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Title VII funding not associated with practice outcomes in cross-sectional study of physicians graduating medical school between 2004-2010

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I. Introduction

Title VII, Section 747, of the *Public Health Service Act*, reauthorized by the *Affordable Care Act*, directs funding to medical schools and residency programs to strengthen the primary care workforce in underserved communities. Previous research found that physicians who attended a medical school that received Title VII funding were more likely to practice in primary care, locate in underserved communities (i.e. health professional shortage areas [HPSAs], rural, and low-income areas), practice in Community Health Centers, and participate in the National Health Service Corps loan repayment program.[1-4] The most recent of these studies used physicians' location and practice characteristics in 2003.

II. Methods

This study used data from 2016 AMA Physician Masterfile (AMA MF), the Area Health Resource File (AHRF), the American Community Survey, the Integrated Postsecondary Education Data System (IPEDS), Title VII grants data from the HRSA Data Warehouse, and NHSC participant data obtained from HRSA. The analysis categorized physicians as either having attended or not attended a Title VII-funded medical school based on whether their medical school received Title VII funding during the time they were in school. The sample of physicians analyzed was derived from pooled data on physicians who graduated from medical school between 2004 and 2010. We conducted a cross-sectional analysis of the practice outcomes of these graduates based on their reported characteristics in the 2016 Masterfile. Physicians were categorized as practicing in whole county HPSA, in urban versus rural counties based on Rural Urban Continuum Codes and in a low socioeconomic status county based on a composite measure of socioeconomic factors. Physicians were identified as primary care practitioners if their primary specialty in the AMA MF was in family medicine, general internal medicine, or general pediatrics. NHSC loan repayment program participation was also included as an outcome in the analysis. We used multivariable logistic regression to control for physician gender, graduation year, residency completion year, whether the physician participated in NHSC loan repayment program (in all models except when NHSC was considered an outcome), whether the medical school attended was in the top 30 US News and World Report rankings in either 2004 or 2010, whether the medical school is a public school, and whether the medical school is located in a nonmetropolitan county. Standard errors were clustered by medical school.

Conclusions and Policy Implications

1) This cross-sectional study analyzed the practice outcomes in 2016 of physicians who graduated from medical schools between 2004 and 2010. Physicians whose medical school received Title VII funding during their education were compared to physicians who attended medical schools that did not receive Title VII funding.

2) Exposure to Title VII funding in medical school was not associated with meaningful differences in a physician's probability of practicing in a rural county, whole county HPSA, low SES county, primary care specialty, or participation in the NHSC.

3) A longitudinal analysis that examines trends before and after receiving Title VII funds and more years of data are needed to more systematically examine the outcomes of Title VII funding. Such a study could account for physicians' length of training; secular trends affecting medical schools and physician behavior; as well as time-invariant, unobserved characteristics of medical schools.

III. Findings

Between 2004 and 2010, 120 schools received Title VII funding for at least one year and 27 schools did not receive Title VII funding in any year. Medical schools receiving Title VII funding graduated a larger number of physicians and were

more likely to be public schools. No other characteristics were statistically significant (Table 1). In bivariate comparisons, physicians who attended a medical school that received Title VII funding for at least one year during their medical education were significantly less likely to practice as a primary care physician, less likely to practice in a rural county, less likely to practice in a whole county HPSA, but more likely to practice in a low SES county relative to physicians who attended medical schools that did not receive Title VII funding (Table 2). These differences are relatively small in magnitude and are likely statistically different due to the large sample size and lack of controlling for other factors that affect specialty and practice location.

After adjusting for control variables, there were no statistically significant associations between any exposure to Title VII grants while in medical school and practice in a primary care specialty, rural area, low SES county, or participation in the NHSC in either the whole sample or a primary care physician subset (results not shown). The only statistically significant relationships were between type of Title VII grant and practicing in a whole county HPSA, and between level of Title VII funding and practicing in a whole county HPSA. Specifically, among primary care physicians, being exposed to both pre-doctoral and departmental Title VII grants during medical school was associated with having a 0.64 percentage point lower probability of practicing in a whole HPSA county relative to those who were not exposed to any Title VII funding. While statistically significant, this result is small in magnitude. The amount of funding received by a medical school was statistically significantly and negatively associated with practicing in a whole county HPSA in the full model and for primary care physicians alone. The average marginal effects were -0.01 and -0.04 in the full model (i.e. all physicians) and primary care physicians, respectively, which represents a 0.01 and 0.04 percentage point lower probability of practicing in a whole county HPSA for an additional $100,000 in Title VII funding. These results, while statistically significant, are extremely small in magnitude.

IV. Conclusion

Title VII funding was not associated with meaningful differences in medical students ultimately practicing in rural counties, whole county HPSAs, low SES counties, primary care, or participating in the NHSC. These findings differ from earlier analyses which may be due to differences in the data and methodological approaches used and/or the use of more recent data. Fryer and colleagues found positive and significant associations between attending Title VII funded medical schools and practice in primary care, rural areas, and HPSAs, though these findings were based on unadjusted odds ratios which do not control for any observed characteristics of the physicians or medical schools other than receipt of Title VII funding.[2] Rittenhouse and colleagues found that, among primary care physicians, attending a medical school that received a Title VII predoctoral grant was associated with increased likelihood of participating in the NHSC.[4] They did not identify a statistically significant association between attending a medical school that received a Title VII academic unit grant and likelihood of NHSC participation. Importantly, however, the authors did not cluster their standard errors in the logistic regression models to account for clustering of physicians within schools, so their confidence intervals are likely too narrow and p-values artificially small.

V. Policy Implications

Longitudinal evaluations that can provide causal estimates are needed. In particular, a study with substantial historical data on medical schools and physicians (e.g. 15 to 30 years) with outcomes over that same period (e.g. using claims data to identify whether a physician actually practiced in a given area in each year) is needed to account for the length of physician training. Such a dataset would also allow researchers to examine outcomes before and after receiving Title VII funds relative to schools that did not receive it, while accounting for secular trends affecting all medical schools and physicians as well as time-invariant unobserved characteristics of medical schools. This type of analysis would be better suited than a cross-sectional study at identifying and isolating the effect of Title VII funding on outcomes. This is the only approach that would allow analysts to draw definitive conclusions on the effect of medical schools receiving Title VII funding on outcomes.

Table 1. Descriptive statistics for medical schools, 2004-2010

Characteristic	Did not receive Title VII funding (n = 27)	Received Title VII funding (n = 120)	P-value
Total number of physicians graduated, mean (SD)	556.15 (360.68)	793.68 (293.75)	<0.001[a]
Not in top 30 USNRW rankings, n (%)	23 (85.2%)	93 (77.5%)	0.45[b]
In top 30 USNRW rankings, n (%)	4 (14.8%)	27 (22.5%)	
Private, n (%)	18 (66.7%)	48 (40.0%)	0.018[b]
Public, n (%)	9 (33.3%)	72 (60.0%)	
Outcome measures			
% of physicians with primary care specialty (2016), mean (SD)	28.6% (11.4%)	27.1% (6.7%)	0.39[a]
% practicing rural county (2016), median (IQR)	4.4% (2% - 10%)	4.6% (2.7% - 7.6%)	0.88[c]
% practicing in whole county HPSA (2016), median (IQR)	0.83% (0.28% - 1.5%)	0.55% (0.30% - 1.21%)	0.28[c]
% participated in NHSC LRP, mean (SD)	1.5% (1.0%)	1.4% (0.88%)	0.49[a]
% practicing in low SES county (2016), mean (SD)	31.3% (11.7%)	29.9% (13.1%)	0.60[a]
Total funding amount received, in $100,00s, median (IQR)	--	$24.06 ($12.04 - $44.83)	--
Funding per student per year, median (IQR)	--	$413.79 ($265.23 - $616.41)	--

[a]T-test, [b]Fisher's exact test, [c]Wilcoxon rank-sum test

Table 2. Descriptive statistics for physicians who graduated from medical school between 2004-2010

Characteristic	Did not receive Title VII funding (n = 22,371)	Received Title VII funding (n = 83,981)	P-value[a]
Specialty, n (%)			
Non primary care	15,858 (70.9%)	61,166 (72.8%)	<0.001
Primary care	6,513 (29.1%)	22,815 (27.2%)	
NHSC LRP participation, n (%)			
Did not participate	22,012 (98.4%)	82,767 (98.6%)	0.080
Participated	359 (1.6%)	1,214 (1.4%)	
Practice location, n (%)			
Urban	20,972 (93.7%)	79,121 (94.2%)	0.008
Rural	1,399 (6.3%)	4,860 (5.8%)	
HPSA designation, n (%)			
Not whole county HPSA	22,129 (98.9%)	83,296 (99.2%)	<0.001
Whole county HPSA	242 (1.1%)	685 (0.8%)	
County SES, n (%)			
High SES	15,976 (71.4%)	59,000 (70.3%)	<0.001
Low SES	6,395 (28.6%)	24,981 (29.7%)	
Number of years exposed to Title VII funding during medical school, median (IQR)	--	4 (3 - 4)	--
Funding amount during medical school, $100,000s, median (IQR)	--	$11.06 ($5.10 - $18.81)	--

[a]Chi-squared test

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