The Influence of Patient Care, Shadowing, and Volunteer Experience on Diverse Applicant Matriculation Into Physician Assistant/Associate Programs

Mirela Bruza-Augatis, MS, PA-C; Bettie Coplan, PhD, PA-C; Wendiann Sethi, PhD; M. Jane McDaniel, MS, MLS(ASCP)SC

Purpose To better understand factors contributing to low matriculation rates for health professions students from backgrounds underrepresented in medicine (URiM), this study examined the influence of healthcare-releated preadmission experiences on physician assistant/associate (PA) program matriculation.

Methods We analyzed data from the Centralized Application Service for PAs 2018 to 2019 admissions cycle to compare characteristics of non-URiM and URiM PA program applicants and matriculants. The primary focus was on preadmission healthcare-releated experiences. To control for the strong influence of grade point average (GPA) on the likelihood of matriculation, we divided applicants into 2 groups: those with GPA < 3.6 (the median GPA for matriculants) and those with GPA ≥ 3.6. Analyses consisted of descriptive statistics and logistic regressions.

Results Our sample consisted of 25,880 PA program applicants. Higher proportions of URiM compared with non-URiM applicants identified as first-generation college students (39.3% vs. 19.9%) or indicated economic disadvantage (32.3% vs. 12.5%). Overall, higher proportions of URiM compared with non-URiM applicants reported no patient care experience (24.3% vs. 17.9%), no shadowing (31.7% vs. 21.7%), or no volunteering (32.2% vs. 26.9%). Among all applicants with GPA < 3.6, reporting any type of experience was associated with increased odds of matriculation. Among URiM applicants with GPA ≥ 3.6, patient care experience did not influence odds of matriculation (odds ratio [OR] = 1.22, P = .23), whereas shadowing was associated with twice the odds (OR = 2.01, P < .001).

Conclusions Although academic metrics are known to predict PA program matriculation, we found that preadmission experiences also play a role. The study findings suggest that lack of experience hours may hinder URiM student access to PA education.

INTRODUCTION

Among physician assistants/associates (PAs) and other health care professionals in the United States, the persistently low proportion of racial and ethnic minorities underrepresented in medicine (URiM) contributes to pervasive health and health care disparities.[1–3] Minorities are more likely than nonminorities to practice in underserved communities,[2,4] and racial or ethnic concordance between patients and providers positively affects various aspects of patient care, including interpersonal interactions, medication adherence, and care continuity.[5–7] The trend toward increasing racial and ethnic diversity in the US population is expected to continue for the next several decades.[8] Therefore, the ongoing lack of URiM health care professionals is of growing concern.

Over the past 20 years, similar to the medical profession, the PA profession has made little progress toward increasing the proportion of its workforce that is URiM.[9,10] For example, despite multiyear commitments to diversity and initiatives by national PA organizations,[11] in 2019, Hispanic or Latino(a) (Hispanic/Latino[a]) and African American or Black (African American/Black) individuals comprised 18% and 13% of the US labor force, respectively,[12] yet just 7.6% of first-year PA students were Hispanic/Latino[a] and only 3.9% were African American/Black.[13] In addition, students from URiM backgrounds who apply to PA school are approximately 45% less likely to matriculate than applicants from non-URiM backgrounds.[14]

Because educational programs serve as gatekeepers to a profession, to meaningfully increase PA workforce diversity, PA programs must identify and address aspects of their admissions processes that pose barriers to URiM applicants. Physician assistant/associate program applicants from URiM backgrounds experience many of the same significant challenges that applicants to medical school do. Decades of structural racism have contributed to inequities in wealth, health, and access to high-quality education that influence performance on measures of academic achievement (eg, grade point average [GPA] and standardized tests).[15(p.352)] Therefore, although individuals of every race and ethnicity earn high grades and test scores, on average, those from URiM backgrounds do not perform as well as those from non-URiM backgrounds.[13,15(p.352)] In their analysis of national PA program

The authors declare no conflict of interest.

J Physician Assist Educ 2023;00(00):1–8

DOI 10.1097/JPA.0000000000000563

application data, Yuen and Honda found that the lower likelihood of matriculation among URiM applicants was primarily attributable to differences related to GPA and the graduate record examination (GRE), which most PA programs require for admission.[13,14] Thus, an overreliance on academics in the admissions process seems to negatively affect URiM matriculation into PA school.

Although the effect of academic measures on URiM student matriculation into PA school has been studied,[14] little attention has focused on other preadmission factors. Two studies, which showed that applying to a greater number of PA programs increased the likelihood of matriculation, highlight the benefit that can result from having financial resources to apply to multiple programs.[16,17] Preadmission experience requirements may also play a role. Most (88.3%) PA programs require (67.4%) or prefer (20.9%) direct patient care experience; nearly 61% require (22.0%) or prefer (38.8%) shadowing and 67.1% require (48.4%) or prefer (18.7%) other health care experience (ie, volunteering and community service hours).[18] Students who have limited connections to health care or work long hours during school to meet financial needs may find it difficult to obtain these experiences.[19,20] Thus, the negative influence that societal factors, such as wealth inequity, can have on the ability of URiM applicants to meet prerequisite academic requirements may extend to other factors required or considered desirable for admission.[19,21]

Whether URiM applicants to PA programs report preadmission experience levels similar to those reported by non-URiM applicants is unknown. In addition, the influence of preadmission experiences on the likelihood of applicant matriculation into a PA program is unclear. To address these gaps in knowledge, we used data from a national cohort to compare the patient care, shadowing, and volunteer experiences reported by URiM and non-URiM PA program applicants and to determine whether and to what extent these experiences influenced the likelihood of matriculation. In addition, because first-generation college students or those who experience economic disadvantage may lack the social connections to obtain preadmission shadowing or find it difficult financially to engage in volunteering,[19,20] we also identified the prevalence of these factors across applicants and matriculants. Understanding characteristics of the URiM compared with non-URiM applicant pool and the influence that preadmission experiences have on PA program matriculation may assist efforts to create admissions processes that facilitate higher rates of URiM applicant acceptance.

METHODS

Data Source

We conducted a secondary analysis of de-identified data from the Central Application Service for PAs (CASPA) 2018 to 2019 admissions cycle. Central Application Service for PAs is an online-based platform where prospective PA students can apply to numerous programs using one centralized application.[22] During the 2018 to 2019 admissions cycle, 239 (98%) of all 243 accredited US PA programs used CASPA.[13] Hence, our sample represented most of the entire population of interest. Institutional Review Board at Seton Hall University deemed this study nonhuman subjects research (ID No. 2021-149).

Measures

Demographic Factors

The CASPA application includes academic measures (GPA and GRE) and self-reported demographic characteristics and preadmission experiences. We examined race, ethnicity, age, sex/gender, first-generation college graduate status, and economic disadvantage. When assessing factors that contribute to the odds of PA program matriculation (binary: yes, no), to gain a complete picture of the influence of self-identified race or ethnicity on PA program matriculation, we analyzed individuals in each category with which they identified (eg, an individual who identified as African American/Black and Hispanic/Latino(a) was included in analyses of African American/Black applicants/matriculants and in analyses of Hispanic/Latino(a) applicants/matriculants). For this study, we used the Association of American Medical Colleges' definition of URiM, "... those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population."[23] Consequently, URiM was defined as anyone who identified as African American/Black, American Indian/Alaska Native, Pacific Islander or Native Hawaiian, or Hispanic/Latino(a) of any category. Individuals who identified as non-Hispanic Asian or non-Hispanic White were considered non-URiM.[23]

Experiences

Central Application Service for PAs defines patient care experience as experiences directly responsible for a patient's care (eg, working as an emergency medical technician or paramedic).[24] Shadowing is time observing a health care professional, preferably a PA, and volunteer experience is volunteer work outside the health care field (eg, fundraising and Habitat for Humanity).[24] Whether applicants reported any patient care, shadowing, or volunteer experience (binary for each category: yes, no) was identified. For those who reported experience hours, the number of hours in each category was also assessed. In addition, as in previous research, to quantify the number of experience hours reported, patient care hours were collapsed into 500-hour increments, from 1 to 4001 or more.[14] To reduce the effect of outliers on the self-reported experience hours, shadowing hours were collapsed into 20-hour increments, from 1 to 201 or more, and volunteer hours were collapsed into 100-hour increments, from 1 to 1001 or more.

Confounders

For our analyses of the influence of experiences on the odds of matriculation, we controlled for factors associated with the likelihood of PA program matriculation. Consistent with previous research,[14] our preliminary analysis showed that overall GPA was the strongest predictor of PA program matriculation. To control for this significant influence, we used the median overall cumulative GPA of matriculants, 3.6, as a benchmark and, in our final analyses, divided the data into 2 groups. The first group comprised individuals whose GPAs were <3.6, and the second group comprised individuals whose GPAs were ≥3.6. Within each group assessed, we also controlled for other known predictors of matriculation, including age, gender, number of program applications, overall cumulative GPA, and GRE status (whether an applicant reported GRE scores).[14,16,17] Science GPA is also a potential confounder[16] but was not

included in our models because of multicollinearity with overall cumulative GPA.

Analysis

Descriptive statistics were used to assess the demographic characteristics of applicants and matriculants and determine the number of patient care, shadowing, and volunteer experience hours reported by individuals who identified with each race and ethnicity. After conducting a multivariate regression to determine what factors were significant in predicting matriculation, overall cumulative GPA was found to be the most influential predictor (odds ratio [OR] = 74.77; $P < .001$) (see Appendix A, Supplemental Digital Content 1, http://links.lww.com/PAEA/A77). Therefore, as noted above, we split the applicants into 2 groups: those with GPAs < 3.6 (the median overall cumulative GPA of matriculants) and those with GPAs ≥ 3.6 to control for the strong GPA influence. Then, logistic regression analyses were performed on each group to determine the influence of each type of experience (binary: yes, no) and the influence of the number of hours of each type of experience (based on the intervals described above) on the odds of non-URiM and URiM matriculation while accounting for potential confounders (ie, age, gender, number of program applications, and GRE status). Data were analyzed using IBM SPSS Statistics for Windows, version 28.0 (IBM Corp., Armonk, NY).

RESULTS

Cohort Characteristics and Matriculation Rates

Of the 26,855 applicants who applied to PA programs through CASPA in the 2018 to 2019 admissions cycle, 25,880 (96.4%) reported a race or ethnicity. Among them, 21.9% (n = 5673) identified as URiM, with 94.4% (n = 5353) identifying as a single URiM race or ethnicity and 5.6% (n = 320) selecting two or more race or ethnicity categories. Underrepresented in medicine applicants were slightly older than non-URiM applicants (mean = 26.7 vs. mean = 25.4 years; $P < .001$). Approximately 39% (n = 2231) of URiM compared with 19.9% (n = 4027) of non-URiM applicants identified as first-generation college students, and 32.3% (n = 1831) of URiM compared with 12.5% (n = 2524) of non-URiM applicants reported economic disadvantage (all $P < .001$). In addition, on average, URiM applicants completed fewer PA program applications than non-URiM applicants (mean = 6.5 vs. mean = 7.6; $P < .001$). Approximately 41% (n = 8313) of non-URiM compared with 26.9% (n = 1528) of URiM applicants matriculated, and African American/Black applicants had the lowest rate of matriculation (19.6%, n = 449) (Table 1).

Experiences and Odds of Matriculation

Patient Care

Nearly a quarter (24.3%, n = 1377) of URiM, compared with 17.9% (n = 3626) of non-URiM applicants, reported no patient care experience (Table 2). Applicants most likely to report no patient care experience were those who identified as American Indian/Alaska Native (26.4%, n = 81) or African American/Black (25.3%, n = 580). Compared with applicants, a lower percentage of matriculants of each race and ethnicity reported no patient care experience (Table 2). Among those with patient care experience, URiM applicants reported more median hours than non-URiM applicants (2278 vs. 1994), with American Indian/Alaska Native applicants reporting the highest median number (n = 2650) (Table 2).

As summarized in Table 3, for both non-URiM and URiM applicants whose GPAs were <3.6, reporting any patient care experience predicted increased odds of matriculation (OR = 1.44, 95% confidence interval [CI] [1.28–1.61], $P < .001$ and OR

Table 1. Applicant and Matriculant Demographic Characteristics (n = 25,880)

	Applicants							Matriculants						
			Gender		First-Gen College	Econ. Disadv	Program Applications,			Gender		First-Gen College	Econ. Disadv	Program Applications,
	N	Age, M (SD)	Female (%)	Male (%)	(%)	(%)	M (SD)	N	Age, M (SD)	Female (%)	Male (%)	(%)	(%)	M (SD)
All	25,880	25.7 (5.5)	73.1	26.9	24.2	16.8	7.3 (6.1)	9841	24.5 (4.3)	75.0	25.0	21.0	13.5	9.1 (6.6)
Non-URiM	20,207	25.4 (5.4)	73.3	26.7	19.9	12.5	7.6 (6.2)	8313	24.3 (4.3)	75.3	24.6	18.2	10.6	9.1 (6.7)
URiM	5673	26.7 (5.7)	72.1	27.9	39.3	32.3	6.5 (5.6)	1528	25.3 (4.4)	73.2	26.8	36.3	28.9	8.9 (6.3)
AI/AN	307	27.0 (6.4)	72.6	27.4	29.6	22.8	6.1 (5.0)	92	24.7 (4.1)	73.9	26.1	22.8	17.4	8.2 (5.9)
Black	2291	27.5 (6.3)	73.1	26.9	34.7	36.4	5.9 (5.2)	449	25.8 (5.0)	73.9	26.1	32.5	34.7	8.5 (5.8)
PI/NH	145	26.4 (5.3)	68.3	31.7	29.7	15.2	7.3 (6.3)	48	25.6 (5.3)	68.8	31.3	18.8	10.4	10.8 (7.9)
Hispanic/Latino(a)	3256	26.2 (5.0)	71.3	28.7	43.8	31.2	6.9 (5.8)	1007	25.1 (4.1)	72.9	27.1	39.8	28.4	9.2 (6.5)
Asian	4037	26.0 (5.5)	74.2	25.8	33.9	25.7	9.0 (7.5)	1365	24.8 (4.4)	75.5	24.5	35.3	24.5	11.8 (8.6)
White	19,219	25.3 (5.3)	73.2	26.8	19.0	11.5	7.2 (5.8)	8000	24.3 (4.3)	75.2	24.8	16.5	9.5	8.7 (6.1)
Non-Hispanic White	17,165	25.7 (5.5)	73.2	26.8	16.9	9.7	7.2 (6.1)	7328	24.3 (4.3)	75.2	24.8	15.1	8.3	8.7 (6.1)

AI/AN, American Indian/Alaska Native; Black, African American/Black; Econ Disadv., economic disadvantage; M, mean; PI/NH, Pacific Islander or Native Hawaiian; SD, standard deviation; URiM, underrepresented in medicine.

= 1.47, 95% CI [1.20–1.81], $P < .001$, respectively). For applicants whose GPAs were ≥3.6, reporting any patient care experience only predicted increased odds of matriculation for non-URiM applicants (OR = 1.27, 95% CI [1.10–1.47], $P < .001$) (Table 3). The influence of the number of hours of experience for those who reported any hours is shown in Figures 1 and 2. For both non-URiM and URiM applicants whose GPAs were <3.6, having >1000 hours of patient care experience significantly increased the odds of matriculation (Figure 1). For URiM applicants whose GPAs were ≥3.6, patient care hours at any level did not significantly predict higher odds of matriculation (Figure 2).

Shadowing

Approximately 32% (n = 1796) of URiM, compared with 21.7% (n = 4379) of non-URiM applicants, reported no shadowing hours (Table 2). Applicants most likely to report no shadowing were those who identified as African American/Black (37.6%, n = 862) or Hispanic/Latino(a) (28.5%, n = 929) (Table 2). Compared with applicants, a substantially lower percentage of matriculants of each race and ethnicity reported no shadowing experience. Among applicants with shadowing experience, URiM applicants reported more median hours than non-URiM applicants (96 vs. 70). However, compared with applicants, with the exception of Pacific Islanders/Native Hawaiians, matriculants of each race and ethnicity with shadowing experience reported slightly fewer median hours (Table 2).

Reporting any shadowing experience predicted increased odds of matriculation for all applicants and was associated with greater odds of matriculation than reporting patient care or volunteer experience (Table 3). For all applicants who reported shadowing hours, nearly all levels of experience were associated with increased odds of matriculation (Figures 1 and 2). For URiM applicants whose GPAs were <3.6, the greatest increase in odds of matriculation was associated with reporting 161 to 180 hours (OR = 2.94, 95% CI [1.73–5.01], $P < .001$) (Figure 2).

Volunteer

Nearly 32% (n = 1824) of URiM, compared with 26.9% (n = 5428) of non-URiM applicants, reported no volunteer hours. Applicants most likely to report no volunteer hours were those who

Table 2. Applicant and Matriculant Experience Hours (n = 25,880)

	N	No Patient Care Hours (%)	Patient Care Hours, Median	No Shadow Hours (%)	Shadow Hours, Median	No Volunteer Hours (%)	Volunteer Hours, Median
Applicants							
All	25,880	19.3	2040	23.9	72	28.1	186
Non-URiM	20,207	17.9	1994	21.7	70	26.9	182
URiM	5673	24.3	2278	31.7	96	32.2	198
AI/AN	307	26.4	2650	26.7	85	30.0	226
Black	2291	25.3	2351	37.6	96	38.2	186
PI/NH	145	16.6	2520	27.6	83	26.9	206
Hispanic/ Latino(a)	3256	23.6	2213	28.5	95	28.7	200
Asian	4037	19.3	2216	24.4	89	27.5	240
White	19,218	18.4	1977	21.6	68	26.7	176
Non-Hispanic White	17,164	17.8	1953	21.1	65	26.6	172
Matriculants							
All	9841	13.5	1948	12.6	72	19.3	184
Non-URiM	8313	12.8	1875	11.8	69	19.3	180
URiM	1528	17.4	2240	16.2	91	18.8	200
AI/AN	92	17.4	2184	15.2	90	23.9	104
Black	449	17.8	2472	17.4	90	22.9	119
PI/NH	48	2.1	2825	10.4	84	22.9	103
Hispanic/ Latino(a)	1007	17.9	2160	16.3	93	16.7	150
Asian	1365	11.7	2275	11.0	87	18.6	168
White	800	13.5	1840	12.1	67	19.1	120
Non-Hispanic White	7328	13.0	1819	12.0	65	19.3	120

AI/AN, American Indian/Alaska Native; Black, African American/Black; PI/NH, Pacific Islander or Native Hawaiian; URiM, underrepresented in medicine.

Table 3. Experience Indicated and Odds of Matriculation

		Non-URiM				URiM			
			95% CI				95% CI		
Overall Cumulative GPA	Predictors	OR	LL	UL	*P*-value	OR	LL	UL	*P*-value
GPA < 3.6	Patient care experience indicated	1.44	1.28	1.61	<.001	1.47	1.20	1.81	<.001
	Shadowing experience indicated	2.00	1.78	2.24	<.001	1.85	1.52	2.24	<.001
	Volunteer experience indicated	1.45	1.32	1.60	<.001	1.57	1.31	1.88	<.001
	Age	1.00	0.99	1.01	.75	0.97	0.96	0.99	<.001
	Gender[a]	0.77	0.70	0.84	<.001	0.78	0.66	0.93	<.001
	Number of applications	1.07	1.06	1.07	<.001	1.09	1.08	1.10	<.001
	GRE scores reported	1.50	1.35	1.67	<.001	1.20	1.00	1.44	.05
GPA ≥ 3.6	Patient care experience indicated	1.27	1.10	1.47	<.001	1.22	0.88	1.70	.23
	Shadowing experience indicated	1.60	1.38	1.86	<.001	2.01	1.41	2.85	<.001
	Volunteer experience indicated	1.19	1.04	1.36	.01	1.71	1.21	2.42	<.001
	Age	0.94	0.93	0.95	<.001	0.97	0.94	0.99	.01
	Gender[a]	1.05	0.92	1.20	.48	1.22	0.88	1.71	.24
	Number of applications	1.14	1.12	1.15	<.001	1.17	1.13	1.22	<.001
	GRE scores reported	1.36	1.19	1.56	<.001	1.34	0.96	1.88	.08

CI, confidence interval; GPA, grade point average; GRE, graduate record examination; LL, lower limit; OR, odds ratio; UL, upper limit; URiM, underrepresented in medicine.

[a]For gender, the reference category is male.

identified as African American/Black (38.2%, n = 875) or American Indian/Alaska Native (30.0%, n = 92). Similar to shadowing hours, compared with applicants, a lower percentage of matriculants of each race and ethnicity reported no volunteer experience. For applicants with volunteer experience, overall, URiM applicants reported more median hours than non-URiM applicants (198 vs. 182); however, Asian applicants reported the most median hours (240) (Table 2).

For all applicants, reporting any volunteer experience predicted increased odds of matriculation and the odds of matriculation associated with volunteer experience were higher for URiM than non-URiM applicants (Table 3). The number of volunteer hours was inconsistently associated with the odds of matriculation; however, for all URiM applicants, a positive relationship was found between the number of volunteer hours and the odds of matriculation (Figures 1 and 2). For URiM applicants whose GPAs were <3.6, maximum benefit was associated with reporting 901 to 1000 hours (OR = 3.13, 95% CI [1.51–6.48], $P < .001$), and for those whose GPAs were ≥3.6, maximum benefit was associated with reporting 801 to 900 hours (OR = 6.39, 95% CI [1.26–32.38], $P = .03$) (Figures 1 and 2).

DISCUSSION

Although academic factors have been shown to be the strongest predictors of PA program matriculation,[14] we found that the influence of preadmission experience was also important. Among all applicants (non-URiM and URiM) who were less likely to matriculate based on GPA (ie, whose GPAs were <3.6), reporting any patient care, shadowing, or volunteer experience was associated with increased odds of matriculation. In addition, for all applicants, reporting any shadowing experience was associated with a greater increase in odds of matriculation than reporting any patient care or volunteer experience. Among URiM applicants, various levels of patient care, shadowing, and volunteer experience had a greater influence on the odds of matriculation among those whose GPAs were <3.6 compared with those whose GPAs were ≥3.6. In addition, for URiM applicants with GPAs ≥ 3.6, having any patient care experience was not predictive of PA program matriculation.

Overall, URiM applicants who reported experience hours reported slightly more median hours than non-URiM applicants, which, in combination with their slightly older age, may reflect a higher proportion of URiM individuals who pursue PA as a second career. However, higher percentages of URiM compared with non-URiM applicants reported no patient care, shadowing, or volunteer experience. Across these types of experiences, the disparity between African American/Black and non-Hispanic White applicants was particularly striking, with a quarter of African American/Black applicants (25.3% vs. 17.8% of non-Hispanic White applicants) reporting no patient care experience and more than a third reporting no shadowing or no volunteer experience (37.6% and 38.2% vs. 21.1% and 26.6% of non-Hispanic White applicants, respectively). These findings suggest that obtaining preadmission experience requirements may be more challenging for URiM compared with non-URiM PA program applicants.

In this study, PA program matriculants had a median of 1948 hours of patient care experience, which is substantial; however, evidence for the value of requiring experience before

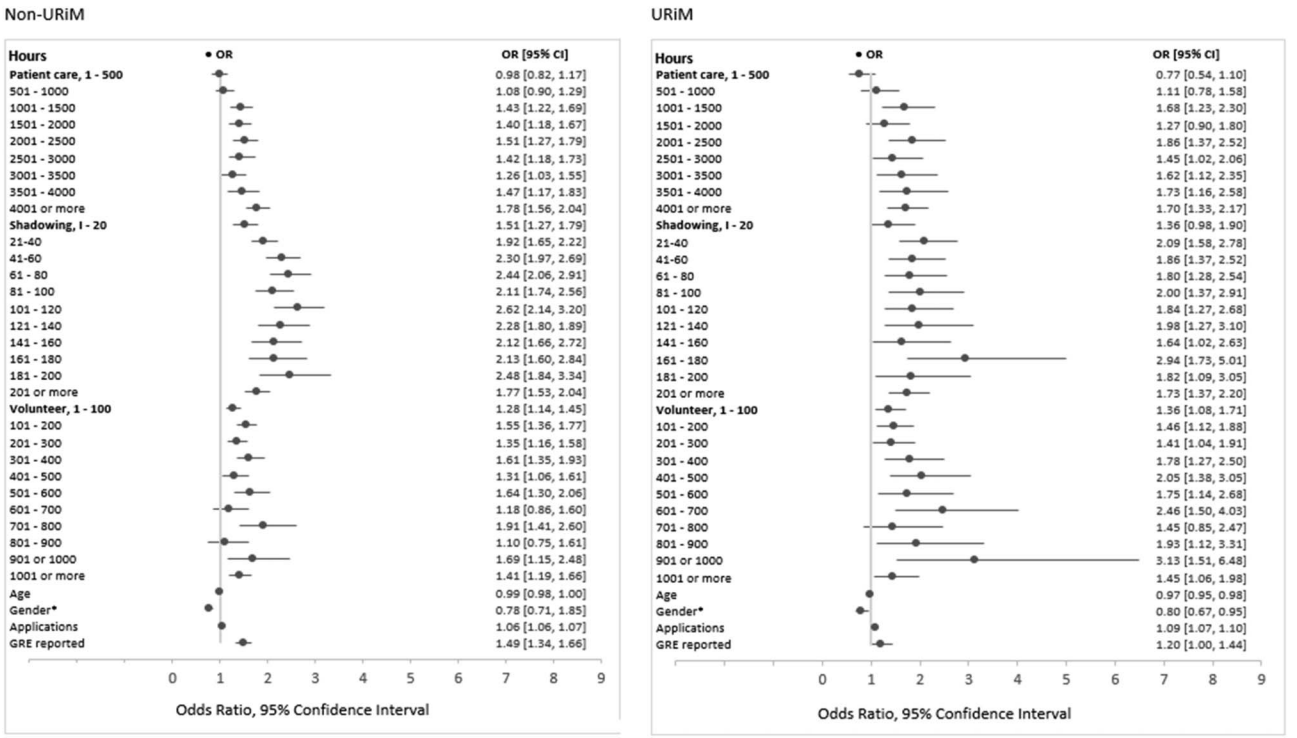

Figure 1. Experience hours and odds of matriculation, grade point average < 3.6. ORs are presented with 95% CIs. *For gender, the reference category is male. CI, confidence interval; GRE, graduate record examination; OR, odds ratio; URiM, underrepresented in medicine.

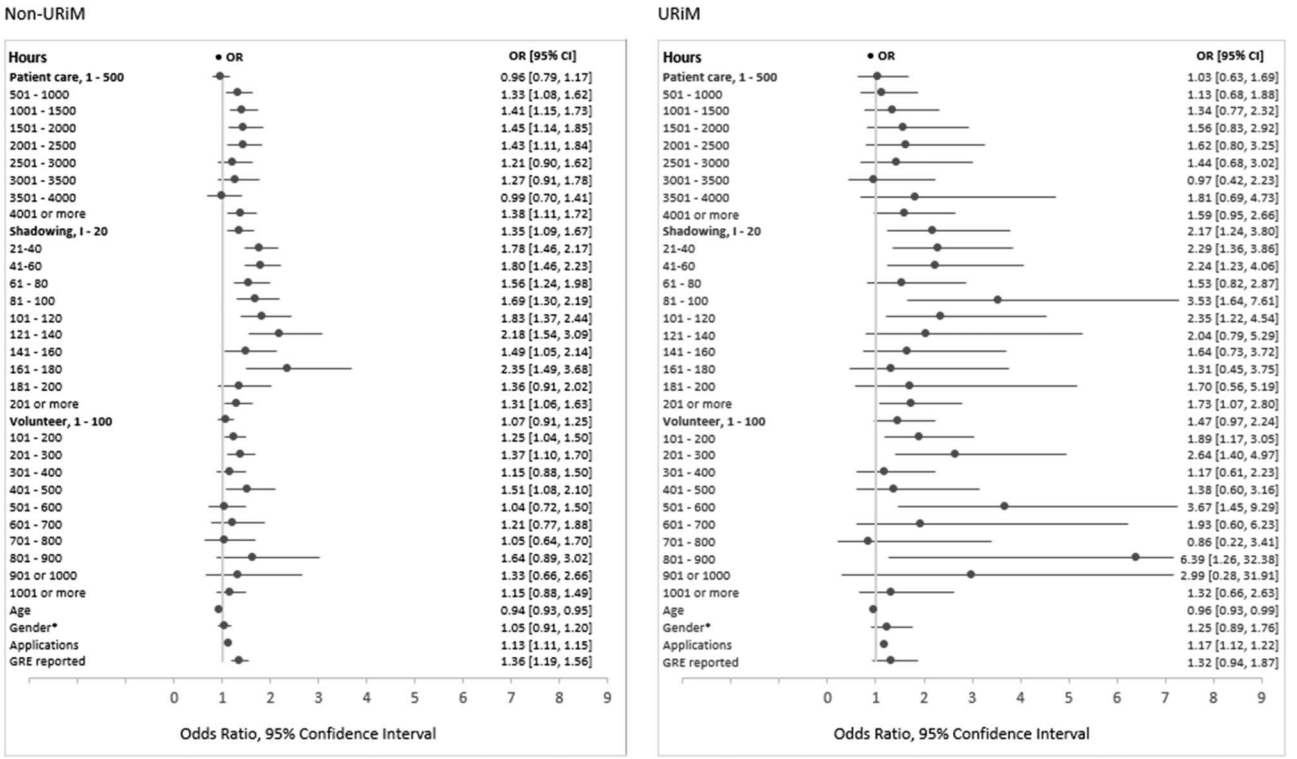

Figure 2. Experience hours and odds of matriculation, grade point average ≥ 3.6. ORs are presented with 95% CIs. *For gender, the reference category is male. CI, confidence interval; GRE, graduate record examination; OR, odds ratio; URiM, underrepresented in medicine.

admission is lacking. Lolar et al[25] found that preadmission hours of clinical experience were not associated with PA national certifying exam scores, and Hegmann and Iverson[26] found no relationship between preadmission hours of clinical experience and clinical outcomes assessed during PA school. Yet, similar to requirements for medical school, in addition to threshold levels of academic achievement and letters of recommendation, traditional requirements for PA school include experience hours.[18,27]

Notably, substantially higher percentages of URiM compared with non-URiM applicants reported being first-generation college students (39.3% vs. 19.9%) or experiencing economic disadvantage (32.3% vs. 12.5%), which suggests that, as we presumed, URiM applicants may be more likely to lack the social capital required to obtain experience hours. Considering the additional socioeconomic and educational barriers that individuals with URiM backgrounds face, health professions' school admissions processes seem to involve multiple facets that reward wealth and privilege.[28]

The findings from studies primarily involving single health professions programs suggest that admission of higher numbers of URiM applicants can be accomplished through holistic admissions, a process that involves balanced consideration of applicants' attributes and experiences as well as their academic metrics.[29] Yet, despite the adoption of holistic admissions by most health professions programs, including nearly 80% of PA programs[30] and more than 91% of publicly-funded medical schools,[31] URiM representation among students nationally has not substantially increased.[13,32] Moreover, a study of national PA program data showed that using holistic admissions was not associated with a program's proportion of African American/Black students and only modestly associated with a program's proportion of Hispanic/Latino(a) students.[30] The extent to which individual programs conducting holistic admissions consider or weigh patient care, shadowing, and volunteer experiences is unknown. However, our results suggest that the failure of widespread adoption of holistic admissions to significantly increase URiM representation among PA students nationally may be partially attributable to the fact that URiM applicants are more likely than non-URiM applicants to lack the types of experiences typically desired for PA program admission.[18]

A handful of PA programs that admit relatively high proportions of URiM students have seemingly overcome system-wide barriers.[33] Program culture and thoughtful approaches—for example, revising the types of attributes desired for admission to include skills such as language interpreting that may improve an applicant's ability to provide care in medically underserved communities—seem to contribute to their success.[34] Our study results suggest that by helping individuals with URiM backgrounds gain desired experiences, pathway programs also offer some promise for improving URiM applicant acceptance rates to health professions programs.[9] Nonetheless, the lack of large-scale progress associated with potential solutions such as holistic admissions and pathway programs suggests that the approach advocated by Reed[28]—to dismantle, reimagine, and rebuild the entire admissions system—may be necessary.

Limitations and Strengths

Our study has several limitations worth noting. Data on applicant characteristics were self-reported. In addition, we excluded students for whom data on variables of interest (eg, race and ethnicity) were missing, which has the potential to introduce selection bias. Furthermore, because we examined the outcome of matriculation rather than acceptance, the study results should not be interpreted as representative solely of applicant acceptance into a PA program. Finally, we analyzed a single PA program admissions cycle that concluded before the COVID-19 pandemic. Therefore, our results may not be generalizable to the entirety of PA program admissions cycles and did not account for factors, such as the pandemic, particular to specific years. A substantial study strength was the use of a national dataset containing admissions data obtained from 98% of PA programs.

CONCLUSIONS

Although other studies have included patient care experience as a covariate when analyzing factors associated with PA school matriculation,[14,17] to our knowledge, this is the first study to focus on the potential influence of preadmission patient care, shadowing, and volunteer experience on the likelihood of matriculation into a health professions program. Our results show that for URiM and non-URiM applicants, obtaining patient care, shadowing, or volunteer experience improves the likelihood of matriculation. However, URiM applicants are less likely to obtain these experiences, which places them at a disadvantage. At present, the main criteria for PA program admission include academic measures and preadmission experience.[18] Yet, socioeconomic barriers that can negatively influence academic achievement among URiM applicants may also impede one's ability to obtain desired experiences.[19,20] Therefore, requiring or substantially weighting experiences, for example, as part of a holistic admissions process, may do little to overcome obstacles to matriculation that URiM applicants face. Consequently, to achieve significant progress toward improving URiM representation in the PA workforce, new approaches to the admissions system should be explored and evaluated. In addition, comparing patient care and shadowing experience requirements for PA programs with higher-than-average percentages of URiM students to requirements for typical programs may provide valuable insight.

Mirela Bruza-Augatis, MS, PA-C, is a research scientist, National Commission on Certification of Physician Assistants, Johns Creek, Georgia; she is also an adjunct clinical professor of Department of Physician Assistant Studies, Seton Hall University, Nutley, New Jersey; he is also a doctoral candidate of Department of Educational Leadership Management and Policy, Seton Hall University, South Orange, New Jersey.

Bettie Coplan, PhD, PA-C, is an associate professor in the Department of Physician Assistant Studies, College of Health and Human Services, Northern Arizona University, Phoenix, Arizona.

Wendiann Sethi, PhD, is a senior faculty associate and director of the Department of Mathematics, Department of Mathematics and Computer Science, Seton Hall University, South Orange, New Jersey.

M. Jane McDaniel, MS, MLS(ASCP)SC, is a lecturer, director of Alumni Affairs, emeritus chair of Admissions, Yale Physician Assistant Online Program at Yale University School of Medicine, New Haven, Connecticut.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.jpae.pub).

Correspondence should be addressed to: Mirela Bruza-Augatis, MS, PA-C, Research Scientist, National Commission on Certification of Physician Assistants, Johns Creek, GA; Adjunct Clinical Professor, Department of

Physician Assistant Studies, Seton Hall University, Nutley, NJ; Doctoral Candidate, Department of Educational Leadership Management and Policy, Seton Hall University, South Orange, NJ 07079. Telephone: (718) 410-4199; Email: mirela.bruzaaugatis@shu.edu

REFERENCES

1. Sullivan LW. *Missing Persons: Minorities in the Health Professions. Diversity*; 2004:1-208. http://health-equity.pitt.edu/40/. Assessed June 12, 2023.
2. Nelson A. Unequal treatment: confronting racial and ethnic disparities in health care. *J Natl Med Assoc*. 2002;94(8):666-668.
3. Jackson CS, Gracia JN. Addressing health and health-care disparities: the role of a diverse workforce and the social determinants of health. *Public Health Rep*. 2014;129(suppl 2):57-61.
4. Marrast LM, Zallman L, Woolhandler S, Bor DH, McCormick D. Minority physicians' role in the care of underserved patients: diversifying the physician workforce may be key in addressing health disparities. *JAMA Intern Med*. 2014;174(2):289-291.
5. US Department of Health and Human Services. *The Rationale for Diversity in the Health Professions: A Review of the Evidence*. Health Resources and Services Administration, Bureau of Health Professions; 2006. https://docplayer.net/255577-The-rationale-for-diversity-in-the-health-professions-a-review-of-the-evidence.html. Accessed February 16, 2023.
6. Traylor AH, Schmittdiel JA, Uratsu CS, Mangione CM, Subramanian U. Adherence to cardiovascular disease medications: does patient-provider race/ethnicity and language concordance matter? *J Gen Intern Med*. 2010;25(11):1172-1177.
7. Ma A, Sanchez A, Ma M. The impact of patient-provider race/ethnicity concordance on provider visits: updated evidence from the medical expenditure panel survey. *J Racial Ethn Health Disparities*. 2019;6(5):1011-1020.
8. Vespa J, Medina L, Armstrong DM. Demographic Turning Points for the United States: Population Projections for 2020 to 2060 Population Estimates and Projections Current Population Reports. Available at: www.census.gov/programs-surveys/popproj. Accessed April 15, 2022.
9. Snyder CR, Frogner BK, Skillman SM. Facilitating racial and ethnic diversity in the health workforce. *J Allied Health*. 2018;47(1):58-65.
10. National Commission on Certification of Physician Assistants I. *2020 Statistical Profile of Recently Certified Physician Assistants National Commission on Certification of Physician Assistants: An Annual Report*; 2020. http://www.nccpa.net/. Accessed February 16, 2023.
11. Fleming S. *Physician Assistant Education Association. PAEA's Diversity and Inclusion Initiatives: A Status Report*; 2017. https://paeaonline.org/resources/public-resources/paea-news/paeas-diversity-and-inclusion-initiatives-a-status-report. Accessed June 9, 2023.
12. Bureau of Labor Statistics. *BLS Reports (Report 1088). Labor Force Characteristics by Race and Ethnicity, 2019*; 2020. https://www.bls.gov/opub/reports/race-and-ethnicity/2019/home.htm#:~:text=The%20employment%E2%80%93population%20ratio%20was,%2C%205%2C%20and%205A. Accessed June 9, 2023.
13. Physician Assistant Education Association. *By the Numbers: Program Report 35: Data From the 2019 Program Survey*; 2020. https://paeaonline.org/resources/public-resources/research-reports/program-survey-and-reports. Accessed February 16, 2023.
14. Yuen CX, Honda TJ. Predicting physician assistant program matriculation among diverse applicants: the influences of underrepresented minority status, age, and gender. *Acad Med*. 2019;94(8):1237-1243.
15. Lucey CR, Saguil A. The consequences of structural racism on MCAT scores and medical school admissions: the past is prologue. *Acad Med*. 2020;95(3):351-356.
16. McDaniel MJ, Hildebrandt CA, Russell GB. Central application service for physician assistants ten-year data report, 2002 to 2011. *J Physician Assist Educ*. 2016;27(1):17-23.
17. Honda T, Henry TD, Mandel ED, et al. Maximizing Black applicant matriculation in US PA programs: associations between the number of submitted applications and likelihood of matriculation. *BMC Med Educ*. 2021;21(1):127.
18. PA Education Association. *By the Numbers Curriculum Report 6: Data From the 2021 Prerequisite Website Analysis*; 2023. doi: 10.17538/CR6.2021.
19. Southgate E, Kelly BJ, Symonds IM. Disadvantage and the "capacity to aspire" to medical school. *Med Educ*. 2015;49(1):73-83.
20. Brosnan C, Southgate E, Outram S, et al. Experiences of medical students who are first in family to attend university. *Med Educ*. 2016;50(8):842-851.
21. Robb N, Dunkley L, Boynton P, Greenhalgh T. Looking for a better future: identity construction in socio-economically deprived 16-year-olds considering a career in medicine. *Soc Sci Med*. 2007;65(4):738-754.
22. PA Education Association. *CASPA for Advisors and Pre-PA Students*. PA Education Association; 2023. https://paeaonline.org/how-we-can-help/advisors/caspa-for-advisors-and-pre-pa-students. Accessed February 17, 2023.
23. Association of American Medical Colleges. *Underrepresented in Medicine Definition*; 2014. https://www.aamc.org/what-we-do/equity-diversity-inclusion/underrepresented-in-medicine. Accessed June 9, 2023.
24. PA Education Association. *CASPA Applicant Help Center. Experiences*; 2023. https://help.liaisonedu.com/CASPA_Applicant_Help_Center/Filling_Out_Your_CASPA_Application/CASPA_Supporting_Information/2_Experiences. Accessed June 9, 2023.
25. Lolar S, Pilat MJ, Welch RD. Impact of type of healthcare experience before physician assistant school admission on PANCE score. *J Allied Health*. 2020;49(3):176-180.
26. Hegmann T, Iverson K. Does previous healthcare experience increase success in physician assistant training? *JAAPA*. 2016;29(6):54-56.
27. Association of American Medical Schools (AAMC). *Researching Medical School Admission Requirements*; 2022. https://students-residents.aamc.org/medical-school-admission-requirements/researching-medical-school-admission-requirements. Accessed February 16, 2023.
28. Reed H. Diversity requires an admissions process overhaul. *JAAPA*. 2021;34(6):11-12.
29. Association of American Medical Colleges. *Holistic Review*; 2023. https://www.aamc.org/services/member-capacity-building/holistic-review. Accessed February 16, 2023.
30. Coplan B, Todd M, Stoehr J, Lamb G. Holistic admissions and underrepresented minorities in physician assistant programs. *J Physician Assist Educ*. 2021;32(1):10-19.
31. Urban Universities for HEALTH. *Holistic Admissions in the Health Professions: Findings From a National Survey*. AAMC; 2014. https://www.aamc.org/about-us/equity-diversity-inclusion/urban-universities-health. Accessed February 16, 2023.
32. Morris DB, Gruppuso PA, McGee HA, Murillo AL, Grover A, Adashi EY. Diversity of the national medical student body—four decades of inequities. *N Engl J Med*. 2021;384(17):1661-1668.
33. Bradley-Guidry C, Burwell N, Dorough R, Bester V, Kayingo G, Suzuki S. An assessment of physician assistant student diversity in the United States: a snapshot for the healthcare workforce. *BMC Med Educ*. 2022;22(1):680.
34. Coplan B, Evans BC. How organizational culture influences holistic review: a qualitative multiple case study. *Adv Health Sci Educ Theory Pract*. 2021;26(5):1491-1517.