Original Articles

Medical Student Debt and Primary Care Specialty Intentions

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Background and Objectives: *This study's purpose was to evaluate the relationship between medical student debt and primary care specialty choice, while examining the potentially confounding effects of family income and race/ethnicity.* Methods: *A cross-sectional survey was offered to all students at three medical schools between 2006 and 2008. The survey assessed students' anticipated educational debt and intended specialty choice. The relationship between debt and primary care or non-primary care specialty choice was assessed for all students and also for all students stratified by year in medical school, family income level, and racial/ethnic group.* Results: *A total of 983 students participated (response rate 64.1%). Students from lower income families and under-represented minority students anticipated more educational debt. There was no relationship between anticipated debt and career plans when participants were analyzed as a whole. However, among students from middle income families, those anticipating more debt were less likely to plan primary care careers.* Conclusions: *Confounding factors, including income of family of origin, may mask a relationship between debt and specialty choice in observational studies. This study suggests that medical students from middle income families are sensitive to debt when making career choices.*

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The average debt of indebted US medical school graduates is now more than $150,000.[1] If debt levels continue to increase at current rates, graduates of the class of 2033 will use more than 25% of their after-tax income to repay medical school loans for 25 working years.[2] Simultaneously, medical student interest in primary care has substantially declined. As the United States faces a worsening primary care physician shortage, it is vital for educators and policymakers to understand whether high educational debt deters students from choosing primary care careers.

There are reasons to believe that high debt may keep students from choosing primary care. Primary care careers have a lower financial return on investment in education than medical and surgical specialization.[3,4] Residency programs of higher income specialties consistently fill with US medical graduates at higher rates, suggesting that US students are sensitive to income in making career choices.[5] In addition, students and residents with higher levels of debt are more likely to state that debt influences their specialty choices.[6-8] Finally, debt is widely believed by students, residents, educators, and physicians to influence specialty choices.

Despite this, most research to date has not demonstrated a convincing relationship between lower debt and primary care specialty choice.[4,9-15] If a causal relationship exists, it may be confounded by other factors that influence both debt and specialty choice, including socioeconomic status, race, and ethnicity.[2,10,11,16] Students with high debt may also be influenced both toward and away from primary care specialties, because primary care physicians have lower salaries than specialists but typically shorter residency training.

The purpose of this study was to assess the relationship between US medical students' anticipated debt and their career plans. The investigators hypothesized that students who anticipated high debt would be less likely to plan to enter primary care specialties. The investigators also hypothesized that when students were stratified by race/ethnicity and by income of family of origin, an inverse relationship between primary care specialty choice and anticipated debt would emerge or become stronger. Finally, the investigators hypothesized that students with higher debt would give greater

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consideration to potential income and length of training in making specialty choices.

Methods

Study Design and Participants

A cross-sectional survey was offered to all medical students at the University of Michigan Medical School (UM), Michigan State University College of Human Medicine (MSU), and Alpert Medical School of Brown University (Brown) between August 2006 and February 2008. The Institutional Review Board of each school approved the study. The graduating classes of 2007–2010 were surveyed from UM and MSU, and the graduating classes of 2008–2011 were surveyed from Brown.

Students from three diverse medical schools were surveyed. UM is a public, Midwestern medical school with a research focus, integrated with a tertiary academic medical center. Brown is a smaller, private, East Coast medical school. Both of these institutions graduate a large proportion of specialist physicians. MSU is a large, Midwestern, community-based public medical school with a service focus and a relatively large number of primary care graduates.

Survey Instrument

The 75-item survey instrument was piloted among UM family medicine residents for content validity, comprehension, and ease of use. Identical online and paper versions were developed. The survey took approximately 7–10 minutes to complete.

Using an open-ended format, students were asked to report a number, in "today's dollars," estimating their anticipated educational debt at the time of graduation. They were also asked to estimate their "family's annual income growing up" and supply other demographic information. The survey requested that students independently rank the importance of "being well compensated financially" and "length of training" in their specialty decision making, using a scale of "not important," "somewhat important," "important," or "very important." They were also asked to choose a single intended specialty, and students choosing internal medicine, pediatrics, or internal medicine-pediatrics were asked to choose either "primary care focus" or "planning to subspecialize." The subspecialties of internal medicine, pediatrics, and medicine-pediatrics were listed on the survey as informational items.

Survey Administration

Students were invited to participate either in person, online, or both. The principal investigator and medical school administrators recruited students with e-mail messages, brief presentations, and posters. Each student was solicited at least three times. The survey data were collected anonymously, and students were offered a token incentive for participating.

Definitions of Key Measures

"Primary care" was defined as internal medicine, pediatrics, or internal medicine-pediatrics "with a primary care focus" or family medicine. All demographic and financial information was self-reported. Under-represented minority students included all those indicating a non-Caucasian, non-Asian ethnic group.

Data Analysis

The effects of institution and year in medical school upon debt were initially evaluated using a one-way ANOVA. The effect of institution upon career choice was evaluated with the Pearson chi-square test for categorical variables, while the effect of year in medical school upon career choice was evaluated with the Mantel-Haenszel chi-square test of trend for ordinal variables. The institution site was significantly associated with both debt and primary care specialty choice, and year in medical school was significantly associated with primary care career choice (Table 1). Therefore, all further analyses were conducted accounting for this inherently clustered and stratified survey sample.

The study's aim was to evaluate the relationships between medical school debt, family income, race/ethnicity, student-rated importance of income and length of training, and primary care specialty choice. Potentially important variables were assessed with SAS PROC SURVEYREG for the continuous variable (anticipated educational debt) and SAS PROC SURVEYLOGISTIC for the dichotomous variable (primary care specialty choice). After univariate analysis, variables found to have $P \leq .2$ were included in an initial multivariate model controlling for institution and year in medical school and removed in a stepwise fashion, resulting in a final model containing only those variables significant at the $P<.1$ level. Further analysis of the effect of educational debt upon primary care specialty choice was performed with SAS PROC SURVEYLOGISTIC controlling for institution, year in medical school, and variables found to be significant on prior analysis (subjective importance of compensation and length of training). All statistical analyses were conducted using SAS version 9.1 (SAS Institute Inc, Cary, NC).

Results

Study Participants

A total of 1,533 students were eligible and invited to participate in the survey, and 983 students returned surveys adequate for analysis, for an overall response rate of 64.1%. Most respondents (65.4%) completed the survey online.

Table 2 displays the demographic characteristics of respondents and compares them to a national sample of medical students. The race/ethnicity and gender of respondents from each institution were found to be similar to all the students at that institution, as measured

Table 1

US Medical Student Characteristics Associated With Anticipated Educational Debt and Primary Care* Career Plans: Clustering and Stratification Variables

	Number of Respondents (Percentage)	*Mean Debt*	*Standard Deviation of Debt*	*Median Debt*	P *Value*	*Percentage Planning Primary Care Careers*	P *Value*
Institution							
Michigan State University College of Human Medicine	283 (28.8%)	$180,000	$87,000	$180,000	<.0001	20.9%	.002
Alpert Medical School of Brown University	209 (21.3%)	$137,000	$84,000	$150,000		11.0%	
University of Michigan Medical School	491 (50.0%)	$114,000	$81,000	$110,000		12.8%	
Year in Medical School							
First	303 (32.2%)	$146,000	$91,000	$150,000	.18	11.2%	.0003
Second	195 (20.7%)	$141,000	$93,000	$150,000		10.8%	
Third	191 (20.3%)	$132,000	$90,000	$150,000		18.3%	
Fourth	252 (26.8%)	$130,000	$79,000	$150,000		21.0%	

* Primary care defined to include students indicating family medicine or internal medicine, pediatrics, or internal medicine-pediatrics with a "primary care focus."

independently by each school's administration, suggesting that the sample was representative. Compared to a national sample of medical students, the study included slightly more women (54.5% versus 50.2%[17]), and the respondents were slightly younger. Study participants were similar to medical students nationally in family income, race/ethnicity, educational debt, and intended specialty choice. Study sampling was uneven by medical school class, with response rates of 79.1%, 50.1%, 49.9%, and 65.8% for first-, second-, third-, and fourth-year students, respectively. A total of 14.8% of students reported an intention to practice primary care. Of note, first- and second-year students were significantly less likely to indicate interest in a primary care career than third- and fourth-year students (P=.0003). Students from different institutions, and in different graduating classes, were notably different in their anticipated debt levels and career plans (Table 1).

Lower Income Students, Ethnic Minority Students, and Debt

Table 3 lists debt levels and specialty choice plans for students stratified by income of family of origin, race/ethnicity, and assessment of the value of income and length of training in career planning. Mean anticipated educational debt in the study was $138,000. Debt level was strongly correlated with race/ethnicity (Table 3). Students from lower income families anticipated accruing more debt than students from wealthier families (P<.0001). These relationships persisted in multivariate modeling.

Subjective Importance of Compensation and Length of Training

Students' assessments of the importance of "being well-compensated financially" and "length of training" in specialty decision making were not correlated with debt. Students planning primary care careers were more likely to state that "being well-compensated financially" is less important (P<.0001), and "length of training" is more important (P<.0001).

Debt and Primary Care Career Choice

There was no relationship between the absolute amount of anticipated debt and intentions to practice primary care. However, students with any level of debt were twice as likely to choose primary care as students with no debt (16.4% versus 8.0%, P=.05). Compared to those with any debt, students without debt were more likely to be Asian (35.4% versus 20.0%, P<.0001)

Table 2

Characteristics of Study Participants Compared to All US Medical Students

		Michigan State University	*Brown University*	*University of Michigan*	*All Study Participants**	*All US Medical Students***
Number of Participants		283	209	491	983	N/A
Response Rate		59.0%	56.5%	71.9%	64.1%	N/A
Gender	Female	154 (56.2%)	114 (58.5%)	249 (51.9%)	517 (54.5%)	50.2%
	Male	120 (43.8%)	81 (41.5%)	231 (48.1%)	432 (45.5%)	49.8%
Race/ethnicity***	African American	23 (8.9%)	8 (4.8%)	25 (5.4%)	56 (6.3%)	7.5%
	Asian/Pacific Islander	30 (11.6%)	36 (21.5%)	132 (28.8%)	198 (22.4%)	23.7%
	Caucasian	169 (65.2%)	100 (59.9%)	257 (56.0%)	526 (59.4%)	72.8%
	Hispanic	21 (8.1%)	11 (6.6%)	23 (5.0%)	55 (6.2%)	7.1%
	Native American	0	0	5 (1.1%)	5 (0.6%)	1.4%
	Other****	16 (6.2%)	12 (7.2%)	17 (3.7%)	45 (5.1%)	N/A
Age at medical school matriculation*****	Under 20	1 (0.4%)	2 (1.1%)	3 (0.6%)	6 (0.6%)	0.3%
	20–22	114 (43.7%)	120 (65.6%)	346 (73.5%)	580 (63.4%)	45.5%
	23–25	93 (35.6%)	40 (21.8%)	90 (19.1%)	223 (24.4%)	39.2%
	26–28	33 (12.6%)	13 (7.1%)	20 (4.2%)	66 (7.2%)	9.2%
	29 or older	20 (7.7%)	8 (4.4%)	12 (2.6%)	40 (4.4%)	5.8%
Family income	$0–$49,999	58 (24.4%)	21 (12.9%)	42 (10.0%)	121 (14.7%)	16.6%
	$50,000–$99,999	79 (33.2%)	50 (30.7%)	131 (31.0%)	260 (31.6%)	29.1%
	$100,000–$249,999	83 (34.9%)	61 (37.4%)	193 (45.7%)	337 (40.9%)	40.8%
	$250,000 or more	18 (7.5%)	31 (19.0%)	56 (13.3%)	105 (12.8%)	13.5%
Average educational debt†		$180,000	$137,000	$114,000	$138,000	$134,000
Intended specialty††	Primary care	59 (20.8%)	23 (11.0%)	63 (12.8%)	145 (14.8%)	16.9%
	Non-primary care	224 (79.2%)	186 (89.0%)	428 (87.2%)	838 (85.2%)	83.1%

* Nonrespondents for the category of interest are excluded from percentage calculations.
** Association of American Medical Colleges (AAMC). For gender, race/ethnicity, age at matriculation, and family income, Matriculating Student Questionnaire data, as reported annually to individual schools, is used. Non-weighted averages of data from students matriculating in 2003–2007 (the study participants' peers) are reported. For educational debt and intended specialty choice, Graduation Questionnaire data is used.
*** AAMC percentages may not sum to 100%, as multiple responses are allowed.
**** The majority of participants of "other" ethnicities in our survey reported Arabic/Middle Eastern descent.
***** For study participants, age at medical school matriculation is extrapolated based on age and year in medical school at the time of study participation. Age at matriculation, rather than current age, is reported for purposes of comparison with AAMC data.
† This study reports mean anticipated educational debt at medical school graduation, reported by students at various stages of medical school. The AAMC reports mean educational debt, excluding students with no debt, reported by students at graduation, 2008 (most recent year available).
†† 2007 AAMC data is used, because this is the most recent published year for which internal medicine and pediatrics subspecialties are reported separately. AAMC defines primary care as family medicine, general internal medicine, and general pediatrics. This study defines primary care to include family medicine and internal medicine, pediatrics, or internal medicine-pediatrics "with a primary care focus."

and less likely to be from underrepresented minority groups (5.2% versus 19.7%, $P<.0001$). The mean family income of students with no debt was more than twice that of students with any debt ($264,766 versus $112,313, $P<.0001$), and they were much more likely to have a physician parent or relative (21.8% versus 6.9%, $P<.0001$). Students without debt did not differ significantly from their peers in age, gender, or marital status.

Table 4 displays relationships between family income, anticipated debt, and career choice. When examined separately, students from middle income families were less likely to choose primary care as their debt levels increased. Specifically, students from families earning $50,000–$99,999 annually were 0.74 times as likely to choose a primary care career as they moved from a given debt level to a higher debt level, as defined in the study ($P=.01$, RR=0.74, CI=0.61–0.90). There were no significant relationships between debt level and primary care specialty choice for students in other income groups.

When students were stratified by year in medical school and by race/ethnicity, no statistically significant relationships between debt level and primary care specialty intentions emerged.

Table 3

US Medical Student Characteristics Associated With Anticipated Educational Debt and Primary Care* Career Plans: Variables of Interest**

	Number of Respondents (Percentage)	*Mean Debt*	*Standard Deviation of Debt*	*Median Debt*	P *Value*	*Percentage Planning Primary Care Careers*	P *Value*
Income of Family of Origin							
$0–$49,999	121 (14.7%)	$162,000	$97,000	$150,000	<.0001***	19.8%	.09
$50,000–$99,999	260 (31.6%)	$147,000	$77,000	$150,000		18.5%	
$100,000–$199,999	266 (32.3%)	$141,000	$85,000	$150,000		13.2%	
$200,000 or more	176 (21.4%)	$94,000	$90,000	$80,000		13.1%	
Race/Ethnicity							
Asian American	198 (22.4%)	$113,000	$88,000	$111,000	.004****	11.6%	NS
Caucasian	526 (59.4%)	$138,000	$85,000	$150,000		16.5%	
Under-represented minorities*****	161 (18.2%)	$162,000	$94,000	$150,000		18.0%	
Assessment of "Being Well Compensated Financially" in Specialty Choice							
Not important	104 (10.8%)	$124,000	$82,000	$120,000	NS	32.7%	<.0001
Somewhat important	353 (36.6%)	$131,000	$87,000	$140,000		19.8%	
Important	390 (40.5%)	$146,000	$86,000	$150,000		9.0%	
Very important	117 (12.1%)	$144,000	$102,000	$150,000		5.1%	
Assessment of "Length of Training" in Specialty Choice							
Not important	175 (18.2%)	$132,000	$91,000	$150,000	NS	9.7%	<.0001
Somewhat important	366 (38.1%)	$137,000	$83,000	$140,000		14.8%	
Important	325 (33.8%)	$147,000	$92,000	$150,000		16.9%	
Very important	96 (10.0%)	$121,000	$87,000	$130,000		18.8%	
All respondents	983	$138,000	$88,000	$150,000	N/A	14.8%	N/A

* Primary care defined to include students indicating family medicine or internal medicine, pediatrics, or internal medicine-pediatrics with a "primary care focus"
** All analyses conducted within a model accounting for clustering and stratification of participants within institution and year in medical school (see Table 1).
*** The following pairwise comparisons with $P<.05$: $0–49,999 versus $200,000 or more, $50,000–$99,999 versus $200,000 or more; $100,000–$199,999 versus $200,000 or more.
**** All pairwise comparisons < .05.
***** Under-represented minority students include all those who indicated a non-Caucasian, non-Asian ethnic group, including African-American, Latino(a), Native American, and Middle Eastern students.

Discussion

Medical Student Debt and the Physician Workforce

When analyzed as a whole group, anticipated debt level had no association with medical students' plans to pursue a primary care or subspecialty career. Even students who anticipated debt levels greater than $225,000 were as likely to plan a primary care career as their peers. Interestingly, the 100 students who expected to be debt free at graduation were about half as likely to plan primary care careers, compared to their peers with any debt. These students, on average, come from wealthy families.

However, when students from middle income families were examined separately, those with more debt were less likely to choose primary care. These students may be less likely than more affluent students to have the financial support of their families in the event of economic difficulties, which may make them less comfortable with the risk inherent in accumulating large amounts of debt. Although this finding was not statistically significant for the subgroup of 121 students (14.7%) from families earning less than $50,000 per year, the relationship between debt and specialty choice may warrant further investigation with a larger population of lower income medical students.

The relationship between debt and primary care specialty choice among middle income students is very concerning. Students from relatively low income families are at greater risk of incurring high debt,[18] and previous literature has demonstrated that they are more inclined to choose primary care than their peers.[19] Thus, debt may be shaping the physician workforce

Table 4

US Medical Students' Anticipated Educational Debt and Primary Care* Career Plans Stratified by Family Income**

Anticipated Educational Debt	*Number of Respondents (Percentage)*	*Mean Debt*	*Standard Deviation of Debt*	*Median Debt*	*Percentage Planning Primary Care Careers*	P *Value*
All Students						
$0–$74,999	216 (24.1%)	$21,000	$24,000	$10,000	15.7%	
$75,000–$149,999	217 (24.2%)	$107,000	$18,000	$100,000	16.6%	.90
$150,000–$224,999	350 (39.0%)	$181,000	$22,000	$180,000	14.9%	
$225,000 or more	115 (12.8%)	$284,000	$54,000	$270,000	14.8%	
No debt	100 (10.2%)	$0	$0	$0	8.0%	.05
Any debt	798 (88.9%)	$155,000	$78,000	$150,000	16.4%	
Income of Family of Origin <$50,000 Per Year						
$0–$74,999	19 (15.8%)	$39,000	$25,000	$50,000	36.8%	
$75,000–$149,999	37 (30.8%)	$102,000	$17,000	$100,000	24.3%	.19
$150,000–$224,999	36 (30.0%)	$182,000	$22,000	$195,000	8.3%	
$225,000 or more	28 (23.4%)	$301,000	$65,000	$300,000	17.9%	
Income of Family of Origin $50,000–$99,999 Per Year						
$0–$74,999	42 (16.3%)	$27,000	$21,000	$30,000	28.6%	
$75,000–$149,999	77 (29.8%)	$111,000	$19,000	$115,000	16.9%	.01
$150,000–$224,999	105 (40.7%)	$181,000	$22,000	$200,000	18.1%	
$225,000 or more	34 (13.2%)	$273,000	$38,000	$250,000	11.8%	
Income of Family of Origin $100,000–$199,999 Per Year						
$0–$74,999	59 (22.4%)	$22,000	$25,000	$10,000	11.9%	
$75,000–$149,999	54 (20.5%)	$104,000	$17,000	$100,000	11.1%	.19
$150,000–$224,999	123 (46.8%)	$183,000	$21,000	$190,000	13.8%	
$225,000 or more	27 (10.3%)	$287,000	$55,000	$275,000	14.8%	
Income of Family of Origin >$200,000 Per Year						
$0–$74,999	83 (49.1%)	$15,000	$22,000	$0	7.2%	
$75,000–$149,999	25 (14.8%)	$104,000	$18,000	$100,000	24.0%	.22
$150,000–$224,999	48 (28.4%)	$177,000	$21,000	$180,000	16.7%	
$225,000 or more	13 (7.7%)	$275,000	$50,000	$260,000	7.7%	

* Primary care defined to include students indicating family medicine or internal medicine, pediatrics, or internal medicine-pediatrics with a "primary care focus"
** All analyses conducted within a model accounting for clustering and stratification of participants within institution and year in medical school (see Table 1.)

in a way that is important but not easily visible. This study demonstrates that students' origins, including their socioeconomic status and their race and ethnicity, have a dramatic impact on their debt. Race, ethnicity, and family income are also closely related to students' values, goals, and income expectations, which have been demonstrated in previous studies to correlate with primary care career plans.[20] The effect of debt may be difficult to capture in cross-sectional studies that are not designed to integrate these complex factors.

Some researchers have hypothesized that students with high debt may be enticed toward primary care by the relatively short residency training period, allowing students to reach their peak income and begin paying off debt sooner. However, the study did not demonstrate that students with higher debt place more value on length of training.

Limitations

The study has several important limitations. Students from only three US medical schools were included. However, the investigators attempted to include schools with diverse educational cultures, and the responding students were fairly comparable to all medical school

graduates in demographics and specialty choices. To simplify the analysis, all underrepresented minority students, all Caucasians, and all Asian-American students were grouped together, which greatly oversimplifies the diversity within these groups. The effect of scholarships and loan repayment programs on the population was not assessed. Students' self-reported anticipated debt levels may not be accurate. However, the students' average anticipated educational debt is comparable to the actual debt reported by recent graduates nationally. Similarly, family income estimates were self-reported and may not be accurate. Students' career preferences were also assessed at a single point in time and may not remain stable. However, students are less likely to switch between primary care and subspecialties than to make changes within these broad categories.[20] Thus, the categories of interest for this study change less often than specific specialty choices. The percentage of students in the sample indicating a primary care preference also reflects national trends.

Finally, one of the most important findings of this study—the relationship between debt and specialty choice among students from middle income families—is based on a subgroup analysis, rather than a dedicated study of this population. However, this analysis was planned *a priori*, and the findings are logical and consistent with the hypothesis.

Conclusions

Debt burden does not appear to correlate with medical students' career plans when students are examined in aggregate. However, ethnic minority students and students from lower income families are more likely to have high educational debt. These factors may mask a relationship between debt and specialty choice in observational studies. In this study, students from middle income families (earning $50,000–$99,999 annually) were less likely to plan primary care careers as their debt level increased.

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