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The Financial Burden of Physician Assistant Education - Do Who and Where Matter?

Yale University IRB Protocol #: 1512016892

Kara Stencel, Dr. Rosana Gonzalez-Colaso, Dr. Mark Schlesinger

INTRODUCTION

The financial burden of graduate level education is characterized by the accumulation of loans and interest among young adults. Student indebtedness has been linked to increased financial stress[1-4], future career choice[4-7] and even delayed marriage, child-rearing and home buying [3, 8]. This is a growing concern well documented across different healthcare professions for the last 20 years, both in the United States and in Canada. The concern is that debt levels could distort career choices, whether before choosing to undertake training or after graduating. In particular, these financial barriers might deter entry or distort choice most by potential practitioners from lower income backgrounds, who might otherwise be predisposed to practice in medically underserved areas.

The Physician Assistant Education Association (PAEA) began to characterize the level of student indebtedness in physician assistant (PA) education through a survey of newly matriculated PA students in 2013 [1]. Almost two thirds (63%) of first year PA students reported depending on loans to finance their education, with 39% of students expecting their total debt to total over \$100,000 [1]. The higher the level of both prior educational debt and anticipated student debt, the higher the level of financial concerns reported by newly matriculated students [1]. With an average of prior educational debt at \$40,629, over 80% of those students also reported that their ability to pay down their debts upon graduation was “very important” or “essential” [1].

Previous literature on health profession education suggests that multiple factors, including school level factors, explain variation in student indebtedness. Contributing student level factors include students’ race/ethnicity, age, marital status, and gender, [9, 10] socioeconomic status (SES), [1, 4, 7, 11, 12] and housing/living arrangements [2, 7, 9]. It is well known that tuition contributes to student indebtedness, but other institutional level factors include institutions’ sponsorship (public, private for profit or private not for profit) [4, 9, 13], regional location [14], and program length [9, 10].

Today, what is known about PA student indebtedness variation has been characterized only by students’ characteristics. Yet, little is known how PA programs’ institutional factors explain PA student indebtedness or financial stress. To fill that gap, our study aims to identify the students’ and educational programs’ characteristics associated to high anticipated student debt and financial stress among newly enrolled PA students.

Beyond the factors described above, we understand that the growing level of student debt in higher education has caught the attention of policy makers. The Obama Administration’s new ‘gainful employment’ regulations aim to strengthen students’ options for career training. By conditioning the flow of federal student aid to program

performance, the regulations recently implemented by the Department of Education is expected to bring transparency to the growing problem of student debt default among for profit programs. In order for the institution to be eligible to receive federal financial aid, certain institutions would have to have to meet applicable accreditation standards, pass accountability metrics about the graduates' debt-to-income ratios, and would have to publicly display information about program costs, debt and performance of gainful employment for students to make informed decisions [15]. Currently, PA programs are only required to inform candidates and students about accreditation status and first time board pass rates, which can be used as a proxy measure of readiness for employment [16]. Furthermore, it has been shown that level of student indebtedness was negatively associated to likelihood of passing boards among medical students and residents [17, 18].

While this findings are the result of a within cohort analysis, it is unknown whether the same association is true at the ecologic level of analysis. Therefore, our exploratory program level characteristics analysis is informed from both the current state of the literature and policy landscape.

METHODS

Study Design

We conducted a cross-sectional secondary analysis of a restricted dataset from the 2014 Physician Assistant Education Association (PAEA) Matriculant survey and corresponding PA programs' characteristics.

Sources of Data

The 2014 Matriculant survey was a modified version of the survey conducted by PAEA in 2013. The PA Matriculant survey is a nationally representative self-administered online survey of first year PA students enrolled in an accredited program in the US, conducted annually by the PAEA. The dataset in our analysis corresponds to students who began their program in the calendar year of 2014 and completed the survey.

The survey was created by the PAEA and administered by PA program staff within PA programs across the country. Eleven (6%) programs representing approximately 13% of students nationwide did not respond despite follow up from PAEA staff and incentives from PAEA to programs achieving higher than 50% response rate from their enrolled students.

Variable Construction

The PAEA agreed to provide restricted access to the Matriculant survey database after modification, clarification and eventual approval of a data request. We requested the following variables from the Matriculant survey: gender, race, ethnicity, age, civil status, legal dependents, highest level of education, college GPA, years since most recent degree completion, previous educational debt, consumer debt, anticipated debt

from PA education, level of financial concern, likelihood of working in a medically underserved community, and estimated salary during first job. The specific wording of the questions from the survey, response scales and variable construction are delineated in the Appendix.

Separately from the Matriculant survey, we constructed a dataset of program variables based on all of the PA Programs granting Master's degrees listed on the PAEA website as of December 1, 2015. From December 2015 and March 2016, we abstracted key program characteristics variables from each program's website. The following program metrics were collated: the five year average first time pass rate on the Physician Assistant National Certifying Exam (PANCE), duration of program, tuition for the full length of the program, accreditation status, seats available, total credit hours required for degree and zip code.

We confirmed each PA program's accreditation status at the time of the matriculant survey data collection via ARC PA website [19]. The PA Program's sponsorship status was determined by the Carnegie Classification found online [20]. We assigned each program a region designation, categorized as Northeast, South, East, West according to PAEA designation [21].

PAEA merged our database of program characteristics with the 2014 Matriculant survey dataset by confidential program ID, replacing all student identifiable information with a code, and providing aggregate demographics and program characteristics of the target student and program population. The final data set included fourteen variables derived from the student surveys and nine variables from publically available program characteristics.

The merged matriculant survey dataset included 170 PA programs and 5081 PA students. Of all the programs that received the survey, 151 programs submitted student responses (program response rate was 94%). Among the responding programs, the average student response rate per program was 74% (range 0-100%). Programs with a student response rate of less than 15% (n =8) were consider non-respondents for the purpose of our analysis, which provided more than 5 students responding and allowed for Chi-square analysis to be valid. Our final dataset had a total of 4980 students and 151 programs, yielding a database response rate of 88%.

The programs that were not analyzed due to low response rates were not different with regard to accreditation status, first time 5 year PANCE pass rates, seat capacity, program length, tuition levels and program sponsorship when compared to the programs that were analyzed.

Statistical Analysis

We examined the proportions of physician assistant students levels of anticipated student debt, financial concern, and likelihood to practice in a medically underserved

area. Using odds ratios and χ^2 statistics, we estimated and tested the statistical significance of associations between our outcomes and student characteristics. We used multivariate logistic regression models to estimate adjusted associations. Multivariate models included independent variables that were significantly associated ($p \leq .05$) in unadjusted analyses.

To account for the intra-cluster correlation for students in the same program, To account for the correlation of student responses from the same program, the standard errors in the regression results reported below were adjusted for clustering at the program level using the generalized estimating equation procedures in SAS. [22] All analyses were conducted with SAS statistical software version 9.3 (SAS Institute Inc, Gary, North Carolina).

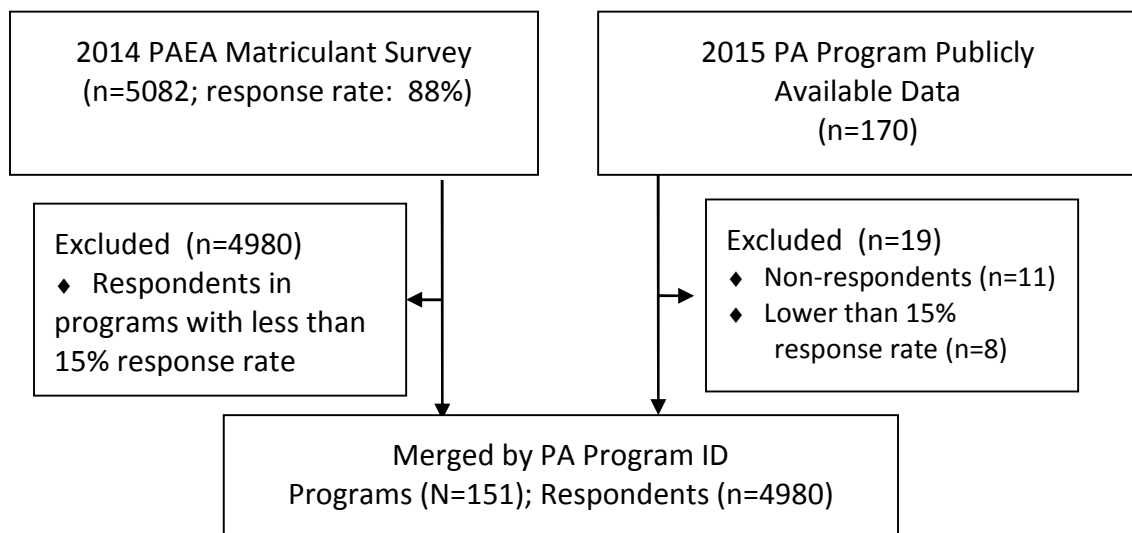
Ethical Statement

The Yale Human Subjects Committee has determined that this study qualified for exemption from review because it involved a previously collected survey for educational purposes, and the information collected from students was de-identified. Individual PA program identities were kept confidential. Yale University IRB Protocol #: 1512016892

RESULTS

The data set is described, program descriptive characteristics are reported, followed by student characteristics, including descriptions of student's financial experience and characterization of the outcome variables (anticipated student debt and financial concerns).

Figure 1: Merged Data Set Description



I. Program Characteristic Descriptive Statistics

The 170 PA programs analyzed were those across the country with continuing or provisional accreditation for granting Master's degrees in Physician Assistant studies in 2014. The programs analyzed were restricted to 151 based on low survey response rates under 15%. These programs represent potentially 776 responses, or 13% of matriculating PAs in 2014 based on their reported seat capacity. The characteristics of the low response rate programs were statistically insignificant from programs that were analyzed.

Accreditation and Sponsorship

Of the 151 programs that met response criteria, the majority (81.5%) had continuing accreditation, 13.3% had provisional and 5.3% had probationary status. Slightly over half (57%; N=62) of the programs analyzed were private non-profit programs, 40.4% (N=62) were public programs and less than 3% (N=4) were private for profit institutions. (Table 1)

Program Location

The largest majority (37.1%) of programs analyzed were located in the South. 27.2% were located in the Northeast, 25.2% were located in the Midwest, and 10.6% were located in the Western part of the United States. (Table 1)

Program Duration and Capacity

The average length of PA program course of studies was 27 months, with a standard deviation of 3 months. The average seats available were 46 with a standard deviation of 20. The analyzed programs' duration ranged from 21-36 months with a range of program seats available for 17 to 105 students every year.

Table 1. PA Program Characteristics (N=151)

Program Characteristics		N (%)
Accreditation Status	Continuing	123 (81.5)
	Provisional	20 (13.3)
	Probationary	8 (5.3)
Sponsorship Status	Public	62 (40.4)
	Private Non-Profit	86 (57.0)
	Private For Profit	4 (2.7)
Program Length (months)	21-24	48 (32.4)
	25-27	59 (39.9)
	> 28	41 (27.7)
Seats Available	<=36	52 (34.4)
	37-64	71 (47.0)
	>65	28 (18.5)
Region of School Location	Northeast	41 (27.2)
	Midwest	38 (25.2)
	South	56 (37.1)
	West	16 (10.6)
Tuition (\$)	<50,000	11 (7.3)
	50,000-75,000	44 (29.1)
	75,000-100,000	82 (54.3)
	>100,000	14 (9.3)
In-State Tuition (\$)	<50,000	135 (89.4)
	50,000-75,000	15 (9.9)
	75,000-100,000	1 (0.7)
5-Year First Time PANCE Rates	100-98%	41 (28.0)
	97-95%	36 (25.0)
	94-92%	35 (24.0)
	91-88%	18 (13.0)
	<88%	14 (10.0)

*Total N=151 unless otherwise noted, due to missing data

†Percentages may not sum to 100% due to rounding

Tuition

Private PA programs tuitions have historically been more expensive than public PA program tuitions. [13, 23] Our analysis confirmed this.

Tuition for private not-for-profit institutions (N=86) averaged \$80,909 with a standard deviation of \$13,706. The maximum tuition charged was \$148,392 with the minimum tuition for PA programs housed in private not-for-profit institutions being \$46,340.

Tuition for private for-profit institutions (N=4) averaged \$84,206 with a standard deviation of \$16,557. The maximum tuition charged was \$99,158, with the minimum private for profit institution tuition being \$68,535.

Tuition for non-resident students at public institutions (N=59) averaged \$75,192 with a standard deviation of \$24,007, with a minimum of \$23,138 and a max of \$137,760. In state tuition for students at public schools (N=49) averaged \$41,385 with a standard deviation of \$16,442, with a minimum of \$10,961 and a maximum of \$79,458. The difference between those public PA programs with resident and non-resident tuition averaged \$34,175 with a standard deviation of \$14,636.

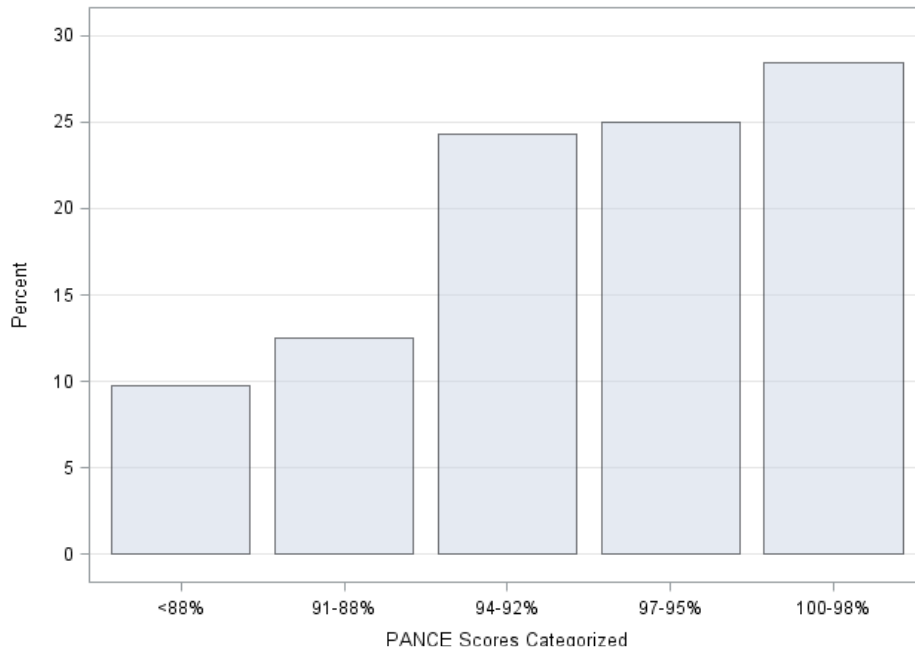
Table 2. Variation in PA Program Tuition by Sponsorship Status

Variable	Mean (\$)	Standard Deviation (\$)	Range (\$)
Public Tuition (N=61)	75,756	21,544	35,165-137,760
Public In State Tuition (N=50)	42,497	15,464	11,832-83,312
Difference Between Out and In State Tuition	34,175	14,636	4,014-67,674
Private Non-Profit Tuition (N=86)	80,910	13,707	46,340-148,392
Private For Profit Tuition (N=4)	84,206	15,557	68,535-99,158

PANCE Rates

The five year first time PANCE rates associated with the 151 institutions analyzed ranged from 100% to 71%. Over a quarter of programs (28%; N=41) achieved 99%-100% pass rates, one-quarter (N=36) achieved a 95%-97% PANCE pass rate, just under a quarter (24%; N=35) of programs fell in the 92%-94% category, 13% achieved (N=18) a 91%-88% first time PANCE rate and a tenth (N=14) of programs fell in the category of an 88% pass rate or lower (Figure 2). The mean five-year first time PANCE score was 94% with a standard deviation of 5%.

Figure 2: Five-Year First Time PANCE Rates Distribution Over Programs Analyzed



II. Student Characteristic Descriptive Results

A total of 5080 unique student responses were recorded and analyzed. After low response rate programs were excluded from the analysis, 4089 responses remained. The majority of the students in the sample were single (71.7%), non-Hispanic (93.9%), white (82.9%), females (74.3%) with no children (87.4%) and a bachelor's degree (82.6%). The average age of the respondents was 26.7 years old with a standard deviation of 5.7 years, a minimum of 19 years old and a maximum of 81 years old (Figure 3). The students' prior school experience GPA average was 3.58, with a standard deviation of .26, a minimum of 2.2 and a maximum of 4.00.

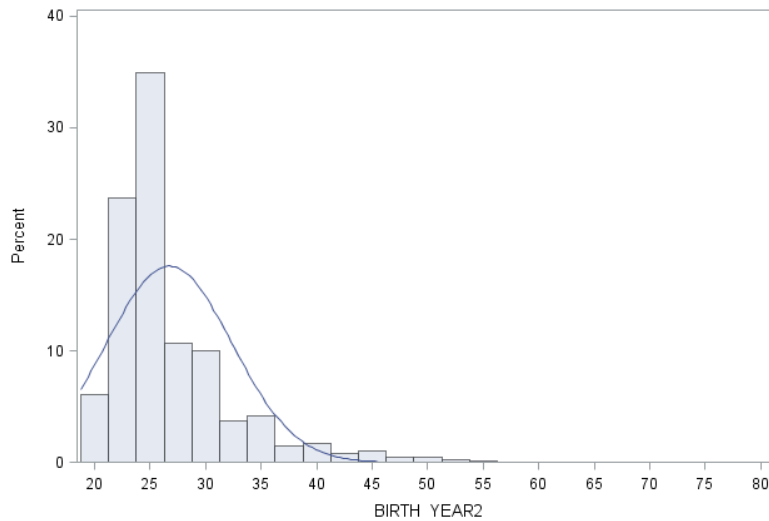
Table 3. Student Demographic and Socio Economic Characteristics (N=4,980)

Characteristics		N (%)
Gender	Male	1208 (25.7)
	Female	3497 (74.3)
Ethnicity	Non-Hispanic	4341 (93.9)
	Hispanic	284 (6.1)
	Non-Hispanic	4341 (93.9)
Race	White	3905 (82.9)
	Asian	140 (3)
	Black	374 (7.9)
	Other	292 (6.2)
Civil Status	Single	3389 (71.7)
	Married	1135 (24.0)
	Other	200 (4.3)
Legal Dependents	No Dependents	4348 (87.4)
	1	237 (4.8)
	2	217 (4.4)
	Over 3	175 (3.5)
Education Level	Less than College	357 (7.4)
	Bachelor's	4001 (82.6)
	Masters/Doctorate/Other	489 (10.0)
Prior Educational Loans	No Loans	2311 (52.4)
	\$1-\$24,999	936 (21.2)
	\$25,000-\$49,999	654 (14.8)
	\$50,000-\$74,999	261 (5.9)
	Over \$75,000	251 (5.7)
Other Consumer Debt	Less than \$4,999	3944 (79.2)
	\$5,000-\$24,999	573 (11.5)
	Over \$25,000	462 (9.3)

*Total N=4,980 unless otherwise noted, due to missing data

†Percentages may not sum to 100% due to rounding

Figure 3: Distribution of Age of Student Respondents

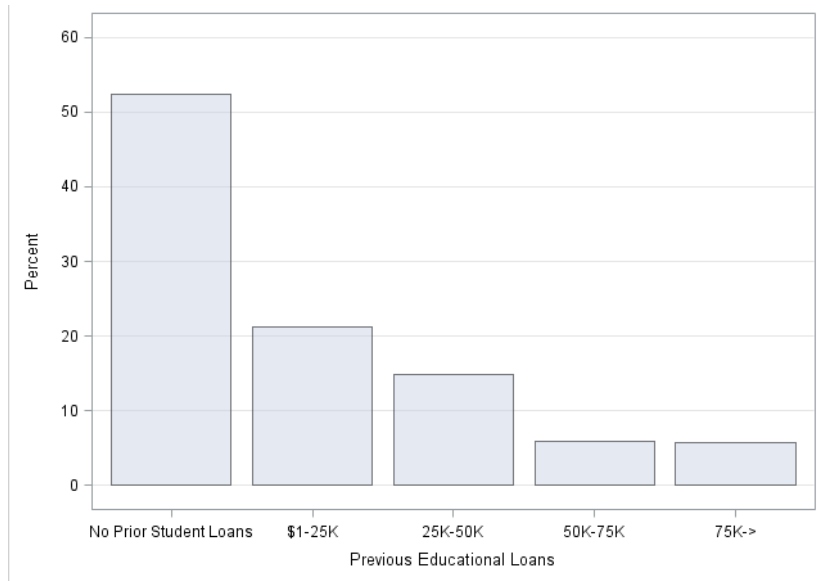


III. Financial Descriptors of Student Cohort

Prior Educational Loans

National statistics indicate about half of graduate students have already borrowed for previous educational efforts [10], and our analysis of PA students was roughly on par with this. Slightly over half (52.4%) of the 2014 matriculating students reported starting their PA program without previous educational loans. Of the 47.5% students reporting prior loans, the average loan amounted to \$36,654. Figure 4 shows the distribution of previous educational loans.

Figure 4: Self-Reported Level of Prior Student Loans from Student Respondents



Consumer Debt

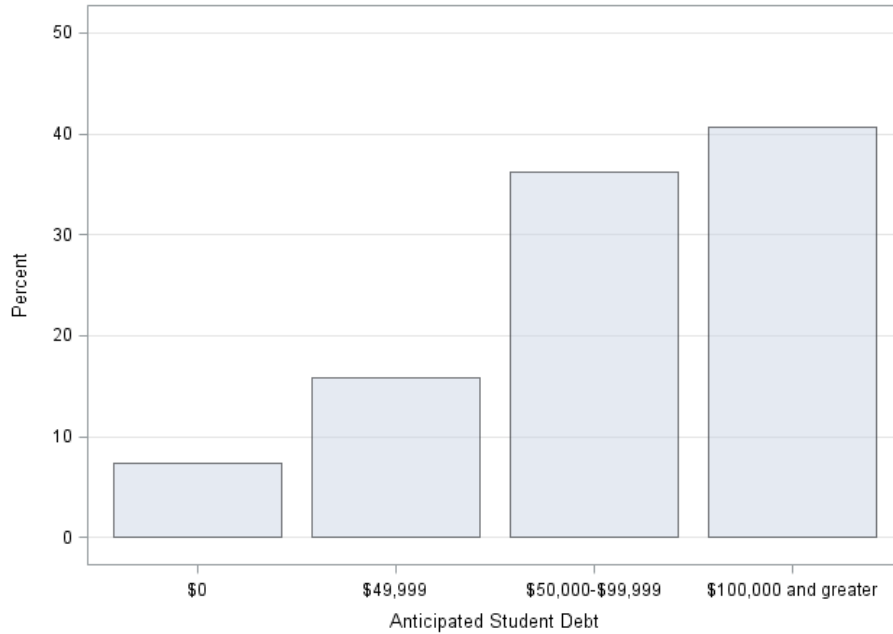
Less than a third of students (28.5%) reported other consumer debt, including car loans, home mortgages or credit card balances. Eight in ten students reporting consumer loans indicated that consumer debt amounted to less than \$4,999.

IV. Outcome Variables

Anticipated Student Debt

In our sample, 7.3% (n=342) of students expected to have no debt coming out of PA school. Only 15.8% (n=740) expected less than \$50,000 of debt. Over a third (1696; 36.2%) of students expected between \$50,000 and \$99,999, while 40.7% (n=1905) expected over \$100,000. Reported anticipated student debt was significantly different depending on whether the program was designated as public, private for profit or private non profit. (Chi-square <.001)

Figure 5: Distribution of Anticipated Student Debt



Financial Stress

More than half of the surveyed students (n=2988; 61.6%) reported being concerned about finances. A little over a tenth (n=598; 12.3%) of students reported being very concerned about finances, while 49.2% (n=2390) were mildly concerned and 38.4% (n=1866) were not concerned.

Table 5: Student Reported Financial Concerns

Variable		n(%)
FINANCIAL CONCERNS	Not Concerned	1866 (38.4)
	Mildly Concerned	2390 (49.2)
	Very Concerned	598 (12.3)

V. Student Characteristics Analysis Results

In examining student characteristics associated with anticipated student debt and financial concerns, the analysis considered ethnicity, race, civil status, legal dependents, previous educational attainment, previous grade point average, previous student loans and current consumer debt as reported by the matriculating PA students across the country in 2014 (Table 6).

Prior Educational Loans

At the student level, the strongest statistically significantly factor associated with high anticipated PA student debt was having prior student loans greater than \$75,000 [adjusted odds ratio 6.76; 95% CI 4.82-9.48] when compared to those with no prior loans. After controlling for cluster effect and adjusting for confounders, students with any level of prior student loans were more likely than their peers without prior student loans to report financial stress.

Consistent with prior studies indicating that borrowing in undergraduate strongly increases the likelihood of borrowing for graduate school [10], previous educational debt at any amount was significantly associated with anticipated debt over \$100,000 when compared to students reporting no previous educational debt and after adjusting for confounders. As prior student loan amounts rose, the odds of reporting high anticipated debt from PA school rose, but the level of financial concerns plateaued even after adjusting for confounders.

Prior Degree Attainment

Similar results can be seen when examining anticipated student debt and prior degree attainment. Previously graduating with a Bachelor's significantly increased the odds of reporting high anticipated student debt from pursuing a PA degree when compared to students who had less than college level education [adjusted odds ratio 5.00; 95% CI 2.89-8.65]. Students with a Master's or doctoral degree had over three times the odds of reporting high anticipated student debt from a PA degree when compared to students who had less than college level education [adjusted odds ratio 3.43; 95% CI 1.94-6.04]. Obtaining these prior degrees did not result in a significant relationship with financial stress after considering cluster and confounding effects.

Consumer debt

Consumer debt and financial stress showed a non-linear relationship. The strongest statistically significantly factor associated with high anticipated financial stress was having consumer debt under \$5,000 [adjusted odds ratio 1.98; 95% CI 1.46-2.70] when compared to those with no consumer debt. Students reporting consumer debt over \$5000 to \$24,999 also were significantly more likely to report financial concerns [adjusted odds ratio 1.63; 95% CI 1.28-2.08] when compared to those with no consumer debt. However, even after controlling for confounders and cluster effects, students with over \$25,000 in consumer debt were not more likely to report financial concerns, leading us to wonder if there is a level by which debt becomes so overwhelming that it

does not matter.

Students reporting any level of consumer debt were more likely to report over \$100,000 in anticipated student debt from PA school when compared to students without any consumer debt after adjusting for confounders.

Race and Ethnicity

Hispanic students were significantly less likely to report anticipated student debt over \$100,000 [adjusted odds ratio .56; 95% CI .42-.75] when compared to non-Hispanics. Those students identifying as black similarly had lower odds [adjusted odds ratio .77; 95% CI .59-1.00] of reporting over \$100,000 in anticipated student debt when compared to whites.

Civil Status

Being married was significantly likely to decrease reports of high anticipated student debt when compared to single students and after being adjusted for confounders [adjusted odds ratio .53; 95% CI .42-.69]. This tracks with prior literature indicating “an addition source of financial support, such as a . . spouse” can reduce borrowing. [10] Accordingly, married students were significantly less likely to report financial stress when compared to their single counterparts [adjusted odds ratio .78; 95% CI .62-.98].

Legal Dependents

At the other end of the spectrum, students with over three legal dependents increased odds of reporting high anticipated student debt [adjusted odds ratio 1.59; 95% CI 1.00-2.54]. This, too, is consistent with prior literature indicating that students increase their borrowing as dependents increase.[10]

GPA

Prior academic performance as measured by grade point average was not associated significantly with anticipated student debt or reported financial concerns.

Table 6. Hierarchical Regression Model to Identify Student Level Explanatory Factors for Outcomes of Interest

		Anticipated High Student Debt	Financial Stress
Student Characteristics		Adjusted OR* (95% C.I.)	Adjusted OR* (95% C.I.)
Ethnicity	Non-Hispanic	Reference	Reference
	Hispanic	0.56 (0.42-0.75)	0.74 (0.55-1.01)
Race	White	Reference	Reference
	Asian	1.10 (0.72-1.67)	0.96 (0.60-1.53)
	Black	0.77 (0.59-1.00)	0.84 (0.66-1.09)
	Other	0.96 (0.59-1.00)	0.88 (0.61-1.27)
Civil Status	Single	Reference	Reference
	Married	0.53 (0.42-0.69)	0.78 (0.62-0.98)
Legal Dependents	No Dependents	Reference	Reference
	1	1.22 (0.85-1.74)	0.96 (0.68-1.37)
	2	1.30 (0.86-1.96)	1.11 (0.75-1.64)
	Over 3	1.59 (1.00-2.54)	1.23 (0.82-1.83)
Previous Education	Less Than College	Reference	Reference
	Bachelors	5.00 (2.89-8.65)	1.35 (0.93-1.96)
	Masters/Doctorate/Other	3.43 (1.94-6.04)	1.12 (0.71-1.79)
Previous Grade Point Average	Over 3.5	Reference	Reference
	Less Than 3.00	1.19 (0.80-1.77)	0.85 (0.61-1.17)
	3.01 to 3.50	1.06 (0.90-1.25)	0.85 (0.72-1.01)
Previous Student Loans (\$)	No Prior Student Loans	Reference	Reference
	1-24,999	1.99 (1.69-2.35)	1.46 (1.21-1.76)
	25,000-49,999	2.64 (2.19-3.18)	1.85 (1.44-2.38)
	50,000-74,999	4.60 (3.33-6.37)	1.89 (1.35-2.63)
	Over 75,000	6.76 (4.82-9.48)	1.86 (1.26-2.73)
Consumer Debt (\$)	No Consumer Debt	Reference	Reference
	Under 5,000	1.54 (1.18-2.01)	1.98 (1.46-2.7)
	5,000-24,999	1.57 (1.24-1.97)	1.63 (1.28-2.08)
	Over 25,000	1.35 (1.03-1.77)	1.26 (0.93-1.69)

* Abbreviations=Adjusted Odds Ratios =adjusted OR; 95% Confidence Intervals=95% C.I.

VI. Program Characteristics Analysis Results

In examining anticipated student debt and financial concerns, the analysis considered program characteristics including tuition levels, program sponsorship, accreditation status, 5-Year first time PANCE rates, program capacity, program duration and location of the PA program (Table 6).

Program Tuition

Attending PA programs with tuition greater than \$100,000 was the strongest statistically significant factor associated with anticipated high debt when compared to programs with tuition less than \$49,999 [adjusted odds ratio 3.67; 95% CI 2.02-6.66]. As tuitions increased, so did the odds of students reporting anticipated student debt over \$100,000 after adjusting for confounders and cluster effect. However, the level of financial concerns reported did not necessarily reflect this increase in higher debt.

Attending public institutions with no discount for in-state residents resulted in increased high anticipated student debt levels when compared to students who attended an institution with the largest difference in in-state and out-of-state tuitions. In this cohort of public student attendees, the financial concerns were greatest in programs with the smallest difference in tuition discounts [adjusted odds ratio 1.5; 95% CI .99-2.29] after taking into account confounders and cluster effect.

Program Sponsorship

Attending a private for profit PA program was the strongest factor associated with high financial stress when compared to PA programs with public sponsorship status [adjusted odds ratio 2.43; 95% CI 1.00-5.94]. Students at private for profit institutions reported twice the odds of high anticipated student debt, however, the significance of $p = .07$ did not meet our $p < .05$ cut off.

Five Year First Time PANCE Rates

Attending programs with five-year first time PANCE pass rates over 88% were significantly associated with high anticipated student debt. Financial stress, however, did not vary significantly between programs with different PANCE scores.

Program Capacity

Attending the largest programs (seats available per class over 65) significantly influenced reports of high anticipated student debt when compared to smaller programs (seats available per class under 36) [adjusted odds ratio 1.49; 95% CI 1.02-2.18]. Financial stress, though, was not found to be significantly associated with the size of the PA program after adjusting for confounders and cluster effect.

Region

Attending programs located in the Midwest, South and Northeast was the weakest factor associated with high student debt when compared to programs located in the West after consideration for confounding and cluster effects. There was no correlation

with financial stress with this variable.

Accreditation Status

A program's accreditation status showed no bearing on anticipated student debt, however, students attending programs with probationary status had a reduced odds of reporting financial stress [adjusted odds ratio .66; 95% CI .49-.9] after adjusting for confounders.

Program Length

After accounting for confounders, it was determined that a program's length was not significantly associated with difference in financial stress or debt levels, the latter of which may be unexpected given length of education has shown to be significant to student borrowing in other graduate level educational endeavors [9, 10].

Table 7. Hierarchical Regression Model to Identify Program Level Explanatory Factors for Outcomes of Interest

Program Characteristics		Anticipated High Student Debt	Financial Stress
		*Adjusted OR (95% C.I.)	*Adjusted OR (95% C.I.)
Accreditation Status	Continuing	Reference	Reference
	Probationary	1.37 (0.83-2.24)	0.66 (0.49-0.90)
	Provisional	1.07 (0.76-1.51)	1.25 (0.95-1.65)
Sponsorship Status	Public	Reference	Reference
	Private For Profit	2.09 (0.94-4.67)	2.43 (1.00-5.94)
	Private Non-Profit	1.58 (1.05-2.37)	0.96 (0.67-1.38)
Program Capacity (seats)	Under 36	Reference	Reference
	37-64	1.14 (0.81-1.61)	0.99 (0.80-1.22)
	Over 65	1.49 (1.02-2.18)	1.13 (0.88-1.46)
Program Length (months)	21-24 months	Reference	Reference
	25-27 months	1.00 (0.73-1.36)	0.86 (0.70-1.06)
	Over 28 months	1.30 (0.94-1.80)	1.07 (0.86-1.32)
Region	West	Reference	Reference
	Midwest	0.46 (0.33-0.65)	0.90 (0.71-1.14)
	Northeast	0.43 (0.30-0.62)	1.02 (0.79-1.33)
	South	0.53 (0.39-0.72)	0.84 (0.69-1.03)
5-Year First Time PANCE Rates	under 88%	Reference	Reference
	100-98%	1.60 (1.02-2.52)	0.78 (0.52-1.16)
	97-95%	1.85 (1.14-3.00)	0.73 (0.49-1.09)
	94-92%	1.85 (1.14-3.02)	1.02 (0.69-1.50)
	91-88%	1.75 (1.04-2.94)	1.00 (0.68-1.49)
Tuition Charged Categories (\$)	<50,000	Reference	Reference
	50,000-75,000	1.26 (0.81-1.94)	0.78 (0.57-1.06)
	75,000-100,000	2.28 (1.42-3.67)	0.95 (0.69-1.3)
	>100,000	3.67 (2.02-6.66)	1.31 (0.88-1.95)
In State Discount Categories	45,032-67,674	Reference	Reference
	0	2.57 (1.35-4.87)	1.50 (0.99-2.29)
	1-22,642	1.68 (0.76-3.70)	1.25 (0.87-1.79)
	23,643-45,031	1.21 (0.67-2.19)	1.30 (0.94-1.80)

* Abbreviations=Adjusted Odds Ratios =adjusted OR; 95% Confidence Intervals=95% C.I.

DISCUSSION

This is the first study to comprehensively explore both student and program characteristics that further define the financial burden of PA education. Not surprisingly, higher tuition at the program level, especially associated with private institution status, was linked to higher anticipated student debt. Earlier literature has extensively examined the increasing proportion of private PA programs and higher tuition levels [13]. Our study was not powered to see greater differences between private for profit and not for profit institutions, but the addition of longitudinal data on this topic would be instrumental in further research on PA student financial burden.

Individual level factors, such as prior education, prior student loans and current consumer debt, also unsurprisingly predicted higher student debt. At the same time, more research should be done to understand why those with graduate degrees report more anticipated debt, but not more financial concerns. Perhaps these students expect high earnings, which mitigate their concerns for future financial stability. It is a topic worth further examination.

We had hypothesized that students with better GPAs may be the beneficiaries of merit aid and report lower debt, but our results did not confirm this. Merit aid is highly variable by program. For example, the Yale Physician Associate Program recently announced the possibility of new merit aid policies for future students given that the Class of 2016 will be the last group to receive need based scholarship funding to cover tuition costs [24]. Tracking these policies would be time consuming, but could further shed light on the financial experience of PA students.

Other results from our study were less expected, including that larger programs are associated with high anticipated student debt. This raises various questions. Do more students require more resources, and thus, cost more? Why wouldn't larger programs allow for savings due to scale?

The significance between the location of the PA programs in the West and higher expected debt was also puzzling. While incidental expenses, such as housing, can significantly drive debt burdens [25], this is not the full picture and more research is needed to understand the relationship between program location and student debt.

These questions are all better asked in the context of financial stress, which ultimately drives behavior, influencing career paths, or even impacting the profession as a whole.

One of the most intriguing results in examining individual level characteristics was that minority respondents report lower debt and financial concern. Historically, African-American and Latino graduate and undergraduate students incur more debt than their Caucasian peers, [10] yet our analysis counters that conclusion. Diversity in the field is a continuing focus of PA national organizations [26], and further exploring the

programmatic and individual level factors accounting for indebtedness trends in these minority populations may be instructive in these efforts.

Finally of concern was the finding that students in programs with probationary accreditation status report less financial concerns. Are students in these programs wearing rose-colored glasses? Or are programs not fully transparent in relaying their accreditation status?

The ultimate question that needs to be evaluated is what are the implications of high debt loads on current PAs? Our study was only able to examine what PA students report at the beginning of their studies. We were limited by the inability to access data from other national PA organizations that track debt and career decisions by practicing PAs, which would more fully elucidate the financial implications of student loan repayment, perhaps shedding light on one highly deliberated topic - the relationship of debt and decreasing levels of PAs in primary care.

Better understanding these issues is important to PA students, who are undertaking the investment of PA education at a time when securing graduate study funding for tuition and living expenses is more and more difficult. As of 2011, federal law prohibited graduate students from obtaining subsidized federal loans [10]. In 2015, funding for Perkins Loans was allowed to expire, reducing the options for post graduation loan forgiveness for graduate students [10]. Most recently, interest rate hikes have been implemented, ensuring that students will pay more than their predecessors for the same education. Furthermore, evidence suggests that recent student borrowers have been paying off their loans more slowly than borrowers who entered the market ten years ago [17].

Recent educational policy efforts focus on cost and quality. The Department of Education is increasing their oversight on both for profit educational institutions and accreditation boards.[27] The Institute of Medicine released a report on Graduate Medical Education in 2014. In short, the policy sphere is ripe for the PA profession to highlight the role PAs play in value for the health care system [28] but it remains to be seen if current trends in PA education will complicate policy efforts that would benefit the profession, such as increased reimbursement levels and expanded scope of practice.

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APPENDIX

The following appendix describes the variables and variable construction.

I. Variables from the PAEA 2014 Matriculant Student Survey

Gender: Please identify your gender.

- Male
- Female
- I prefer not to answer

Ethnicity: Are you Hispanic, Latino, or Spanish in origin?

- Yes☐
- No☐
- I prefer not to answer

Race: What is your race?

- American Indian or Alaskan Native
- Asian
- Black or African American
- Native Hawaiian or other Pacific Islander
- White
- Other, please specify _____
- I prefer not to answer

These variables were categorized as follows:

- White
- Asian
- Black, and
- Other.

Civil status: Which of the following best describes your current civil status?

- Single (never legally married)
- Married
- Domestic partnership/civil union
- Separated, but still legally married
- Divorced
- Widowed
- Other, please specify _____
- I prefer not to answer

For analytical purposes, these variables were categorized as:

- Married
- Single, and
- Other.

Legal dependents: Other than yourself, how many legal dependents do you have?

_____ Legal Dependents

These continuous variables were put into the following categories for analytical purposes:

- No legal dependents
- 1
- 2, and
- Over 3.

Highest level of education

- High school diploma/GED
- Some college but no degree

- Associate's degree
- Bachelor of Arts
- Bachelor of Science
- Master's degree (health or science related; e.g., MPH)
- Master's degree (not health or science related; e.g., MBA)
- Academic doctorate (e.g., PhD, EdD)
- Professional doctorate (e.g., MD, DO, PharmD, JD)
- Foreign medical graduate/unlicensed medical graduate
- Other, please specify _____
- I prefer not to answer

These variables were put into the following categories for analytical purposes:

- Less than College
- Bachelors, and
- Masters/Doc/Other.

GPA: What was your college/university undergraduate grade point average? Use a 4 point scale where an A = 4.0.

Based on prior literature, the GPAs of the survey respondents were categorized into:

- 4 to 3.51
- 3.01 to 3.50, and
- 3.00 to the lowest score. [29]

Previous Student Loans: Do you have any outstanding educational loans for your college/pre-physician assistant education that you are legally required to pay?

- Yes
- No
- I prefer not to answer

Please enter the total amount of outstanding education loans you are legally required to pay.

This continuous variable was then categorized into the following:

- No Prior Student Loans
- \$1 to 25,000
- 25,000 to 50,000
- \$50,000 to 75,000, and
- over \$75,000.

Consumer Debt: Do you have any non-educational, consumer debt that you are legally required to repay? This includes credit card debt, car loans, mortgages, or other consumer debt.

- Yes

- No
- I prefer not to answer

Please estimate the total amount of non-educational, consumer debt you currently have.

- Car loans
- Credit cards Mortgage
- Other consumer loans.

The figures provided by students surveyed were combined into a total consumer debt figure and categorized as:

- No Consumer Debt Reported
- Under \$5,000
- From \$5,000 to \$24,999, and
- Over \$25,000.

Anticipated Student Debt: What do you anticipate your total debt (excluding personal debt) to be from attending PA school?

- \$0
- Less than \$25,000
- \$25,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$124,999
- \$125,000 to \$149,999
- \$150,000 to \$174,999
- \$175,000 to \$199,999
- \$200,000 or greater

Given that students' answered in continuous form, the categorical variables were reduced to the categories:

- No anticipated student debt
- Under \$50,000
- \$50,000-\$99,999, and
- Over \$100,000.

Level of financial concern: Please select the number that best describes your financial concerns during the past week, including today. "1" represents "constant concerns" and "10" represents "no concerns."

This variable was categorized in an identical way to the PAEA 2013 Indebtedness report:

- Very Concerned included the rankings 8-10;
- Mildly Concerned included the rankings 4-7; and
- Not Concerned included the rankings 1-3. [1]

Likelihood of working in a medically underserved community: Upon graduation, how likely are you to choose to work in a medically underserved community? Examples of medically underserved communities include: rural and inner city settings, prison systems, Indian reservations, and Community Health Centers.

- Very unlikely
- Unlikely
- Neither likely nor unlikely
- Likely
- Very likely

These variables were put into the following categories that are identical to the categorization used by PAEA in its 2013 Indebtedness[1] report:

- Unlikely included the “Very Unlikely” & “Unlikely” answer choices.
- Neutral included the “Neither likely nor unlikely” category, and
- Likely included the “Likely” and “Very likely” answer choices.

Estimated salary during first job: Please estimate the salary you expect at graduation for a full-time position as a physician assistant.

- Less than \$50,000
- \$50,000 to \$59,999
- \$60,000 to \$69,999
- \$70,000 to \$79,999
- \$80,000 to \$89,999
- \$90,000 to \$99,999
- \$100,000 or greater

These variables were put into the following categories for descriptive purposes:

- Below \$69,999 included the categories “Less than \$50,000,” “\$50,000 to \$59,999” and “\$60,000 to \$69,999”
- Between \$70,000 and \$89,999 included the categories “\$70,000 to \$79,999” and “\$80,000 to \$89,999”
- Above \$90,000 included the categories “\$90,000 to \$99,999” and “\$100,000 or greater”

Age was calculated from the student’s self reported year of birth.

II. Program Characteristic Variables

First time 5 Year PANCE pass rate

PANCE percentiles were collected from each PA program’s website. The Accreditation Review Commission on Education for the Physician Assistant Programs requires the posting of PANCE statistics on a program’s website, making it the only standardized parameter available to the public.

The following categories created, guided by prior literature:

- 100% to 98% PANCE scores representing pass rates above the 75th percentile;
- 97% to 95% PANCE pass rates representing scores in the 50th percentile;
- 94% to 92% rates representing scores in the 25th percentile;
- 91%-88% rates representing scores in the 25th percentile; and,
- scores of less than 88% represented the lower 10th percentile of PANCE scores.

Program Sponsorship

Based on the Carnegie classification, programs were identified as:

- Public
- Private For Profit
- Private Non Profit

Program Capacity

The program capacity as measured by seats offered per year was categorized into tertiles of the universe of program capacities. This resulted in the following categories:

- <=36 seats,
- 37-64 seats, and
- greater than 65 seats.

Total Credit Hour Requirement

This variable, taken directly from PA program websites, was used to calculate tuitions when costs were based per credit hour.

Program Length

Tertiles were calculated from the universe of program lengths' reported on program's websites. The resulting categories include:

- 21 to 24 months
- 25 to 27 months, and
- over 28 months.

Accreditation

As determined by the PAEA website, programs were categorized as:

- Continuous
- Provisional
- Probationary

Zip code and Region

The program's zip code as taken from each website was used to place the program in a state and subsequently categorized into a region as delineated by PAEA in previous reports:

- Northeast: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, and Pennsylvania.
- South: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, and Texas.
- Midwest: Indiana, Illinois, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.
- West: Arizona, Colorado, Idaho, New Mexico, Montana, Utah, Nevada, Wyoming, Alaska, California, Hawaii, Oregon, and Washington.

Tuition for the length of the program

Tuition for each program was taken off of program websites, or calculated from semester cost, annual cost estimates or credit hour requirements provided by the program.

The 2013 Matriculating Student Survey Brief Report on Indebtedness by the PAEA in 2013 provided guidelines to categorize tuition levels,[1] resulting in the categories :

- \$1 to \$50,000,
- \$50,000 to \$75,000,
- \$ 75,000 to \$100,000, and
- over \$100,000.

Some PA programs associated with public universities offer student discounts for students residing in the same state as the school. This difference in tuition is reflected in the variable of “In-state Tuition Discount” in which the resident tuition discount was subtracted from the total tuition charged to non-residents. The amount of discount was divided into tertiles which were calculated as:

- \$1 to \$22,642,
- \$23,643 to \$45,031, and
- \$45,032 to \$67,674.