



## Written Testimony in Support of HB 290

Madam Chair, and members of the Health and Government Operations Committee, thank you for the opportunity to provide written support in favor of HB290. My name is Alexandra Fitzgerald and I am a general dentist practicing in Frederick, Maryland. Along with providing care in a private practice setting, I additionally serve as the President-Elect of the Maryland State Dental Association (MSDA).

Expanding the Maryland Dent-Care Loan Assistance Repayment Program may play a large role in encouraging dentists to serve the underserved of Maryland. According to the ADA Health Policy Institute, US dental school enrollment is surging at 26,228 students enrolled – the most ever. This will translate to an increase in the number of practicing dentists. Additionally, there are now 70 dental schools in the United States, compared to 54 in 2000. In 2020, nationally the average dental school graduated \$304,824 in student loan debt. Looking more closely at the University of Maryland Baltimore and its professional programs: the 2019 DDS graduates had \$253,313 in student loan debt, over \$100,000 more than the MD graduates at \$151,725, who also completed a 4-year doctoral program. Student debt can play a factor in the decisions of whether to specialize, where to work, and practice modality. I have attached an article from the Journal of the American Dental Association that expands upon these relationships. There is a tendency to migrate to where practices are well established, where the population of patients can best afford and avail themselves to receive dental care. Expanding the Maryland Dent-Care Loan Assistance Repayment Program may play a large role in encouraging dentists and dental hygienists to serve the underserved of Maryland.

There are additional portions of this bill that will expand upon the importance of oral health. Establishing guidelines for dental screenings for children in child care and school systems will lead to an opportunity for providers to discuss this importance with both our pediatric patients and their caregivers. It will also require the Department of Health to distribute material in plain language to better discuss the variety of dental procedures to be performed and the importance of regular dental care on a person's systemic health. The conclusions of the Oral Health Task Force established in 2021 have been well-documented and this legislation has the potential to improve the health of Marylanders for decades to come.

Thank you,

Alexandra Fitzgerald, DDS

MSDA President-Elect

# The relationship between education debt and career choices in professional programs

## The case of dentistry

Kamyar Nasseh, PhD; Marko Vujcic, PhD

**R**elative to average annual dentist earnings, dental school debt has increased substantially over the past 20 years. The ratio of debt to income has increased from approximately 70% in 1996 to approximately 97% in 2010.<sup>1</sup> As one of us has written, some speculate that dentistry might be showing signs of an education bubble.<sup>1</sup> Since 2000, inflation-adjusted annual dentist earnings have remained flat. Although dentists reported increased busyness levels in 2015 compared with those in previous years, there is still unused capacity in the dental care system.<sup>2</sup> Since 2005, the supply of dentists per capita has expanded and is projected to increase in the future.<sup>3</sup> The demand for dental services among working-age adults has decreased steadily since 2003.<sup>4</sup> These combined trends could put downward pressure on future dentist earnings.

There is mixed evidence about whether education debt has an association with career choice. For physicians, results from some studies did not indicate a statistical relationship between education debt and residency preferences.<sup>5-7</sup> However, results from other studies, such as that by Colquitt and colleagues,<sup>8</sup> showed that education debt can induce students to choose a

### ABSTRACT

**Background.** The authors examined the relationship between education debt and career choice, particularly dentists' decisions to specialize, participate in public health insurance programs, and join dental management service organizations (DMSOs).

**Methods.** The authors used data from the American Dental Association 2015 office database, which contains dentist demographic information and identifies dentists who participate in public health insurance programs for pediatric dental care services. The authors merged this database with the 2002-2015 American Dental Association Survey of Dental Graduates, which contains information about education debt, to assess the relationship between education debt and career choices. The authors used probit and multinomial logit models to determine the relationships among education debt, demographic characteristics, and dentist career choices.

**Results.** For each \$10,000 increase in education debt, dentists were 0.9% more likely to join a DMSO (relative risk ratio, 1.009; 95% confidence interval, 1.0021 to 1.0164) and 0.6% less likely to join a non-DMSO group practice (relative risk ratio, 0.994; 95% confidence interval, 0.9897 to 0.9987) over a solo practice. Education debt did not have a statistically significant association with the decision to participate in public health insurance programs, but it did have a statistically significant association with the decision to specialize.

**Conclusions.** Education debt had a modest association with some career choices among dentists. Demographic characteristics, such as race and sex, had a greater association.

**Practical Implications.** Dental education debt has increased substantially in recent years. Debt had only a modest association with some career choices. Policy makers could consider this when considering education debt relief.

**Key Words.** Education debt; dental management service organizations; career choice; Medicaid participation.

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career in family practice or internal medicine. Results from other studies have shown that increased medical school debt deters graduates from pursuing a career in primary care or internal medicine.<sup>9-16</sup> However, Frintner and colleagues<sup>17</sup> showed that increased education debt among pediatrics medical residents was associated with an increased likelihood of entrance into a primary care practice and a lower likelihood of matriculation into a fellowship program. Salter and Kimball<sup>18</sup> found that education debt does not affect the choice to enter a solo practice but could affect the decision to enter into a fellowship. Results from another study showed that education debt has only a small overall effect on specialty choice.<sup>19</sup>

Investigators also have analyzed the potential of dental school debt to influence dentists' career choices, including Medicaid participation or practice ownership.<sup>24,25</sup> Nicholson and colleagues<sup>26</sup> concluded that dentists with high education debt were more likely to enter private practice and work longer hours. However, the authors did not find a relationship between education debt and practice ownership, setting of practice, or the decision to participate in Medicaid. Wancheck and colleagues<sup>27</sup> found that increased debt makes dental graduates more likely to choose private practice over government service, advanced education, and teaching. These study investigators concluded that the overall association of education debt with dentist career choice is small. Demographic characteristics such as sex and race have a bigger association with dentists' career choices.<sup>26,27</sup> Investigators in other studies also concluded that increased education debt levels make it less likely for dentists to specialize.<sup>22,26,28</sup>

In this article, we examine the relationship between education debt and 3 career choices. The first is whether to join a dental management service organization (DMSO) or a non-DMSO group practice or practice as a nonaffiliated solo dentist. DMSOs are entities that offer management services to dental practices.<sup>29</sup> A number of characteristics distinguish DMSOs from other dental organizations.<sup>30</sup> Many DMSOs identify under a particular brand name. Depending on state law, a DMSO practice can be owned by a single dentist, a group of dentists, a private equity firm, or an outside corporation. Some states require dentists to own a dental practice. Dentists employed by a DMSO can be owners, partners, or employees of a corporation. To our knowledge, investigators have not attempted previously to measure the relationship between education debt and graduates' likelihood of joining a DMSO.

The second career choice is whether to participate in pediatric public health insurance programs (Medicaid or the Children's Health Insurance Program [CHIP]). Although previous researchers examined the link between education debt and Medicaid participation<sup>26</sup> and between Medicaid reimbursement and Medicaid participation,<sup>31,32</sup> we also control for practice type (for

example, DMSO) in our analysis. Finally, we measure the relationship between education debt and the decision to specialize.

## METHODS

**Data and sample selection.** Previous researchers primarily used survey data to measure education debt, Medicaid participation, practice type, and specialization. However, in our research, the main outcome variables are based on administrative data rather than being self-reported by dentists. We use Medicaid provider participation data from the Centers for Medicare & Medicaid Services (CMS), DMSO data from a list of DMSO companies, dentist office data from the American Dental Association (ADA) 2015 office database, and education debt data from the 2002-2015 ADA Survey of Dental Graduates (SDG). We believe that these sources of data are more representative of the dentist workforce in the United States.

The 2015 ADA office database is based on a snapshot of professionally active dentists listed in the ADA master file as of November 2015. The ADA master file, a census of dentists in the United States, is used as the primary source of all business addresses in the office database. Business addresses are fed into the ADA master file via the ADA Distribution of Dentists survey, the 2002-2015 ADA SDG, and state and local dental associations. We also merged business address data from the National Provider Identifier dentist registry, which is maintained by CMS.<sup>33</sup> From the ADA master file, we merged demographic data, including dentist specialty, race or ethnicity, sex, age, year of graduation, and school of graduation, into the office database. We identified DMSO group practice locations and dentists by using a list of companies provided by the Association of Dental Support Organizations (ADSO).<sup>34</sup> From September through December 2015, we visited the websites of 138 group practices, including all ADSO members based in the United States for whom we could find websites identifying dentists and office locations. We considered a dentist to be affiliated with a DMSO if at least 1 of his or her 2015 practice locations was a member of ADSO or part of American Dental Partners, Western Dental Services, or Kool Smiles (3 large DMSOs that are not members of ADSO). We considered a dentist to be affiliated with a non-DMSO group practice if his or her practice consisted of more than 1 dentist or more than 1

**ABBREVIATION KEY.** ADA: American Dental Association. ADSO: Association of Dental Support Organizations. CHIP: Children's Health Insurance Program. CMS: Centers for Medicare & Medicaid Services. DMSO: Dental management service organization. FQHC: Federally Qualified Health Center. GP: General practice. IKN: Insure Kids Now. SDG: Survey of Dental Graduates.

location. Using exact and fuzzy matching methods, we flagged dentists in the ADA office database as affiliated with DMSO or non-DMSO group practices.

We flagged dentists participating in public health insurance in the ADA office database by using data from Insure Kids Now (IKN), a website maintained by CMS that identifies dentists who participate in Medicaid or CHIP.<sup>35</sup> For each state, CMS provided us a full list of Medicaid and CHIP providers in September, October, and November 2015. After removing duplicate observations, we used fuzzy matching methods to merge IKN records into the ADA office database. In instances in which IKN provided only the address of a Medicaid or CHIP participating location but no dentist information, we considered all dentists working at that address as public health insurance providers. Finally, on the basis of November 2015 street address data provided by the Health Resources and Services Administration,<sup>36</sup> we identified dentists in the ADA office database working at Federally Qualified Health Centers (FQHCs). We considered all dentists working at FQHCs to be public health insurance providers.

After merging data from the ADA master file, National Provider Identifier dentist registry, Health Resources and Services Administration FQHC file, and IKN, the 2015 ADA office database had 194,851 professionally active dentists, 188,894 of whom we were able to assign an office location (Table 1). To determine the education debt of professionally active dentists, we merged data from the 2002-2015 ADA SDG into the ADA office database. Most dental graduates receive this survey within 1 year after graduating from dental school. The composite response rate for the 2002-2015 ADA SDG was 59.7% based on 47,866 responses to 80,225 surveys. Respondents were asked to report their education debt at the time of their graduations. As of November 2015, 45,885 professionally active dentists had a record in the 2002-2015 ADA SDG and the 2015 ADA office database. From these records, 24,866 dentists reported their education debt. We restricted our sample to dentists from the ages of 24 through 50 years who graduated from a dental school in the United States and had education debt at or below \$600,000. After eliminating records with inconsistent graduation and survey years and missing observations on race or ethnicity, our final sample contained 24,573 dentists.

Our dentist-level file included the following variables: education debt, age, sex, race or ethnicity (white, African American, Hispanic, Asian, other race), public health insurance participation, practice type (DMSO group practice, non-DMSO group practice, nonaffiliated solo practice), the state where the primary business practice is located, whether the office location is urban or rural, specialty (general practice [GP] dentist, pediatric dentist, other specialist), dental school type (private or public), and graduation year. We inflated education debt to 2014

TABLE 1

<b>Sample selection.*</b>	
<b>CRITERION</b>	<b>NO. OF DENTISTS</b>
<b>ADA† Masterfile of Professionally Active Dentists</b>	194,851
<b>No. of Dentists With an Assigned Office Location</b>	188,894
<b>No. of Dentists in ADA Masterfile Surveyed by Survey of Dental Graduates From 2002-2015</b>	45,885
<b>No. of Dentists Who Reported Education Debt and Are in ADA Masterfile With an Assigned Office Location</b>	24,866
<b>Survey Year Not Consistent With Graduation Year</b>	24,845
<b>Graduation Year Before 2001</b>	24,839
<b>Age at Graduation From 24 Through 50 years</b>	24,784
<b>Nonmissing Race or Ethnicity</b>	24,668
<b>Attended Dental School in the United States</b>	24,599
<b>Education Debt at or Below \$600,000</b>	24,573
* Source: 2015 ADA office database and 2002-2015 ADA Survey of Dental Graduates.	
† ADA: American Dental Association.	

dollars by using the Consumer Price Index All Items Index.<sup>37</sup> To this dentist-level file, we merged a state-level policy variable: the Medicaid ratio of fee to commercial charge for a pediatric prophylaxis procedure (Current Dental Terminology code D1120<sup>38</sup>). For each state, we collected the Medicaid reimbursement fee in 2015 for D1120. Also at the state level, we computed the average commercial insurance charge for D1120 by using 2015 data from FAIR Health. From these 2 variables, we computed the Medicaid ratio of fee to commercial charge for D1120.

**Methodology.** To measure the statistical association between education debt at graduation and dentist career choices, we ran a series of regression models. In our first model, we used a multinomial logit model to regress the provider type categorical variable on education debt, controlling for age, sex (reference category: male), graduation year, race or ethnicity (reference category: white), and whether the dentist attended a private dental school. In this regression model, we used nonaffiliated solo practice dentists as the baseline category for practice type career choice. In our second career choice model, we also used a multinomial logit model to measure the statistical association between choice of dental specialty and education debt, controlling for the same variables as in the provider type career choice model. In this multinomial logit model, we used GP dentists as the baseline category for specialty career choice. To account for correlation in unobserved school characteristics among dentists who attended the same dental school, we clustered standard errors according to dental school.

We calculated relative risk ratios to determine whether education debt and the control variables had a positive or negative relationship to career choice

TABLE 2

Summary statistics.*	
VARIABLE	MEAN (STANDARD DEVIATION)
Age at Graduation, y	28.62 (3.46)
Current Age, y	36.4 (5.34)
Female, %	0.44 (0.50)
Total Education Debt in 2014 Dollars, in Thousands	19.45 (11.27)
No Education Debt, %	0.08 (0.27)
White, %	0.72 (0.45)
African American, %	0.04 (0.19)
Hispanic, %	0.05 (0.21)
Asian, %	0.18 (0.38)
Other Race, %	0.02 (0.14)
DMSO† Group Dentist, %	0.11 (0.32)
Non-DMSO Group Dentist, %	0.74 (0.44)
Solo Dentist, %	0.15 (0.36)
Medicaid, CHIP,‡ or FQHC§ Dentist, %	0.48 (0.50)
General Practice Dentist, %	0.81 (0.39)
Pediatric Dentist, %	0.05 (0.23)
Other Specialist, %	0.13 (0.34)
Rural Dentist, %	0.11 (0.32)

\* Source: 2015 American Dental Association office database and 2002-2015 American Dental Association Survey of Dental Graduates.  
† DMSO: Dental management service organization.  
‡ CHIP: Children's Health Insurance Program.  
§ FQHC: Federally Qualified Health Center.

decisions. In the provider type career choice multinomial logit model, a relative risk ratio greater than 1.0 indicates that an increase in the explanatory variable of interest is associated with an increased probability that a dentist will choose to join a DMSO or non-DMSO group practice over a nonaffiliated solo practice. In the dental specialty career choice multinomial logit model, a relative risk ratio greater than 1.0 indicates that an increase in the explanatory variable of interest is associated with an increased probability that a dentist will choose a career in pediatric dentistry or other specialty over GP dentistry.

In our final career choice model, we used a probit model to regress dentist participation in Medicaid or CHIP on education debt, practice type, specialty, age, sex, race or ethnicity, whether the dentist practiced at a rural location, whether the dentist attended a private school, and the Medicaid ratio of fee to commercial charge for a pediatric prophylaxis procedure (D1120). For this model, we clustered standard errors according to state because Medicaid policy is determined at the state level. We also included a state-level policy variable, the Medicaid ratio of fee to commercial charge for a pediatric prophylaxis procedure, in our regression. We calculated marginal effects to determine the relative effects of the independent variables on dentist

participation in Medicaid or CHIP. The regression models used in this analysis address only statistical association, not causation.

**Limitations.** We acknowledge that our categorization of group practices and nonaffiliated solo practices is not optimal. Ideally, we would group practices that share revenues and expenses, but we are not able to do this with our data. In addition, some practices that we categorize as non-DMSO group practices may be DMSO group practices that are not ADSO members, but we have no way of identifying such group practices. This is why we decided to use a list of organizations provided by ADSO<sup>34</sup> to identify DMSOs. Our definition of both non-DMSO and DMSO group practices may result in underestimation of the number of solo-practice dentists. Another limitation in our analysis is that we cannot control for generational preferences in our career choice models. We control for age, but our data do not allow us to control for individual preferences. We also do not have data on the salary offerings made by DMSOs or other types of practices. If DMSOs offer new dental graduates higher salaries out of dental school, this could affect career choice.

## RESULTS

In Table 2, we present summary statistics for key demographic and career choice variables used in our analysis. Average age as of graduation was 29 years and average current age was 36 years. Inflation-adjusted education debt was approximately \$194,000. Eight percent reported no education debt. In our sample, 81% of dentists were GPs, 5% were pediatric dentists, and 13% practiced another specialty. Eleven percent of dentists were in a DMSO group practice, 74% were in a non-DMSO group practice, and 15% were in a nonaffiliated solo practice. Forty-eight percent of dentists in our sample participated in Medicaid or CHIP. Forty-four percent of dentists in our sample were female, and 72% were white. Eleven percent of dentists practiced in a rural location.

As Table 3<sup>37</sup> shows, inflation-adjusted dental school debt increased from approximately \$144,000 in 2001 to \$245,000 in 2014, a 70% increase. Among private dental school graduates, education debt increased from \$190,000 to approximately \$294,000, a 55% increase. Education debt among dentists who attended a public dental school increased from \$114,000 in 2001 to \$215,000 in 2014, an 88% increase. The percentage of recent graduates who reported no education debt remained constant from 2001 (9.4%) to 2014 (8.3%).

In Table 4, we show career choices according to graduation year. Recent graduates were more likely to join a DMSO and were less likely to be in a nonaffiliated solo practice. Furthermore, dentists who recently graduated were more likely to be GP dentists than specialists. However, this finding is not surprising given that it takes

TABLE 3

Education debt according to graduation year (in thousands).*				
GRADUATION YEAR	PERCENTAGE WITH NO DEBT	INFLATION-ADJUSTED† EDUCATION DEBT, \$	INFLATION-ADJUSTED† EDUCATION DEBT (PRIVATE SCHOOL GRADUATE), \$	INFLATION-ADJUSTED† EDUCATION DEBT (PUBLIC SCHOOL GRADUATE), \$
2001	9.4	143.67	190.02	114.26
2002	7.9	155.45	202.92	122.24
2003	8.8	158.85	204.76	127.22
2004	7.6	167.60	213.71	135.25
2005	7.0	175.08	222.94	145.74
2006	5.7	187.03	232.65	161.54
2007	6.4	195.76	242.82	167.41
2008	7.3	197.80	246.58	166.75
2009	7.1	205.73	248.04	181.81
2010	7.1	217.84	260.35	190.89
2011	7.6	222.62	273.09	191.41
2012	8.8	233.28	276.61	205.45
2013	7.5	246.33	294.29	214.29
2014	8.3	244.46	293.52	215.24
Overall	7.7	194.48	240.52	165.20

\* Source: 2015 American Dental Association office database and 2002-2015 American Dental Association Survey of Dental Graduates.  
† Education debt adjusted to 2014 dollars by using Consumer Price Index All Items Index.<sup>37</sup>

TABLE 4

Career choices according to graduation year.*							
GRADUATION YEAR	PERCENTAGE OF DMSO† GROUP DENTISTS	PERCENTAGE OF NON-DMSO GROUP DENTISTS	PERCENTAGE OF NONAFFILIATED SOLO DENTISTS	PERCENTAGE OF MEDICAID, CHIP,‡ OR FQHC§ DENTISTS	PERCENTAGE OF GENERAL PRACTICE DENTISTS	PERCENTAGE OF PEDIATRIC DENTISTS	PERCENTAGE OF OTHER SPECIALISTS
2001	5.9	68.0	26.2	40.0	74.6	6.1	19.3
2002	5.8	70.1	24.1	39.5	76.3	5.9	17.8
2003	7.1	71.4	21.5	41.8	74.6	5.6	19.8
2004	8.7	68.9	22.4	45.1	75.1	6.8	18.1
2005	8.4	74.2	17.4	46.1	77.2	6.2	16.6
2006	11.0	74.2	14.9	52.0	77.5	6.5	16.1
2007	13.3	74.0	12.8	51.7	79.7	6.2	14.1
2008	12.7	73.8	13.5	54.3	77.8	7.5	14.7
2009	11.2	79.4	9.4	53.0	82.0	5.8	12.2
2010	15.3	75.6	9.1	54.5	83.1	6.3	10.6
2011	14.9	76.7	8.4	53.0	81.6	5.7	12.8
2012	17.4	74.8	7.8	53.0	89.5	3.8	6.7
2013	16.4	76.3	7.3	49.0	94.3	3.3	2.4
2014	12.5	79.6	7.8	40.4	99.5	0.1	0.5
Overall	11.3	73.7	15.0	47.8	81.3	5.4	13.2

\* Source: 2015 American Dental Association office database and 2002-2015 American Dental Association Survey of Dental Graduates.  
† DMSO: Dental management service organization.  
‡ CHIP: Children's Health Insurance Program.  
§ FQHC: Federally Qualified Health Center.

multiple years for dentists to enter into a field of specialization outside of GP dentistry.

Education debt had a modest but statistically significant association with practice type (Table 5). Holding all other variables fixed, a \$10,000 increase in education debt

was associated with a 0.9% increase in the likelihood of a dentist joining a DMSO (relative risk ratio, 1.009; 95% confidence interval, 1.0021 to 1.0164) and a 0.6% decrease in the likelihood of a dentist joining a non-DMSO group practice (relative risk ratio, 0.994; 95% confidence

TABLE 5

<b>Multinomial logit: Factors influencing career choices into type of practice.*†</b>	
VARIABLE	RELATIVE RISK RATIO (95% CONFIDENCE INTERVAL)
<b>Career Choice: DMSO‡ Group Practice</b>	
Age	0.99§ (0.97 to 1.0008)
Female	1.48¶ (1.34 to 1.64)
African American	2.58¶ (1.90 to 3.52)
Hispanic	1.43# (1.07 to 1.91)
Asian	1.67¶ (1.35 to 2.07)
Other race	1.72¶ (1.19 to 2.49)
Total education debt	1.009# (1.002 to 1.02)
Private school graduate	1.28* (1.05 to 1.56)
<b>Career Choice: Non-DMSO Group Practice</b>	
Age	0.96¶ (0.95 to 0.97)
Female	1.29¶ (1.19 to 1.39)
African American	1.30§ (0.99 to 1.70)
Hispanic	1.16§ (0.97 to 1.38)
Asian	1.03 (0.90 to 1.18)
Other race	0.88 (0.70 to 1.09)
Total education debt	0.994# (0.990 to 0.999)
Private school graduate	1.15* (1.02 to 1.29)

\* Source: 2015 American Dental Association office database and 2002-2015 American Dental Association Survey of Dental Graduates.  
† The number of observations is 24,573. Standard errors are clustered according to school. The graduation year indicator variables are included in the regression but excluded in the table. The base category for career choice decision is nonaffiliated solo practice.  
‡ DMSO: Dental management service organization.  
§ Significant at the 10% level.  
¶ Significant at the 1% level.  
# Significant at the 5% level.

interval, 0.9897 to 0.9987) over a nonaffiliated solo practice. Demographic characteristics had a larger statistical association with practice type career choices. Compared with male dentists, female dentists were 48% more likely to join a DMSO group practice and 29% more likely to join a non-DMSO group practice. Compared with white dentists, African American dentists (158%), Hispanic dentists (43%), and Asian dentists (67%) were more likely to join a DMSO group practice. Older dentists were more likely to be in a nonaffiliated solo practice. Compared with dentists who graduated from a public dental school, private dental school graduates were 28% more likely to join a DMSO and 15% more likely to join a non-DMSO group practice.

Education debt also had a modest but statistically significant association with specialty career choices (Table 6). Holding all other variables fixed, a \$10,000 increase in education debt was associated with a 0.9% decrease in the likelihood of dentists choosing a specialty outside pediatric or GP dentistry. As with practice type career choices, demographic characteristics had a

TABLE 6

<b>Multinomial logit: Factors influencing career choices into type of specialty.*†</b>	
VARIABLE	RELATIVE RISK RATIO (95% CONFIDENCE INTERVAL)
<b>Career Choice: Pediatric Dentistry</b>	
Age	0.93‡ (0.90 to 0.95)
Female	1.63‡ (1.41 to 1.89)
African American	1.16 (0.91 to 1.48)
Hispanic	0.95 (0.69 to 1.30)
Asian	1.02 (0.85 to 1.21)
Other race	0.97 (0.61 to 1.52)
Total education debt	1.00 (0.99 to 1.01)
Private school graduate	0.97 (0.73 to 1.28)
<b>Career Choice: Other Specialty</b>	
Age	0.92‡ (0.90 to 0.94)
Female	0.52‡ (0.47 to 0.57)
African American	0.92 (0.69 to 1.24)
Hispanic	0.62‡ (0.47 to 0.82)
Asian	0.74‡ (0.62 to 0.90)
Other race	1.03 (0.79 to 1.33)
Total education debt	0.991‡ (0.986 to 0.996)
Private school graduate	1.18 (0.87 to 1.60)

\* Source: 2015 American Dental Association office database and 2002-2015 American Dental Association Survey of Dental Graduates.  
† The number of observations is 24,573. Standard errors are clustered according to school. The graduation year indicator variables are included in the regression but excluded in the table. The base category for career choice decision is general practice dentistry.  
‡ Significant at the 1% level.

larger statistical association with choice of specialty. Compared with male dentists, female dentists were 63% more likely to choose pediatric dentistry but 48% less likely to choose another field of specialization outside of GP dentistry. Compared with white dentists, Hispanic and Asian dentists were less likely to choose a specialization outside of pediatric or GP dentistry.

Unlike other career choice decisions, education debt did not have a statistically significant association with Medicaid or CHIP participation (Table 7), but other factors did. Compared with white dentists, African American dentists were approximately 15% more likely to participate in pediatric public health insurance programs. DMSO and non-DMSO group practice dentists were significantly more likely than nonaffiliated solo practice dentists to participate in Medicaid or CHIP. Compared with GP dentists, pediatric dentists were approximately 23% more likely to participate in Medicaid or CHIP. However, dentists in other specialties were approximately 8% less likely to participate in pediatric public health insurance programs. Rural dentists were 23% more likely than urban dentists to participate in Medicaid or CHIP. Increases in reimbursement had a modest association with dentist

participation in Medicaid or CHIP. A 1.0 percentage point increase in the pediatric prophylaxis Medicaid ratio of fee to commercial charge was associated with a 0.4% increase in public health insurance program participation, but this elasticity was statistically significant only at the 10% level.

## DISCUSSION

Dental school debt had a modest but statistically significant association with a dental school graduate's decision on what type of practice to join (DMSO group practice, non-DMSO group, or nonaffiliated solo practice) and whether to specialize. An increase in dental school debt was associated with a slightly greater likelihood of a dentist joining a DMSO group practice over a nonaffiliated solo practice. Although statistically significant, the association between education debt and the decision to join a DMSO group practice may not be statistically meaningful because the magnitude is small. Education debt levels have increased substantially over the past 15 years, and new dentists may believe entering a DMSO group practice will offer more earnings stability early in their career. Our analysis results, consistent with those from previous research,<sup>22,26,28</sup> also showed that increases in education debt make it less likely dentists will specialize. Increased debt levels may make specialization less attractive for new dentists, considering the additional time and investment it requires.

Increases in education debt did not have a statistically significant association with a dentist's decision to participate in Medicaid or CHIP. Nicholson and colleagues<sup>26</sup> found that an increase in education debt was not associated with dentists having a greater percentage of poor patients in their patient panels. To our knowledge, we are the first to show that the type of practice a dentist works in has a statistically significant association with a dentist's decision to participate in Medicaid or CHIP—namely, dentists in DMSO practices, all else equal, are much more likely to participate in Medicaid or CHIP than are dentists in other settings. As in previous research,<sup>32</sup> we also found that increases in Medicaid reimbursement had a small but statistically significant association with dentist participation. Compared with GP dentists, pediatric dentists were more likely to participate in Medicaid or CHIP.

An important part of our analysis is the relationship between education debt and DMSO affiliation. Approximately 7.4% of dentists in the United States currently are affiliated with a DMSO, and this percentage varies widely by state.<sup>39</sup> Large group practices grew substantially from 1992 to 2002, driven in part by consolidation in the industry.<sup>40</sup> Additional research is needed to identify other main drivers behind the decrease in solo practices and the increase in practice consolidation.

TABLE 7

<b>Probit model: Factors influencing dentist participation in pediatric public insurance programs.*,†</b>	
<b>VARIABLE</b>	<b>MARGINAL EFFECT (95% CONFIDENCE INTERVAL)</b>
<b>Age</b>	0.0084‡ (0.005 to 0.011)
<b>Female</b>	-0.038 (-0.027 to 0.019)
<b>African American</b>	0.15‡ (0.10-0.19)
<b>Hispanic</b>	0.040 (-0.02 to 0.10)
<b>Asian</b>	0.024 (-0.060 to 0.11)
<b>Other Race</b>	0.042 (-0.03 to 0.12)
<b>Total Education Debt</b>	0.001 (-0.0003 to 0.003)
<b>DMSO<sup>§</sup> Group Dentist</b>	0.31‡ (0.25 to 0.38)
<b>Non-DMSO Group Dentist</b>	0.21‡ (0.18 to 0.25)
<b>Pediatric Dentist</b>	0.23‡ (0.16 to 0.29)
<b>Other Specialist</b>	-0.08‡ (-0.11 to -0.04)
<b>Rural Dentist</b>	0.23‡ (0.19 to 0.28)
<b>Medicaid Ratio of Fee to Commercial Charge (D1120)</b>	0.004¶ (-0.0004 to 0.008)
<b>Private School Graduate</b>	-0.02 (-0.08 to 0.04)

\* Source: 2015 American Dental Association office database and 2002-2015 American Dental Association Survey of Dental Graduates.  
† The number of observations is 24,573. Standard errors are clustered according to state. The graduation year indicator variables are included in the regression but excluded in the table.  
‡ Significant at the 1% level.  
§ DMSO: Dental management service organization.  
¶ Significant at the 10% level.

Because we have only 1 year of DMSO data, we cannot conclude that the upward trend in education debt is associated with a higher percentage of DMSO practices over time. Additional research and data would be needed to answer that question.

We believe that the results of our analysis have some important implications for the future of dentistry. In our opinion, the percentage of dentists who choose to join a DMSO will continue to grow in the future, for a wide variety of reasons. In medicine, more primary care physicians have moved from smaller to larger group practices.<sup>41,42</sup> Fewer physicians are involved in the day-to-day administrative aspects of their practice.<sup>43</sup> We believe that a similar phenomenon could occur in dentistry, although much more gradually, over a much longer period. Because of practice consolidation, dentists may have more negotiating power with insurers over reimbursement, which would be an interesting topic to explore in future research. Large DMSO group practices also may have the scale and capacity to treat more patients receiving Medicaid. We found that dentists in DMSOs were significantly more likely to participate in Medicaid. Medicaid is a growing market in dentistry, as more patients gain dental benefits because of the Affordable Care Act's Medicaid expansion.<sup>44</sup> DMSO



practices could play a more substantial role in meeting the demand for dental care from these new patients. Finally, although education debt often is mentioned as the key factor pushing dentists into different practice models, our research results suggest a much weaker effect.

## CONCLUSIONS

Education debt had a modest association with some career choices among dentists. Demographic characteristics had a larger association. Changes in the dental industry, particularly the growth of large group practices and DMSOs, have the potential to affect the delivery of dental care. Future research should focus on how consolidation in the dental industry will affect access to and affordability of dental care, particularly for low-income people, because such practices are more likely to participate in Medicaid or CHIP. ■

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