Supplemental Digital Content

Additional Details Regarding the Methodology and Results of a Study of Community College Applicants and Matriculants to Physician Assistant Programs, 2016-2017

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Supplemental Digital Appendix 1
Variable Definition and Descriptive Statistics

1. Variable Definitions
This section describes the variables we included in the analysis. All of those variables are captured from the Central Application Service for Physician Assistants (CASPA) by the Physician Assistant Education Association (PAEA). The research team receives a deidentified version of the data.

1.1 Outcome Measure
Matriculation: This outcome is a dummy variable defined as 1 if the applicant is matriculated in any program he/she applied for, 0 otherwise.

1.2 Independent Variable
Community College Pathway: This is the primary independent variable of interest. We classified students into five different community college pathways: HS-CC (attended CC while high school), First-CC (attended a CC prior to a 4-year university), 4Y-CC (attended a CC while in 4 year college), Post-CC (attended a CC after graduating from 4-year university), and No-CC (never attended a CC). This five-category pathway variable is our primary independent variable of interest. In our sample, 5,826 applicants and 1,899 matriculants used more than one CC pathways. We assigned them to a single CC pathway category based on the following algorithm: 1) students who attended CC prior to four-year university is categorized as First-CC; the remaining students who attended CC after completing four-year university is categorized as Post-CC; the remaining students who attended CC while in high school is categorized as HS-CC; the remaining students who attended CC while in four-year university is categorized as 4Y-CC.

1.3 Control Variables
We controlled for four categories of covariates: demographics, socioeconomic status, education performance, and application strategy.

Demographics
We controlled for race/ethnicity, gender, and age of the applicant.

Race/Ethnicity

CASPA uses six dummy variables to capture race and ethnicity: white, black, Asian, Pacific Islander, Native American, and Hispanic ethnicity. Those variables are not mutually exclusive. We coded corresponding variables to 1 when the applicant indicate they fits in the race and ethnicity, and 0 otherwise. There were very few applicants of Pacific Islander and Native American. We collapse them into a single “Other” race category.

Age

CASPA captures the self-reported age of the applicant at the time of submission. 13 applicants did not report valid age. We dropped those cases.

Gender

We used the self-reported gender variables from the CASPA. Three applicants did not report their gender. 3 applicants did not report gender. We dropped those cases.

Rurality

HRSA Geographic Designation of Hometown

This variable captures the designation of place where the applicant is raised. We defined the categorical variable as following: 1 = isolated rural area, 2 = small town; 3 = large town; 4 mid-size city; 5 = large city; 6 = urban; 7 = do not want to disclose.

We categorized this variable into three categories of rurality: 1) rural (category 1-3); 2) urban (category 5-6); 3) do not want to disclose (category 7).

Socioeconomic Status

Economically Disadvantaged

We used the following variables to construct a single measure of economically disadvantaged. It is coded as 1 if any of the following variables is 1, and 0 when both are 0.

Family receives public assistance

This variable captures whether the applicant's family receives public assistance (e.g., TANF). 1 = Yes, 0 = No.

Family income is considered economically disadvantaged

This variable captures whether the applicant's family is considered as low-income based on thresholds defined by U.S. Census Bureau or other criteria defined by the Secretary of U.S. Department of Health and Human Service.

Environmentally Disadvantaged

We used the following variables to construct a single measure of economically disadvantaged. It is coded as 1 if any of the following variables is 1, and 0 when all are 0.

English as Second Language (ESL)

This variable captures whether English is a second language for the applicant. 1 = ESL; 0 = English is mother tongue.

Less than 50% of High School Graduates go to College

This variable captures whether less than 50% of graduates of the applicant's high school go to college. 1 = less than 50% go to college; 2 = at least 50% go to college.

Holds Adult High School General Educational Development (GED) Diploma

This variable captures whether the applicant holds a high school diploma from adult high school or GED. 1 = Yes, 0 = No. However, there is little variation in this variable and we decided to exclude it from the regression analysis.

Health Professional Shortage Area (HPSA)

This variable captures whether the applicant is from a HPSA. 1 = Yes, 0 = No.

Enrichment Program Funded by Health Careers

This variable captures whether the applicant is part of an enrichment program funded by health careers. 1 = Yes, 0 = No. However, there is little variation in this variable, and we decided to exclude it from the regression analysis.

Free or Reduced Price Lunch

This variable captures whether at least 30 percent of students in the applicant's high school had free or reduced price lunch. 1 = Yes, 0 = No

Low Performance HS Graduate

Person from high school with low average SAT/ACT scores or below the average State test results.

First Generation Enrollment

This variable captures whether the applicant is the first generation of the family that goes to post-secondary education. 1 = Yes, 0 = No.

Parent Information

The applicants reported their parent's gender, education, and occupation. However, each applicant can report multiple parents so we decided to take the most educated parent from all reported parents to make the data consistent across all applicants.

Application Strategy

Competitiveness of Programs Applied

We constructed a variable to control for the competitiveness of the schools that an applicant applied for. We construct the competitiveness of a school based on six variables: the median matriculating undergraduate science GPA, the median matriculating baccalaureate total GPA, the median matriculating GRE Quantitative Reasoning percentile, the median matriculating GRE Verbal Reasoning percentile, the median matriculating GRE Analytical Writing percentile , and matriculant-to-applicant ratio at the program level. We standardized those variables since they are not on the same scale and then we performed an exploratory factor analysis. The results are listed below:


```
Factor analysis/correlation                      Number of obs    =        227
    Method: principal-component factors          Retained factors =          1
    Rotation: (unrotated)                        Number of params =          6
```

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	4.21878	3.43346	0.7031	0.7031
Factor2	0.78532	0.07287	0.1309	0.8340
Factor3	0.71246	0.52581	0.1187	0.9528
Factor4	0.18664	0.09037	0.0311	0.9839
Factor5	0.09627	0.09575	0.0160	0.9999
Factor6	0.00052	.	0.0001	1.0000

```
    LR test: independent vs. saturated:  chi2(15) = 2402.06 Prob>chi2 = 0.0000
```

```
Factor loadings (pattern matrix) and unique variances
```

Variable	Factor1	Uniqueness
Sci_GPA	0.8736	0.2368
BA_GPA	0.8755	0.2334
GRE_Quant	0.9108	0.1704
GRE_Verb	0.8857	0.2155
GRE_Writ	0.8731	0.2377
Mat_Ratio	-0.5590	0.6875

There is only 1 factor with eigenvalue larger than 1, meaning explains more than a single variable. This factor explains more than 70% of the variations in the data. There is a single underlying factor that encompasses all those competitiveness measures. We extracted Factor 1 and ranked all programs into 4 quartiles of competitiveness using Factor 1. We took the ranking of the least competitive school for each applicant. We tested using other variants of competitiveness measure: the most competitive and the range of competitiveness of school the applicant applied. They are not statistically significant when we add those together with the least competitive school variable. There is no sign of multi-collinearity problem when we tested those other variants. We decided to only use the least competitive school variable in the analysis.

Number of Application

We also controlled for the number of applications that an applicant submitted.

Academic Performance

We used five variables to control for academic performance: two GPA measures, the undergraduate science GPA and the baccalaureate total GPA; three standardized test measures, the percentile rankings of GRE quantitative reasoning, verbal reasoning, and analytical writing. However, there is a considerable of program does not require a GRE for admission, thus, there are 6,764 applicants did not have a valid GRE percentile. This is a meaningful missing data. We do not want to exclude those individuals. We imputed their GRE percentiles using the mean

value from the sample and generated a separate dummy variable indicating that the GRE is imputed such that the coefficients of GRE percentiles are not changed and we can interpret the effect of not having GRE compared to the individuals with average GRE percentiles.

1.4 Descriptive Analysis

Table B1 and B2 below presents the full descriptive analysis of PA applicants and matriculants.

Appendix Table 1 – Descriptive Statistics of Applicants

The following table provides summary statistics for all applicants to PA programs regardless of their matriculation status. It reports the counts of applicants, matriculants, and variables on demographics and socioeconomic status, prior academic performance, and application strategy by their Community College pathways (CC pathways) in columns: 1) **No-CC** (never attended a CC), 2) **HS-CC** (attended CC while in high school), 3) **First-CC** (attended a CC prior to a four-year university), 4) **4Y-CC** (attended a CC while in a four-year university), 5) **Post-CC** (attended a CC after graduating from a four-year university). The summary statistics are provided as follows. For categorical variables, the first row presents the counts of applicants in that category; the second row presents the percent of applicants from given CC Pathways in that category; and, the third row presents p-value from a post-hoc comparison between CC applicants and applicants from no-CC pathways. The last column presents p-values from Pearson Chi-squared or Kruskal-Wallis H tests, indicating whether there are differences in variable between CC pathways.

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
# of Applicants	6072	6093	4216	3736	5326	
	(23.87)	(23.95)	(16.57)	(14.68)	(20.93)	
# of Matriculants [a]	2129	2313	1079	1231	1825	<.001
	(35.06)	(37.96)	(25.59)	(32.95)	(34.27)	
		[0.009]	[<.001]	[0.32]	[>.99]	
Demographics						
Gender (Male) [a]	1669	1409	1577	966	1454	<.001
	(27.49)	(23.12)	(37.41)	(25.86)	(27.30)	
		[<.001]	[<.001]	[0.77]	[>.99]	
Age	24.25	23.83	28.66	25.82	26.56	<.001
	(4.44)	(3.46)	(6.60)	(5.68)	(5.42)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Race/Ethnicity						
White [a]	4406	4651	2623	2637	3413	<.001
	(72.56)	(76.33)	(62.22)	(70.58)	(64.08)	
		[<.001]	[<.001]	[0.34]	[<.001]	
Black [a]	390	256	382	287	433	<.001

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
	(6.42)	(4.20)	(9.06)	(7.68)	(8.13)	
		[<.001]	[<.001]	[0.17]	[0.004]	
Asian [a]	773	663	631	489	856	<.001
	(12.73)	(10.88)	(14.97)	(13.09)	(16.07)	
		[0.02]	[0.01]	[>.99]	[<.001]	
Other [a]	83	103	93	65	92	0.03
	(1.37)	(1.69)	(2.21)	(1.74)	(1.73)	
		[>.99]	[0.01]	[>.99]	[>.99]	
Hispanic [a]	489	613	631	379	545	<.001
	(8.05)	(10.06)	(14.97)	(10.14)	(10.23)	
		[0.001]	[<.001]	[0.004]	[<.001]	
Application Strategy						
Competitiveness [a] (Quartile 1)	3454	3685	2517	2335	3392	<.001
	(56.88)	(60.48)	(59.70)	(62.50)	(63.69)	
		[<.001]	[0.04]	[<.001]	[<.001]	
Quartile 2	1560	1565	1114	901	1301	
	(25.69)	(25.69)	(26.42)	(24.12)	(24.43)	
		[>.99]	[>.99]	[0.81]	[>.99]	
Quartile 3	805	621	375	363	445	
	(13.26)	(10.19)	(8.89)	(9.72)	(8.36)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Quartile 4	253	222	210	137	188	
	(4.17)	(3.64)	(4.98)	(3.67)	(3.53)	
		[>.99]	[0.50]	[>.99]	[0.79]	
Number of Applications [b]	6.93	6.85	6.42	7.60	7.85	<.001
	(5.70)	(5.41)	(6.30)	(6.22)	(6.62)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Academic Performance						
Cumulative Undergrad Science GPA [b]	3.28	3.31	3.23	3.22	3.22	<.001
	(0.41)	(0.40)	(0.43)	(0.42)	(0.40)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Baccalaureate Total GPA [b]	3.38	3.42	3.27	3.28	3.25	<.001
	(0.36)	(0.35)	(0.39)	(0.39)	(0.38)	
		[<.001]	[<.001]	[<.001]	[<.001]	
GRE						
% of Quantitative [b]	45.61	43.61	38.02	42.75	44.73	<.001
	(16.71)	(16.22)	(15.94)	(17.34)	(17.32)	
		[<.001]	[<.001]	[<.001]	[<.001]	

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
% of Verb [b]	53.63	50.86	46.90	50.97	54.33	<.001
	(18.76)	(18.75)	(18.19)	(19.93)	(19.26)	
		[<.001]	[<.001]	[<.001]	[<.001]	
% of Writing [b]	54.55	52.83	46.93	53.10	54.34	<.001
	(20.13)	(20.13)	(19.31)	(20.62)	(20.20)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Imputation Flag	1620	1334	1628	853	1329	<.001
Missing GRE [a]	(26.68)	(21.89)	(38.61)	(22.83)	(24.95)	
		[<.001]	[<.001]	[<.001]	[0.36]	
Rurality						
Urban [a]	2704	2579	2223	1830	2676	<.001
	(44.53)	(42.33)	(52.73)	(48.98)	(50.24)	
		[0.14]	[<.001]	[<.001]	[<.001]	
Rural	3125	3313	1761	1751	2447	
	(51.47)	(54.37)	(41.77)	(46.87)	(45.94)	
		[0.01]	[<.001]	[<.001]	[<.001]	
Do not want to disclose	243	201	232	155	203	
	(4.00)	(3.30)	(5.50)	(4.15)	(3.81)	
		[0.39]	[0.004]	[>.99]	[>.99]	
Socioeconomic Status						
Economically Disadvantaged [a]	835	848	1056	493	908	<.001
	(13.75)	(13.92)	(25.05)	(13.20)	(17.05)	
		[>.99]	[<.001]	[>.99]	[<.001]	
Environmentally Disadvantaged [a]	1874	2229	2071	1195	1916	<.001
	(30.86)	(36.58)	(49.12)	(31.99)	(35.97)	
		[<.001]	[<.001]	[>.99]	[<.001]	
Health Professional Shortage Area [a]	436	755	540	315	564	<.001
	(7.18)	(12.39)	(12.81)	(8.43)	(10.59)	
		[<.001]	[<.001]	[0.24]	[<.001]	
Parent Education [a]						
High School or Less	851	856	927	508	844	<.001
	(14.02)	(14.05)	(21.99)	(13.60)	(15.85)	
		[>.99]	[<.001]	[>.99]	[0.06]	
Some College, Less than Bachelor	916	1112	765	543	826	
	(15.09)	(18.25)	(18.15)	(14.53)	(15.51)	

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
		[<.001]	[<.001]	[>.99]	[>.99]	
Bachelor & Above	3587	3482	1486	2101	2825	
	(59.07)	(57.15)	(35.25)	(56.24)	(53.04)	
		[0.31]	[<.001]	[0.06]	[<.001]	
Don't Know	718	643	1038	584	831	
	(11.82)	(10.55)	(24.62)	(15.63)	(15.60)	
		[0.26]	[<.001]	[<.001]	[<.001]	
Parent Gender [a]						
Gender (Female)	2948	3060	1825	1693	2402	<.001
	(48.55)	(50.22)	(43.29)	(45.32)	(45.10)	
		[0.65]	[<.001]	[0.02]	[0.002]	
Male	2452	2427	1393	1486	2114	
	(40.38)	(39.83)	(33.04)	(39.78)	(39.69)	
		[>.99]	[<.001]	[>.99]	[>.99]	
Do not want to disclose	672	606	998	557	810	
	(11.07)	(9.95)	(23.67)	(14.91)	(15.21)	
		[0.44]	[<.001]	[<.001]	[<.001]	

[a] Percent of applicants in each CC pathway with the attribute of the row in parentheses. Pearson chi-squared tests were performed to determine whether there are statistically significant differences between 5 different CC pathways. Adjusted Pearson residual and Bonferroni-corrected p-values were used to test the pairwise difference between No-CC and First-CC applicants. Bonferroni-corrected p values for pairwise comparisons between the CC applicants from different CC pathways and no-CC applicants are in brackets.

[b] Standard deviation in parentheses. Kruskal–Wallis H test was performed to determine whether there are statistically significant differences between 5 different CC pathways. Conover-Iman tests with Bonferroni correction were performed to test the pairwise differences between No-CC and First-CC applicants. Bonferroni-corrected p values for pairwise comparisons between the CC applicants from different CC pathways and no-CC applicants are in brackets.

Appendix Table 2 – Summary Statistics of Matriculants

The following table provides summary statistics for all matriculants to PA programs regardless of their matriculation status. It reports the counts of matriculants, and variables on demographics and socioeconomic status, prior academic performance, and application strategy by their Community College pathways (CC pathways) in columns:) **No-CC** (never attended a CC), 2) **HS-CC** (attended CC while in high school), 3) **First-CC** (attended a CC prior to a four-year university), 4) **4Y-CC** (attended a CC while in a four-year university), 5) **Post-CC** (attended a CC after graduating from a four-year university). The summary statistics are provided as follows. For categorical variables, the first row presents the counts of matriculants in that category; the second row presents the percent of matriculants from given CC Pathways in that category; and, the third row presents p-value from a post-hoc comparison between CC matriculants and matriculants from no-CC pathways. The last column presents p-values from Pearson Chi-squared

or Kruskal-Wallis H tests, indicating whether there are differences in variable between CC pathways.

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
# of Matriculants [a]	2129	2313	1079	1231	1825	
	(24.82)	(26.97)	(12.58)	(14.35)	(21.28)	
Demographics						
Gender (Male) [a]	497	512	447	304	496	<.001
	(23.34)	(22.14)	(41.43)	(24.70)	(27.18)	
		[>.99]	[<.001]	[>.99]	[0.06]	
Age	23.51	23.28	27.88	24.92	25.96	<.001
	(3.76)	(2.99)	(6.23)	(4.98)	(4.98)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Race/Ethnicity						
White [a]	1694	1886	747	945	1269	<.001
	(79.57)	(81.54)	(69.23)	(76.77)	(69.53)	
		[0.97]	[<.001]	[0.57]	[<.001]	
Black [a]	63	57	70	49	93	<.001
	(2.96)	(2.46)	(6.49)	(3.98)	(5.10)	
		[>.99]	[<.001]	[>.99]	[0.01]	
Asian [a]	225	199	121	135	243	<.001
	(10.57)	(8.60)	(11.21)	(10.97)	(13.32)	
		[0.26]	[>.99]	[>.99]	[0.08]	
Other [a]	24	35	18	16	27	0.72
	(1.13)	(1.51)	(1.67)	(1.30)	(1.48)	
		[>.99]	[>.99]	[>.99]	[>.99]	
Hispanic [a]	139	206	159	107	171	<.001
	(6.53)	(8.91)	(14.74)	(8.69)	(9.37)	
		[0.03]	[<.001]	[0.20]	[0.01]	
Application Strategy						
Competitiveness [a] (Quartile 1)	1262	1495	731	830	1273	<.001
	(59.28)	(64.63)	(67.75)	(67.42)	(69.75)	
		[0.002]	[<.001]	[<.001]	[<.001]	
Quartile 2	557	597	264	304	433	
	(26.16)	(25.81)	(24.47)	(24.70)	(23.73)	
		[>.99]	[>.99]	[>.99]	[0.78]	
Quartile 3	271	189	66	80	101	
	(12.73)	(8.17)	(6.12)	(6.50)	(5.53)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Quartile 4	39	32	18	17	18	

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
	(1.83)	(1.38)	(1.67)	(1.38)	(0.99)	
		[>.99]	[>.99]	[>.99]	[0.26]	
Number of Applications [b]	8.33	8.28	8.58	9.16	9.75	<.001
	(6.27)	(5.90)	(6.99)	(6.45)	(7.28)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Academic Performance						
Cumulative Undergrad Science GPA [b]	3.53	3.55	3.50	3.47	3.45	<.001
	(0.28)	(0.29)	(0.29)	(0.30)	(0.30)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Baccalaureate Total GPA [b]	3.59	3.61	3.50	3.50	3.45	<.001
	(0.26)	(0.26)	(0.31)	(0.31)	(0.30)	
		[<.001]	[<.001]	[<.001]	[<.001]	
GRE						
% of Quantitative [b]	50.48	48.26	42.05	48.01	49.91	<.001
	(17.03)	(16.06)	(16.55)	(17.30)	(17.54)	
		[<.001]	[<.001]	[<.001]	[<.001]	
% of Verb [b]	58.17	55.50	51.55	56.37	59.25	<.001
	(18.83)	(18.60)	(18.20)	(19.49)	(19.70)	
		[<.001]	[<.001]	[<.001]	[<.001]	
% of Writing [b]	59.62	57.23	51.33	58.19	59.24	<.001
	(20.15)	(20.34)	(19.46)	(20.22)	(20.35)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Imputation Flag	399	350	304	183	287	<.001
Missing GRE [a]	(18.74)	(15.13)	(28.17)	(14.87)	(15.73)	
		[0.01]	[<.001]	[0.04]	[0.13]	
Rurality						
Urban [a]	896	960	536	601	882	<.001
	(42.09)	(41.50)	(49.68)	(48.82)	(48.33)	
		[>.99]	[<.001]	[0.002]	[<.001]	
Rural	1172	1308	493	594	884	
	(55.05)	(56.55)	(45.69)	(48.25)	(48.44)	
		[>.99]	[<.001]	[0.001]	[<.001]	
Do not want to disclose	61	45	50	36	59	
	(2.87)	(1.95)	(4.63)	(2.92)	(3.23)	
		[0.45]	[0.096]	[>.99]	[>.99]	

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
Socioeconomic Status						
Economically Disadvantaged [a]	212	266	258	145	284	<.001
	(9.96)	(11.50)	(23.91)	(11.78)	(15.56)	
		[0.97]	[<.001]	[0.99]	[<.001]	
Environmentally Disadvantaged [a]	526	792	492	341	584	<.001
	(24.71)	(34.24)	(45.60)	(27.70)	(32.00)	
		[<.001]	[<.001]	[0.56]	[<.001]	
Health Professional Shortage Area [a]	140	294	155	104	198	<.001
	(6.58)	(12.71)	(14.37)	(8.45)	(10.85)	
		[<.001]	[<.001]	[0.44]	[<.001]	
Parent Education [a]						
High School or Less	239	302	231	137	258	<.001
	(11.23)	(13.06)	(21.41)	(11.13)	(14.14)	
		[0.62]	[<.001]	[>.99]	[0.06]	
Some College, Less than Bachelor	282	402	193	174	261	
	(13.25)	(17.38)	(17.89)	(14.13)	(14.30)	
		[0.001]	[0.005]	[>.99]	[>.99]	
Bachelor & Above	1403	1404	437	748	1080	
	(65.90)	(60.70)	(40.50)	(60.76)	(59.18)	
		[0.003]	[<.001]	[0.03]	[<.001]	
Don't Know	205	205	218	172	226	
	(9.63)	(8.86)	(20.20)	(13.97)	(12.38)	
		[>.99]	[<.001]	[0.001]	[0.06]	
Parent Gender [a]						
Gender (Female)	1051	1174	495	557	820	<.001
	(49.37)	(50.76)	(45.88)	(45.25)	(44.93)	
		[>.99]	[0.62]	[0.21]	[0.05]	
Male	884	943	370	508	782	
	(41.52)	(40.77)	(34.29)	(41.27)	(42.85)	
		[>.99]	[<.001]	[>.99]	[>.99]	
Do not want to disclose	194	196	214	166	223	
	(9.11)	(8.47)	(19.83)	(13.48)	(12.22)	
		[>.99]	[<.001]	[<.001]	[0.02]	

[a] Percent of matriculants in each CC pathway with the attribute of the row in parentheses. Pearson chi-squared tests were performed to determine whether there are statistically significant differences between 5 different CC pathways. Adjusted Pearson residual and Bonferroni-corrected p-values were used to test the pairwise difference between No-CC and First-CC applicants. Bonferroni-corrected p values for pairwise comparisons between the CC applicants from different CC pathways and no-CC applicants are in brackets.

[b] Standard deviation in parentheses. Kruskal–Wallis H test was performed to determine whether there are statistically significant differences between 5 different CC pathways. Conover-Iman test with Bonferroni correction was performed to test the pairwise difference between No-CC and First-CC applicants. Bonferroni-corrected p values for pairwise comparisons between the CC applicants from different CC pathways and no-CC applicants are in brackets.

Supplemental Digital Appendix 2

Carnegie Classification of Institutions of Higher Education for Community Colleges

1. Rationale

We used three different versions of Carnegie Classification (2018, 2015, 2010, 2000) to classify community colleges due to the fact that the applicants for PA programs has a wide range of ages and the Carnegie Classification for some higher education institutions changes over time. Appendix Table 1 shows the age distribution of students and the starting years of their first post-secondary education.

Appendix Table 1 – Distribution of Age and Post-Secondary Education Starting Years

Applicant Age Distribution		
Age Range	No. Applicants	% Applicants
<25	14,841	55.49%
[25,30)	7,302	27.30%
[30,35)	2,447	9.15%
[35,40)	1,065	3.98%
>=40	1,008	4.07%
Post-Secondary Education Distribution		
Starting Year	No. Applicant	% Applicants
<2000	1,978	7.40%
[2000,2010)	11,686	43.70%
[2010,2015)	13,041	48.76%
[2015,2016)	38	0.14%

There is wide dispersion in both age range and the first year of post-secondary education among applicants. We linked the higher education institutions to community college status when applicants attended those institutions. Thus, the same institution might have different CC status for applicants attended it at different times (e.g., some then CCs moved towards a four-year college or Baccalaureate/Associate's Colleges: Baccalaureate Dominant).

2. Carnegie Classification Codes for Community College

Appendix Table 2 lists all classification codes we considered as community college from different versions of Carnegie Classification.

Carnegie Classification Version 2000	
40	Associate's Colleges
Carnegie Classification Version 2010	
1	Assoc/Pub-R-S: Associate's--Public Rural-serving Small
2	Assoc/Pub-R-M: Associate's--Public Rural-serving Medium
3	Assoc/Pub-R-L: Associate's--Public Rural-serving Large
4	Assoc/Pub-S-SC: Associate's--Public Suburban-serving Single Campus
5	Assoc/Pub-S-MC: Associate's--Public Suburban-serving Multi-campus
6	Assoc/Pub-U-SC: Associate's--Public Urban-serving Single Campus
7	Assoc/Pub-U-MC: Associate's--Public Urban-serving Multi-campus

8	Assoc/Pub-Spec: Associate's--Public Special Use
9	Assoc/PrivNFP: Associate's--Private Not-for-profit
10	Assoc/PrivFP: Associate's--Private For-profit
11	Assoc/Pub2in4: Associate's--Public 2-year colleges under 4-year universities
12	Assoc/Pub4: Associate's--Public 4-year Primarily Associate's
13	Assoc/PrivNFP4: Associate's--Private Not-for-profit 4-year Primarily Associate's
14	Assoc/PrivFP4: Associate's--Private For-profit 4-year Primarily Associate's
Carnegie Classification Version 2015	
1	Associate's Colleges: High Transfer-High Traditional
2	Associate's Colleges: High Transfer-Mixed Traditional/Nontraditional
3	Associate's Colleges: High Transfer-High Nontraditional
4	Associate's Colleges: Mixed Transfer/Career & Technical-High Traditional
5	Associate's Colleges: Mixed Transfer/Career & Technical-Mixed Traditional/Nontraditional
6	Associate's Colleges: Mixed Transfer/Career & Technical-High Nontraditional
7	Associate's Colleges: High Career & Technical-High Traditional
8	Associate's Colleges: High Career & Technical-Mixed Traditional/Nontraditional
9	Associate's Colleges: High Career & Technical-High Nontraditional
10	Special Focus Two-Year: Health Professions
11	Special Focus Two-Year: Technical Professions
12	Special Focus Two-Year: Arts & Design
13	Special Focus Two-Year: Other Fields
14	Baccalaureate/Associate's Colleges: Associate's Dominant

3. Classification Methodology

We used the following decision rule to assign CC status for applicant's post-secondary education experience:

1) For applicants who had post-secondary education from 2015 to 2017, we use 2015 version of Carnegie Classification to classify the institutions they attended during this period.
2) For applicants who had post-secondary education from 2010 to 2014, we use 2010 version of Carnegie Classification to classify the institutions they attended during this period.
3) For applicants who had post-secondary education prior to 2010, we used 2000 version of Carnegie Classification to classify the institutions they attended during this period.

Supplemental digital content for Luo Q, Erikson CE, Chitwood R, Yuen CX. Does community college attendance affect matriculation to a physician assistant program? A pathway to increase diversity in the health professions. Acad Med.

Supplemental Digital Appendix 3
Full Regression Results

Appendix Table 1 – Full Regression Results on Alternative Models

The following table presents alternative models. Model 1 includes only community college pathways:) **No-CC** (never attended a CC), 2) **HS-CC** (attended CC while in high school), 3) **First-CC** (attended a CC prior to a four-year university), 4) **4Y-CC** (attended a CC while in a four-year university), 5) **Post-CC** (attended a CC after graduating from a four-year university). No-CC serves as the omitted category. Model 2 additional included demographics. Model 3 additionally included application strategy. Model 4 additionally included prior academic performance. Model 5 additionally included socioeconomic status. Odds ratios and corresponding 95% confidence intervals are presented in the table.

	(1)	(2)	(3)	(4)	(5)
Community College Pathway					
HS-CC	1.13***	1.09**	1.11***	1.08	1.05
	(1.05 - 1.22)	(1.01 - 1.18)	(1.03 - 1.19)	(0.99 - 1.18)	(0.96 - 1.15)
First-CC	0.64***	0.80***	0.79***	0.84***	0.83***
	(0.58 - 0.69)	(0.73 - 0.87)	(0.72 - 0.87)	(0.74 - 0.94)	(0.73 - 0.93)
4Y-CC	0.91**	0.98	0.92*	1.09	1.09
	(0.83 - 0.99)	(0.90 - 1.07)	(0.84 - 1.01)	(0.98 - 1.21)	(0.98 - 1.22)
Post-CC	0.97	1.11**	1.03	1.15***	1.14**
	(0.89 - 1.04)	(1.02 - 1.20)	(0.95 - 1.11)	(1.04 - 1.27)	(1.03 - 1.25)
Demographics					
White		1.22***	1.30***	1.10*	1.09*
		(1.12 - 1.32)	(1.19 - 1.41)	(0.99 - 1.21)	(0.98 - 1.20)
Black		0.52***	0.57***	1.17*	1.12
		(0.45 - 0.60)	(0.49 - 0.67)	(0.98 - 1.40)	(0.94 - 1.33)
Asian		0.75***	0.67***	0.74***	0.73***
		(0.68 - 0.84)	(0.61 - 0.75)	(0.65 - 0.84)	(0.64 - 0.83)
Other Race		0.84	0.88	1.02	0.99
		(0.68 - 1.04)	(0.71 - 1.09)	(0.77 - 1.34)	(0.75 - 1.32)
Hispanic		0.80***	0.83***	1.22***	1.17***
		(0.73 - 0.88)	(0.75 - 0.91)	(1.09 - 1.37)	(1.04 - 1.32)
Gender (Male)		0.98	0.98	0.93*	0.92**
		(0.93 - 1.05)	(0.92 - 1.05)	(0.86 - 1.00)	(0.85 - 0.99)
Age		0.95***	0.96***	1.00	1.00
		(0.94 - 0.96)	(0.96 - 0.97)	(0.99 - 1.01)	(0.99 - 1.01)
Application Strategy					
Competitiveness (2nd Quartile)			1.16***	0.80***	0.80***
			(1.08 - 1.24)	(0.74 - 0.87)	(0.74 - 0.87)
(3nd Quartile)			1.00	0.63***	0.63***
			(0.90 - 1.10)	(0.56 - 0.71)	(0.56 - 0.72)

	(1)	(2)	(3)	(4)	(5)
(4th Quartile)			0.45***	0.21***	0.21***
			(0.37 - 0.54)	(0.17 - 0.26)	(0.16 - 0.26)
Number of Applications			1.07***	1.09***	1.09***
			(1.07 - 1.08)	(1.08 - 1.10)	(1.08 - 1.10)
Academic Performance					
Undergrad Science GPA (0.1)				1.28***	1.28***
				(1.25 - 1.30)	(1.26 - 1.30)
Baccalaureate GPA (0.1)				1.11***	1.11***
				(1.09 - 1.14)	(1.09 - 1.14)
GRE (Quant) (5%)				1.05***	1.05***
				(1.04 - 1.06)	(1.04 - 1.07)
GRE (Verb) (5%)				1.04***	1.04***
				(1.03 - 1.05)	(1.03 - 1.05)
GRE (Writing) (5%)				1.03***	1.03***
				(1.02 - 1.04)	(1.02 - 1.04)
Missing GRE				0.81***	0.81***
				(0.75 - 0.88)	(0.74 - 0.88)
Rurality (Ref = Isolated Rural)					
Rural					1.03
					(0.96 - 1.10)
Do not want to disclose					0.88
					(0.73 - 1.05)
Socioeconomic Status					
Economically Disadvantaged					0.99
					(0.91 - 1.09)
Environmentally Disadvantaged					1.03
					(0.93 - 1.15)
Health Professional Shortage Area					1.36***
					(1.21 - 1.54)
Parent Education					
Some College, Less than bachelor					0.92
					(0.82 - 1.04)
Bachelor & Above					0.89**
					(0.79 - 0.99)
Don’t Know					0.68**
					(0.47 - 0.99)
Parent Gender					
Male					0.98
					(0.91 - 1.05)
Do not want to disclose					1.16
					(0.80 - 1.69)

95% confident interval based robust standard errors in parenthesis. * p<0.1 **p<0.05 ***p<0.01

Supplemental Digital Appendix 4

Robustness Check Including Applicants with Missing GPAs

This section provides descriptive and regression analysis with the 1,300 applicants who di not have a valid GPA. We imputed their GPAs using the sample mean and had two separate dummy variables indicating that they are missing GPAs.
Appendix Tables 1 and 2 provide descriptive statistics for the robustness check sample with applicants with missing GPAs. Appendix Table 3 exhibits the regression results.

Appendix Table 1 – Summary Statistics of Applicants

The following table provides summary statistics for all applicants to PA programs regardless of their matriculation status, including 1300 applicants missing at least 1 GPA. It reports the counts of applicants, matriculants, and variables on demographics and socioeconomic status, prior academic performance, and application strategy by their Community College pathways (CC pathways) in columns: 1) **No-CC** (never attended a CC), 2) **HS-CC** (attended CC while in high school), 3) **First-CC** (attended a CC prior to a four-year university), 4) **4Y-CC** (attended a CC while in a four-year university), 5) **Post-CC** (attended a CC after graduating from a four-year university). The summary statistics are provided as follows. For categorical variables, the first row presents the counts of applicants in that category; the second row presents the percent of applicants from given CC Pathways in that category; and, the third row presents p-value from a post-hoc comparison between CC applicants and applicants from no-CC pathways. The last column presents p-values from Pearson Chi-squared or Kruskal-Wallis H tests, indicating whether there are differences in variable between CC pathways.

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
# of Applicants	6565	6227	4671	3832	5448	
	(24.55)	(23.28)	(17.47)	(14.33)	(20.37)	
# of Matriculants [a]	2149	2317	1129	1242	1832	<.001
	(32.73)	(37.21)	(24.17)	(32.41)	(33.63)	
		[<.001]	[<.001]	[>.99]	[>.99]	
Demographics						
Gender (Male) [a]	1862	1447	1736	998	1502	<.001
	(28.36)	(23.24)	(37.17)	(26.04)	(27.57)	
		[<.001]	[<.001]	[0.11]	[>.99]	
Age	24.75	23.88	29.27	25.93	26.66	<.001
	(5.26)	(3.55)	(7.06)	(5.80)	(5.55)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Race/Ethnicity						
White [a]	4634	4735	2822	2681	3465	<.001
	(70.59)	(76.04)	(60.42)	(69.96)	(63.60)	
		[<.001]	[<.001]	[>.99]	[<.001]	

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
Black [a]	472	270	460	302	457	<.001
	(7.19)	(4.34)	(9.85)	(7.88)	(8.39)	
		[<.001]	[<.001]	[>.99]	[0.14]	
Asian [a]	890	688	762	516	889	<.001
	(13.56)	(11.05)	(16.31)	(13.47)	(16.32)	
		[<.001]	[<.001]	[>.99]	[<.001]	
Other [a]	88	107	106	67	94	0.01
	(1.34)	(1.72)	(2.27)	(1.75)	(1.73)	
		[0.81]	[0.002]	[0.98]	[0.86]	
Hispanic [a]	538	636	673	389	565	<.001
	(8.19)	(10.21)	(14.41)	(10.15)	(10.37)	
		[<.001]	[<.001]	[0.007]	[<.001]	
Application Strategy						
Competitiveness [a] (Quartile 1)	3670	3744	2742	2388	3448	<.001
	(55.90)	(60.13)	(58.70)	(62.32)	(63.29)	
		[<.001]	[0.03]	[<.001]	[<.001]	
Quartile 2	1685	1601	1246	922	1333	
	(25.67)	(25.71)	(26.68)	(24.06)	(24.47)	
		[>.99]	[>.99]	[0.68]	[>.99]	
Quartile 3	908	649	433	381	470	
	(13.83)	(10.42)	(9.27)	(9.94)	(8.63)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Quartile 4	302	233	250	141	197	
	(4.60)	(3.74)	(5.35)	(3.68)	(3.62)	
		[0.15]	[0.69]	[0.25]	[0.07]	
Number of Applications [b]	6.65	6.77	6.20	7.53	7.76	<.001
	(5.66)	(5.41)	(6.24)	(6.22)	(6.62)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Academic Performance						
Cumulative Undergrad Science GPA [b]	3.28	3.31	3.26	3.22	3.23	<.001
	(0.40)	(0.40)	(0.43)	(0.42)	(0.40)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Baccalaureate Total GPA [b]	3.38	3.42	3.28	3.28	3.25	<.001
	(0.34)	(0.35)	(0.37)	(0.38)	(0.37)	
		[<.001]	[<.001]	[<.001]	[<.001]	
GRE						
% of Quantitative [b]	45.30	43.54	38.19	42.69	44.60	<.001
	(16.53)	(16.17)	(15.86)	(17.31)	(17.29)	

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
		[<.001]	[<.001]	[<.001]	[<.001]	
% of Verb [b]	53.20	50.77	46.76	50.91	54.21	<.001
	(18.51)	(18.69)	(18.08)	(19.84)	(19.18)	
		[<.001]	[<.001]	[<.001]	[<.001]	
% of Writing [b]	54.03	52.70	46.52	52.98	54.17	<.001
	(19.94)	(20.09)	(19.29)	(20.52)	(20.17)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Imputation Flag	1944	1407	1898	908	1403	<.001
Missing GRE [a]	(29.61)	(22.60)	(40.63)	(23.70)	(25.75)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Rurality						
Urban [a]	2971	2636	2508	1878	2738	<.001
	(45.26)	(42.33)	(53.69)	(49.01)	(50.26)	
		[0.009]	[<.001]	[0.002]	[<.001]	
Rural	3316	3384	1900	1791	2495	
	(50.51)	(54.34)	(40.68)	(46.74)	(45.80)	
		[<.001]	[<.001]	[0.002]	[<.001]	
Do not want to disclose	278	207	263	163	215	
	(4.23)	(3.32)	(5.63)	(4.25)	(3.95)	
		[0.07]	[0.007]	[>.99]	[>.99]	
Socioeconomic Status						
Economically Disadvantaged [a]	914	875	1160	511	937	<.001
	(13.92)	(14.05)	(24.83)	(13.34)	(17.20)	
		[>.99]	[<.001]	[>.99]	[<.001]	
Environmentally Disadvantaged [a]	2079	2299	2314	1234	1967	<.001
	(31.67)	(36.92)	(49.54)	(32.20)	(36.10)	
		[<.001]	[<.001]	[>.99]	[<.001]	
Health Professional Shortage Area [a]	481	775	582	321	576	<.001
	(7.33)	(12.45)	(12.46)	(8.38)	(10.57)	
		[<.001]	[<.001]	[0.53]	[<.001]	
Parent Education [a]						
High School or Less	922	880	1001	517	859	<.001
	(14.04)	(14.13)	(21.43)	(13.49)	(15.77)	
		[>.99]	[<.001]	[>.99]	[0.08]	
Some College, Less than Bachelor	980	1132	806	554	845	

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
	(14.93)	(18.18)	(17.26)	(14.46)	(15.51)	
		[<.001]	[0.009]	[>.99]	[>.99]	
Bachelor & Above	3760	3539	1619	2138	2876	
	(57.27)	(56.83)	(34.66)	(55.79)	(52.79)	
		[>.99]	[<.001]	[>.99]	[<.001]	
Don't Know	903	676	1245	623	868	
	(13.75)	(10.86)	(26.65)	(16.26)	(15.93)	
		[<.001]	[<.001]	[0.005]	[0.008]	
Parent Gender [a]						
Gender (Female)	3112	3122	1937	1731	2442	<.001
	(47.40)	(50.14)	(41.47)	(45.17)	(44.82)	
		[0.02]	[<.001]	[0.28]	[0.048]	
Male	2604	2468	1531	1509	2160	
	(39.66)	(39.63)	(32.78)	(39.38)	(39.65)	
		[>.99]	[<.001]	[>.99]	[>.99]	
Do not want to disclose	849	637	1203	592	846	
	(12.93)	(10.23)	(25.75)	(15.45)	(15.53)	
		[<.001]	[<.001]	[0.003]	[<.001]	

[a] Percent of applicants in each CC pathway with the attribute of the row in parentheses. Pearson chi-squared tests were performed to determine whether there are statistically significant differences between 5 different CC pathways. Adjusted Pearson residual and Bonferroni-corrected p-values were used to test the pairwise difference between No-CC and First-CC applicants. Bonferroni-corrected p values for pairwise comparisons between the CC applicants from different CC pathways and no-CC applicants are in brackets.

[b] Standard deviation in parentheses. Kruskal–Wallis H test was performed to determine whether there are statistically significant differences between 5 different CC pathways. Conover-Iman tests with Bonferroni correction were performed to test the pairwise differences between No-CC and First-CC applicants. Bonferroni-corrected p values for pairwise comparisons between the CC applicants from different CC pathways and no-CC applicants are in brackets.

Appendix Table 2 – Summary Statistics of Matriculants

The following table provides summary statistics for all matriculants to PA programs regardless of their matriculation status, including 1300 applicants did not provide at least 1 GPA. It reports the counts of matriculants, and variables on demographics and socioeconomic status, prior academic performance, and application strategy by their Community College pathways (CC pathways) in columns:) **No-CC** (never attended a CC), 2) **HS-CC** (attended CC while in high school), 3) **First-CC** (attended a CC prior to a four-year university), 4) **4Y-CC** (attended a CC while in a four-year university), 5) **Post-CC** (attended a CC after graduating from a four-year university). The summary statistics are provided as follows. For categorical variables, the first row presents the counts of matriculants in that category; the second row presents the percent of matriculants from given CC Pathways in that category; and, the third row presents p-value from

a post-hoc comparison between CC matriculants and matriculants from no-CC pathways. The last column presents p-values from Pearson Chi-squared or Kruskal-Wallis H tests, indicating whether there are differences in variable between CC pathways.

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
# of Applicants	6072	6093	4216	3736	5326	
	(23.87)	(23.95)	(16.57)	(14.68)	(20.93)	
# of Matriculants [a]	2129	2313	1079	1231	1825	<.001
	(35.06)	(37.96)	(25.59)	(32.95)	(34.27)	
		[0.009]	[<.001]	[0.32]	[>.99]	
Demographics						
Gender (Male) [a]	1669	1409	1577	966	1454	<.001
	(27.49)	(23.12)	(37.41)	(25.86)	(27.30)	
		[<.001]	[<.001]	[0.77]	[>.99]	
Age	24.25	23.83	28.66	25.82	26.56	<.001
	(4.44)	(3.46)	(6.60)	(5.68)	(5.42)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Race/Ethnicity						
White [a]	4406	4651	2623	2637	3413	<.001
	(72.56)	(76.33)	(62.22)	(70.58)	(64.08)	
		[<.001]	[<.001]	[0.34]	[<.001]	
Black [a]	390	256	382	287	433	<.001
	(6.42)	(4.20)	(9.06)	(7.68)	(8.13)	
		[<.001]	[<.001]	[0.17]	[0.004]	
Asian [a]	773	663	631	489	856	<.001
	(12.73)	(10.88)	(14.97)	(13.09)	(16.07)	
		[0.02]	[0.01]	[>.99]	[<.001]	
Other [a]	83	103	93	65	92	0.03
	(1.37)	(1.69)	(2.21)	(1.74)	(1.73)	
		[>.99]	[0.01]	[>.99]	[>.99]	
Hispanic [a]	489	613	631	379	545	<.001
	(8.05)	(10.06)	(14.97)	(10.14)	(10.23)	
		[0.001]	[<.001]	[0.004]	[<.001]	
Application Strategy						
Competitiveness [a] (Quartile 1)	3454	3685	2517	2335	3392	<.001
	(56.88)	(60.48)	(59.70)	(62.50)	(63.69)	
		[<.001]	[0.04]	[<.001]	[<.001]	
Quartile 2	1560	1565	1114	901	1301	
	(25.69)	(25.69)	(26.42)	(24.12)	(24.43)	

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
		[>.99]	[>.99]	[0.81]	[>.99]	
Quartile 3	805	621	375	363	445	
	(13.26)	(10.19)	(8.89)	(9.72)	(8.36)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Quartile 4	253	222	210	137	188	
	(4.17)	(3.64)	(4.98)	(3.67)	(3.53)	
		[>.99]	[0.50]	[>.99]	[0.79]	
Number of Applications [b]	6.93	6.85	6.42	7.60	7.85	<.001
	(5.70)	(5.41)	(6.30)	(6.22)	(6.62)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Academic Performance						
Cumulative Undergrad Science GPA [b]	3.28	3.31	3.23	3.22	3.22	<.001
	(0.41)	(0.40)	(0.43)	(0.42)	(0.40)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Baccalaureate Total GPA [b]	3.38	3.42	3.27	3.28	3.25	<.001
	(0.36)	(0.35)	(0.39)	(0.39)	(0.38)	
		[<.001]	[<.001]	[<.001]	[<.001]	
GRE						
% of Quantitative [b]	45.61	43.61	38.02	42.75	44.73	<.001
	(16.71)	(16.22)	(15.94)	(17.34)	(17.32)	
		[<.001]	[<.001]	[<.001]	[<.001]	
% of Verb [b]	53.63	50.86	46.90	50.97	54.33	<.001
	(18.76)	(18.75)	(18.19)	(19.93)	(19.26)	
		[<.001]	[<.001]	[<.001]	[<.001]	
% of Writing [b]	54.55	52.83	46.93	53.10	54.34	<.001
	(20.13)	(20.13)	(19.31)	(20.62)	(20.20)	
		[<.001]	[<.001]	[<.001]	[<.001]	
Imputation Flag	1620	1334	1628	853	1329	<.001
Missing GRE [a]	(26.68)	(21.89)	(38.61)	(22.83)	(24.95)	
		[<.001]	[<.001]	[<.001]	[0.36]	
Rurality						
Urban [a]	2704	2579	2223	1830	2676	<.001
	(44.53)	(42.33)	(52.73)	(48.98)	(50.24)	
		[0.14]	[<.001]	[<.001]	[<.001]	
Rural	3125	3313	1761	1751	2447	

	CC Pathways					
	No-CC	HS-CC	First-CC	4Y-CC	Post-CC	p-value
	(51.47)	(54.37)	(41.77)	(46.87)	(45.94)	
		[0.01]	[<.001]	[<.001]	[<.001]	
Do not want to disclose	243	201	232	155	203	
	(4.00)	(3.30)	(5.50)	(4.15)	(3.81)	
		[0.39]	[0.004]	[>.99]	[>.99]	
Socioeconomic Status						
Economically Disadvantaged [a]	835	848	1056	493	908	<.001
	(13.75)	(13.92)	(25.05)	(13.20)	(17.05)	
		[>.99]	[<.001]	[>.99]	[<.001]	
Environmentally Disadvantaged [a]	1874	2229	2071	1195	1916	<.001
	(30.86)	(36.58)	(49.12)	(31.99)	(35.97)	
		[<.001]	[<.001]	[>.99]	[<.001]	
Health Professional Shortage Area [a]	436	755	540	315	564	<.001
	(7.18)	(12.39)	(12.81)	(8.43)	(10.59)	
		[<.001]	[<.001]	[0.24]	[<.001]	
Parent Education [a]						
High School or Less	851	856	927	508	844	<.001
	(14.02)	(14.05)	(21.99)	(13.60)	(15.85)	
		[>.99]	[<.001]	[>.99]	[0.06]	
Some College, Less than Bachelor	916	1112	765	543	826	
	(15.09)	(18.25)	(18.15)	(14.53)	(15.51)	
		[<.001]	[<.001]	[>.99]	[>.99]	
Bachelor & Above	3587	3482	1486	2101	2825	
	(59.07)	(57.15)	(35.25)	(56.24)	(53.04)	
		[0.31]	[<.001]	[0.06]	[<.001]	
Don't Know	718	643	1038	584	831	
	(11.82)	(10.55)	(24.62)	(15.63)	(15.60)	
		[0.26]	[<.001]	[<.001]	[<.001]	
Parent Gender [a]						
Gender (Female)	2948	3060	1825	1693	2402	<.001
	(48.55)	(50.22)	(43.29)	(45.32)	(45.10)	
		[0.65]	[<.001]	[0.02]	[0.002]	
Male	2452	2427	1393	1486	2114	
	(40.38)	(39.83)	(33.04)	(39.78)	(39.69)	
		[>.99]	[<.001]	[>.99]	[>.99]	
Do not want to disclose	672	606	998	557	810	
	(11.07)	(9.95)	(23.67)	(14.91)	(15.21)	
		[0.44]	[<.001]	[<.001]	[<.001]	

[a] Percent of matriculants in each CC pathway with the attribute of the row in parentheses. Pearson chi-squared tests were performed to determine whether there are statistically significant differences between 5 different CC pathways. Adjusted Pearson residual and Bonferroni-corrected p-values were used to test the pairwise difference between No-CC and First-CC applicants. Bonferroni-corrected p values for pairwise comparisons between the CC applicants from different CC pathways and no-CC applicants are in brackets.
[b] Standard deviation in parentheses. Kruskal–Wallis H test was performed to determine whether there are statistically significant differences between 5 different CC pathways. Conover-Iman test with Bonferroni correction was performed to test the pairwise difference between No-CC and First-CC applicants. Bonferroni-corrected p values for pairwise comparisons between the CC applicants from different CC pathways and no-CC applicants are in brackets.

Appendix Table 3 – Full Regression Results on Alternative Models

The following table presents alternative models similar to Appendix Table 1 (SD Appendix 3). Those models now includes 1300 applicants with missing GPAs. Model 1 includes only community college pathways:) **No-CC** (never attended a CC), 2) **HS-CC** (attended CC while in high school), 3) **First-CC** (attended a CC prior to a four-year university), 4) **4Y-CC** (attended a CC while in a four-year university), 5) **Post-CC** (attended a CC after graduating from a four-year university). No-CC serves as the omitted category. Model 2 additional included demographics. Model 3 additionally included application strategy. Model 4 additionally included prior academic performance. Model 5 additionally included socioeconomic status. Odds ratios and corresponding 95% confidence intervals are presented in the table.

	(1)	(2)	(3)	(4)	(5)
Community College Pathway					
HS-CC	1.22***	1.14***	1.14***	1.11**	1.08*
	(1.13 - 1.31)	(1.06 - 1.22)	(1.06 - 1.23)	(1.01 - 1.21)	(0.99 - 1.18)
First-CC	0.65***	0.82***	0.81***	0.84***	0.83***
	(0.60 - 0.71)	(0.75 - 0.90)	(0.74 - 0.89)	(0.75 - 0.94)	(0.74 - 0.93)
4Y-CC	0.99	1.04	0.95	1.13**	1.14**
	(0.91 - 1.07)	(0.95 - 1.13)	(0.87 - 1.04)	(1.02 - 1.26)	(1.02 - 1.27)
Post-CC	1.04	1.17***	1.06	1.22***	1.20***
	(0.96 - 1.12)	(1.08 - 1.26)	(0.98 - 1.15)	(1.11 - 1.34)	(1.09 - 1.33)
Demographics					
White		1.22***	1.29***	1.11**	1.10*
		(1.12 - 1.32)	(1.19 - 1.41)	(1.00 - 1.22)	(0.99 - 1.21)
Black		0.51***	0.58***	1.12	1.07
		(0.45 - 0.59)	(0.50 - 0.67)	(0.95 - 1.33)	(0.90 - 1.26)
Asian		0.74***	0.66***	0.72***	0.71***
		(0.67 - 0.82)	(0.60 - 0.74)	(0.63 - 0.81)	(0.63 - 0.81)
Other Race		0.81*	0.86	1.00	0.97
		(0.66 - 1.01)	(0.70 - 1.06)	(0.76 - 1.32)	(0.73 - 1.30)
Hispanic		0.79***	0.82***	1.23***	1.17***

Supplemental digital content for Luo Q, Erikson CE, Chitwood R, Yuen CX. Does community college attendance affect matriculation to a physician assistant program? A pathway to increase diversity in the health professions. Acad Med.

	(1)	(2)	(3)	(4)	(5)
		(0.72 - 0.87)	(0.75 - 0.90)	(1.10 - 1.37)	(1.04 - 1.31)
Gender (Male)		0.97	0.98	0.94	0.93*
		(0.92 - 1.04)	(0.92 - 1.04)	(0.87 - 1.02)	(0.86 - 1.01)
Age		0.95***	0.96***	0.99**	0.99*
		(0.94 - 0.96)	(0.95 - 0.97)	(0.98 - 1.00)	(0.98 - 1.00)
Application Strategy					
Competitiveness (2nd Quartile)			1.16***	0.81***	0.82***
			(1.09 - 1.24)	(0.75 - 0.88)	(0.75 - 0.89)
(3nd Quartile)			0.97	0.64***	0.64***
			(0.88 - 1.07)	(0.57 - 0.72)	(0.57 - 0.72)
(4th Quartile)			0.43***	0.21***	0.21***
			(0.36 - 0.53)	(0.17 - 0.27)	(0.17 - 0.27)
Number of Applications			1.08***	1.09***	1.10***
			(1.07 - 1.08)	(1.09 - 1.10)	(1.09 - 1.10)
Academic Performance					
Undergrad Science GPA (0.1)				1.26***	1.27***
				(1.24 - 1.29)	(1.24 - 1.29)
Baccalaureate GPA (0.1)				1.14***	1.13***
				(1.11 - 1.16)	(1.11 - 1.16)
GRE (Quant) (5%)				1.05***	1.05***
				(1.04 - 1.06)	(1.04 - 1.06)
GRE (Verb) (5%)				1.04***	1.04***
				(1.03 - 1.05)	(1.03 - 1.06)
GRE (Writing) (5%)				1.03***	1.03***
				(1.02 - 1.04)	(1.02 - 1.04)
Missing GRE				0.77***	0.77***
				(0.71 - 0.83)	(0.71 - 0.83)
Rurality (Ref = Isolated Rural)					
Rural					1.03
					(0.97 - 1.11)
Do not want to disclose					0.86*
					(0.72 - 1.02)
Socioeconomic Status					
Economically Disadvantaged					0.99
					(0.91 - 1.08)
Environmentally Disadvantaged					1.06
					(0.95 - 1.18)
Health Professional Shortage Area					1.36***
					(1.20 - 1.53)
Parent Education					
Some College, Less than bachelor					0.91

Supplemental digital content for Luo Q, Erikson CE, Chitwood R, Yuen CX. Does community college attendance affect matriculation to a physician assistant program? A pathway to increase diversity in the health professions. Acad Med.

	(1)	(2)	(3)	(4)	(5)
					(0.81 - 1.03)
Bachelor & Above					0.87**
					(0.78 - 0.98)
Don’t Know					0.66**
					(0.46 - 0.94)
Parent Gender					
Male					0.97
					(0.91 - 1.04)
Do not want to disclose					1.16
					(0.81 - 1.66)

95% confident interval based robust standard errors in parenthesis. * p<0.1 **p<0.05 ***p<0.01

