in keeping with SOMA's mission, student characteristics associated with a desire to serve the underserved were evaluated. This study focused on two research questions. What percentage of students matched with a residency in primary care or a needed specialty? Which student characteristics correlated with the choice of a residency in primary care or a needed specialty?

2. METHODS

2.1 Research design

This evaluation of two cohorts took place May 15, 2011 through June 5, 2012 at ATSU SOMA in Mesa, Arizona, a college of osteopathic medicine. Graduating classes were surveyed in June 2011 and 2012. The research plan was evaluated and exempted by the ATSU SOMA Institutional Review Board in February 2011. The project subsequently received grant funding through the American Association of Colleges of Osteopathic Medicine (AACOM).

2.2 Survey Development and Data Collection

The authors developed a graduation survey instrument subsequent to reviewing the literature, consulting with experts, and conducting focus groups with graduating OMSIV

students in the spring of 2011, after students matched with residency programs. The 52-item survey instrument collected data on student desires for residency training and the programs with which the students ultimately matched. The survey collected information along multiple domains that could influence student residency choice. These were socioeconomic background prior to matriculation, debt load, family obligations, and undergraduate experiences.[9,22-23]The survey assessed student choice compared with ultimate residency match and student perceptions of forces bearing on specialty selection such as role models and mentoring.[18,19,23-24]

The project advisory panel, comprised of SOMA faculty, reviewed the survey prior to administration. The data analysis team sent electronic surveys to all graduating seniors in 2011 (*N*=92) and 2012 (*N*=92). Study participants received invitations and consent letters via email.

2.3 Data Analysis

Survey data were de-identified by a third party and linked by unique student codes to two specific data files: academic records and admissions records. The students' academic records provided key fields such as graduation grade point average (GPA) and total professionalism score. The admissions records provided detailed demographics, undergraduate GPA, health care work experience and hours of community service prior to matriculation. A third party specialist merged these data files with survey data. This specialist removed identifying information.

Consistent with the literature [1,2,7,11-14,17], primary care specialties and needed, non-primary care specialties were defined. These definitions were used to code the survey responses regarding residency choice and residency match into: Primary Care, Non-Primary care needed specialties, other and undecided. Primary Care specialties include Family Medicine, Internal Medicine, Pediatrics and Obstetrics-Gynecology.[1,11-13] Non-primary care needed specialties include

cardiology, oncology, emergency medicine, thoracic surgery, urology, general surgery and psychiatry.[1,2,7,14-17]

Frequencies and percentages are provided for categorical data; means and standard deviations for continuous data. The statistical significance of predictors of residency match was calculated using a planned comparison approach; primary care residency matches and needed specialty residency matches were compared to "other" residency matches . Fisher's Exact tests were calculated for categorical data; rank bi-serial or point bi-serial correlations were calculated for ordinal or continuous data, as appropriate. All significance tests were two-tailed, and alpha=0.05 was the threshold for statistical significance. No adjustments were made for multiplicity. SPSS™ version 21 was used for processing data and statistical analysis.

3. RESULTS

3.1 Response Rate and Demographics

Ninety five percent (*n*=175) of graduating students completed the survey: 91/92 (98.9%) in 2011 and 84/92 (91.3%) in 2012. Table 1 provides a profile of the survey respondents. There were slightly more men than women. The majority of students were White (60.6%). Nearly half of the respondents (45.7%) were married. Nearly two thirds (70.3%) of the total population of respondents indicated no members of their family were physicians.

Table 1: Characteristics of Study Sample: Graduating Medical Students (n = 175)

Attribute		n (%)
Gender		
	Male	96 (54.9)
	Female	79 (45.1)
Race/Ethnicity		
	White	106 (60.6)
	Asian	35 (20)
	Hispanic	7 (4)
	American Indian/Alaskan Native	6 (3.4)
	Black	4 (2.3)
	Unknown	17 (9.7)
Marital Status		
	Single	90 (51.4)
	Married	80 (45.7)
	Divorced	2 (1.1)
	Other	3 (1.7)
Number of Dependents (spouse included if legal dependent)		
	0	115 (65.7)
	1	16 (9.1)
	2	21 (12.0)
	3	12 (6.9)
	4 or more	11 (6.3)
Family Member is a Physician		
	Yes	52 (29.7)
	No	123 (70.3)

3.2 Socioeconomic Factors and Healthcare Experience

Factors related to socioeconomic and healthcare training background appear in Table 2. With regard to economic background, 19.4% of respondents reported being economically disadvantaged upon application to SOMA. This is based on student self-report on the AACOM application service document. This represents a belief that a student grew up in an economically disadvantaged household or was economically disadvantaged at the time of application to

medical school. Upon graduation, most carried a high debt load with approximately 81% of the graduates reporting $200,000 or more of debt. More than half (56%) indicated they are participating in a loan forgiveness or repayment program.

Upon entry to SOMA, there were varying degrees of prior healthcare experience with more than one-third of the class having no experience and more than one-third having 1-4 years of experience. Significant community service was evident, with 40.6% reporting high levels of community service experience upon entry. This was defined as more than 500 hours of documented service.

Table 2. Socioeconomic Factors and Healthcare Experience of Graduating Osteopathic Medical Students (n=175)

Attribute		n	(%)
Socioeconomic Disadvantaged Background			
	Yes	34	(19.4)
	No	141	(80.6)
Education Debt			
	< $100,000	17	(9.7)
	$ 100,000 - $199,999	16	(9.1)
	$200,000 - $299,999	68	(38.9)
	> $300,000	74	(42.3)
Participate in a Loan Repayment Program			
	Yes	98	(56.0)
	No	77	(44.0)
Years in Healthcare Field prior to Matriculation			
	0	75	(42.9)
	1 - 4	74	(42.3)
	5 or more	26	(14.9)
Military Status			
	Never in Military	153	(87.4)
	Active	18	(10.3)
	Retired	4	(2.3)
Community Service prior to Matriculation			
	High (>500 hours)	71	(40.6)
	Medium (200-500 hours)	10	(5.7)
	Low (<200 hours)	94	(53.7)

3.3 Interest in Medical Specialties

The survey captured desired medical specialty at graduation and at what point during medical school a specialty was chosen. The authors compared student desired medical specialty upon entering SOMA with desired specialty upon graduation and with the ultimate residency program match. As reported in Table 3, a large percentage (59.4%) made a decision regarding a target specialty in their third or fourth year. When asked, “What was your original desired specialty upon entering medical school?” about half (50.9%) of respondents indicated their original desired specialty was primary care (50.9%) and another 17.7% intended to go into a

needed specialty. At the time of residency program application, these percentages were 50.3% (primary care) and 26.9% (needed specialty). While the overall proportions for primary care did not change, most respondents indicated that during medical school, they changed their minds about specialties (64%).

Table 3. Desired Specialty of Graduating Medical Students at varying Stages of Osteopathic Medical Education (n = 175)

	n	(%)
Point when student decided on preferred specialty		
Prior to matriculation	45	(25.7)
OMSI year	10	(5.7)
OMSII year	16	(9.1)
OMSIII year	69	(39.4)
OMSIV year	35	(20.0)
Desired specialty category upon entering ATSU-SOMA		
Primary Care	89	(50.9)
Needed Specialty	31	(17.7)
Other	49	(28.0)
Undecided	6	(3.4)
Desired specialty category upon graduation		
Primary Care	88	(50.3)
Needed Specialty	47	(26.9)
Other	39	(22.3)
Undecided	1	(0.6)
Student changed mind regarding desired specialty		
Yes	112	(64.0)
No	63	(36.0)

3.4 Match Choice vs. Match Results

As depicted in Table 4, 56.6% of respondents indicated their first choice for residency was primary care and 58.3% ultimately matched with a primary care residency. About one fourth (24.6%) stated their first choice was a needed specialty, with the outcome that 20% matched with a residency in a needed specialty. Nearly half (48.6%) reported an intention to serve in an underserved community after residency.

The distinction between Table 3 and Table 4 with regards to desired program, is that Table 3 depicts student choices in terms of the intended career outcome. This shows that 77.2% of the students desired a career in primary care or a needed specialty. Table 4 demonstrates the residency program the students desired. A student cannot match directly with cardiology or oncology. Therefore, some students who wished to subspecialize matched with a primary care program. Some of these students wish to go on to a needed specialty or another specialty in the future. The data show 78.3% of the students matched with either a primary care or a needed specialty residency.

Table 4. Residency Desired, Residency Program Match and Desire to Serve the Underserved (*n* = 175)

	n (%)	
Residency program desired as OMSIV		
Primary Care	99	(56.6)
Needed Specialty	43	(24.6)
Other	33	(18.9)
Residency program match		
Primary Care	102	(58.3)
Needed Specialty	35	(20.0)
Other	38	(21.7)
Plans to practice in an underserved community after residency		
Yes	85	(48.6)
No	20	(11.4)
Undecided	70	(40.0)

Over half of the students (64%) received their first choice of residency type with an additional 10.9% receiving their second choice of residency type. Similarly, 48.9% of students received their first choice of specific program and 15.5% received their second choice.

3.5 Preparation for Residency and Influences on Residency Choice

When asked whether they had participated in a sub-internship or acting internship during the OMSIII or OMSIV years, 78.3% responded affirmatively. Also, nearly two thirds (62.3%) completed an audition rotation at their first choice residency program.

Students were asked, "How influential were the following in helping you choose your residency specialty type?" Attributes were scored on a 5-point Likert scale of "no influence" to "very strong influence". Table 5 depicts rankings of students' perceived influences on residency choice. Students believed fit with personality, interests and skills, rotations and role models were the greatest influences on residency choices.

Table 5: OMSIV Students' Perceived influences on Residency Choice (n = 175)	Level of Influence n (%)						Rank Biserial Correlation with Match to Primary Care	Rank Biserial Correlation with Match to Needed Specialty
	Very Strong or Strong		Moderate		Minor or None			
Fit with Personality, Interests and skills	148	(84.6)	12	(6.9)	15	(8.6)	0.12	0.14
Elective Rotations	120	(68.6)	33	(18.9)	22	(12.6)	0.18*	0.07
Role Model Influence	99	(56.6)	36	(20.6)	40	(22.9)	0.06	0.05
Core Rotations	97	(55.4)	39	(22.3)	39	(22.3)	-0.01	0.12
Work/Life Balance	94	(53.7)	45	(25.7)	36	(20.6)	0.18*	0.02
Reputation of Program	76	(43.4)	39	(22.3)	60	(34.3)	0.00	0.09
Future Family Plans	75	(42.9)	33	(18.9)	67	(38.3)	0.12	0.09
Geographic Location	72	(41.1)	33	(18.9)	70	(40.0)	0.00	0.19
Ability to work in Underserved Community	68	(38.9)	48	(27.4)	59	(33.7)	0.20*	0.02
Options for Fellowship Training	65	(37.1)	37	(21.1)	73	(41.7)	0.07	0.03
Clinical Science Material	63	(36.0)	47	(26.9)	65	(37.1)	0.13	0.13
Family Expectations	47	(26.9)	37	(21.1)	91	(52.0)	0.17*	0.11
Advising/Mentoring	46	(26.3)	34	(19.4)	95	(54.3)	0.04	0.13
Length of Residency Training	44	(25.1)	46	(26.3)	85	(48.6)	0.04	0.00
Competitiveness of Specialty	43	(24.6)	37	(21.1)	95	(54.3)	0.24**	0.03
Income Expectations	43	(24.6)	43	(24.6)	89	(50.9)	0.24**	0.17
Basic Science Material	33	(18.9)	35	(20.0)	107	(61.1)	0.32**	0.30*
Level of Educational Debt	32	(18.3)	29	(16.6)	114	(65.1)	0.24**	0.03
Specialty Interest group	17	(9.7)	26	(14.9)	132	(75.4)	0.20*	0.06

*Significant, p<0.05, ** p<0.01, two-tailed.

Those factors rated as least influential in determining residency choice (competitiveness of specialty through specialty interest group), were most highly correlated with actual match to primary care. That is, on average, students who matched with a primary care residency tended to rate the influence of these factors lower than students who matched with an "other" residency.

3.6 Bivariate Analyses

The authors explored student characteristics and potential influence parameters to determine any associations with residency match (primary care or needed specialty). The results of cross tabulations between putative predictors of desire for residency and actual match results are in Table 6. The analyses demonstrated the following statistically significant associations.

Students who plan to work in an underserved area were more likely to match with a primary care residency (p = .02). Students with dependents were more likely to match with a needed specialty (p = .03). Table 6 shows that 56.9% of the students who matched with primary care, plan to work in an underserved area. These data demonstrate that 58 of the 85 students (68%) who plan to work in an underserved area matched in primary care.

Table 6. Crosstabulations between potential predictors with residency match results (n = 175)

Variable	Response	Residency Match		
		Primary Care (n=102)	Needed Specialty (n=35)	Other (n=38)
Family Member Physician	Yes	28 (27.5)	12 (34.3)	12 (31.6)
	No	74 (72.5)	23 (65.7)	26 (68.4)
Student's HS Zip code is MUP	Yes	39 (44.3)	15 (44.1)	18 (56.3)
	No	49 (55.7)	19 (55.9)	14 (43.7)
Socio-economically disadvantaged pre-matriculation	Yes	17 (16.7)	7 (20.0)	10 (26.3)
	No	85 (83.3)	28 (80.0)	28 (73.7)
Number of years working at least part time in healthcare field with direct patient contact	0	45 (44.1)	13 (37.1)	17 (44.7)
	1-4	40 (39.2)	17 (48.6)	17 (44.7)
	5 or more	17 (16.7)	5 (14.3)	4 (10.5)
Hours of Community Service	Low	58 (56.9)	19 (54.3)	17 (44.7)
	Medium	4 (3.9)	3 (8.6)	3 (7.9)
	High	40 (39.2)	13 (37.1)	18 (47.4)
Marital Status	Single	60 (58.8)	14 (40.0)	21 (55.3)
	Married	42 (41.2)	21 (60.0)	17 (44.7)
Dependents	Yes	32 (31.4)	18 (51.4)*	10 (26.3)
	No	70 (68.6)	17 (48.6)	28 (73.7)
Military Status	Yes	10 (9.8)	4 (11.4)	8 (21.1)
	No	92 (90.2)	31 (88.6)	30 (78.9)
Educational Debt	< $100,000	11 (10.8)	3 (8.6)	3 (7.9)
	$100,000 - $199,999	11 (10.8)	2 (5.7)	3 (7.9)
	$200,000 - $299,999	37 (36.3)	12 (34.3)	19 (50.0)
	> $300,000	43 (42.2)	18 (51.4)	13 (34.2)
Loan Repayment Program	Yes	56 (54.9)	19 (54.3)	23 (60.5)
	No	46 (45.1)	16 (45.7)	15 (39.5)
Plan to work in underserved area	Yes	58 (56.9)*	14 (40.0)	13 (34.2)
	No and Undecided	44 (43.1)	21 (60.0)	25 (65.8)
Sub-Internship or Acting Intern during years 3 or 4	Yes	83 (81.4)	26 (74.3)	28 (73.7)
	No	19 (18.6)	9 (25.7)	10 (26.3)

*Significant, p<0.05, two-tailed.

4. LIMITATIONS

This study was a pilot project with a sample of two graduating classes from one medical school with a specific mission. The results cannot be generalized to other populations of students. However, the results will focus further research at ATSU SOMA and at other medical schools with similar missions.

This survey-based observational study does not determine causation. Rather, it highlights correlations and areas for future exploration.

As described in the methods, it is not possible to capture residency match with specific needed specialties and residency match with primary care programs might over-represent graduates' intentions toward primary care. This study addressed this by tracking intended specialty, residency desired and match results. Analyses were performed on all outcomes, but did

not render significant differences in correlates. That 77.2% of the students desired a specialty category in either primary care or a needed specialty at the time of graduation and 78.3% matched with a residency program in primary care or a needed specialty suggests the aggregate residency match is a good proxy for intended careers. Future surveys will capture ultimate career paths of SOMA graduates.

5. CONCLUSIONS

Personality fit, role models, and clinical experience were perceived by graduates as significant influences on residency choice. Despite recruiting and admitting students with a significant history of service and an expressed desire for primary care, most students decided on ultimate residency goals during their third or fourth years. Ensuring appropriate primary care and needed specialty experiences with engaging mentors will be important for the future.

Students who wish to work in an underserved community were more likely to desire and match with a residency in primary care. Historically, SOMA has focused on community service during the admissions process. This is evidenced by the 40.6% of the members of the classes of 2011 and 2012 who had over 500 hours of community service logged upon admission. This service orientation persisted, with 85 of the 175 graduating seniors (48.6%) expressing a desire to work in an underserved area. That these students were more likely to go into primary care supports a need to focus on service orientation during the admissions process and during undergraduate training.

Residency and career decisions are complex and individualized. We were surprised that contrary to prior research findings, level of debt[12] did not play a statistically significant role in student choice. We were further surprised by how few statistically significant correlations we found. The results of this and future surveys may refine the admissions process as well as the

curriculum to increase the proportion of graduates who plan for careers in primary care specialties and in needed non-primary care specialties, at this time we suggest a focus on positive experiences.[8] Students perceived clinical experiences and mentors as important influences on residency choice. Providing positive role models for primary care and for needed specialties, as well as providing engaging educational opportunities will be important for the future.

This cohort study has the potential to influence program designs to benefit medical students, medical educators, and organizations concerned with increasing access to primary health care.[25] The perceived importance of role models and experiences can inform, inspire, and support the dedicated faculty mentors of these medical students. Additionally, this study provides a longitudinal model of research that can be replicated and refined each year.

Future research will include evaluating the ultimate practice patterns of graduates. Only when alumni have completed residency training and have entered clinical practice will it be possible to assess whether or not the graduates are serving the health care needs of society.

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