

# An Evaluation of Race Disparities in Academic Plastic Surgery

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**Background:** Academic plastic surgery has a history of underrepresentation of ethnic and racial minority groups. Recent policy shifts by national medical groups and plastic surgery societies have focused on reversing these inequalities. This study seeks to measure ethnic and racial representation at academic and leadership positions following recent changes.

**Methods:** A cross-sectional study was conducted in June of 2018, measuring ethnic and racial diversity of U.S. academic plastic surgery faculty. Among faculty, career qualifications, years of experience, faculty positions, and leadership ethnicity were compared.

**Results:** A total of 930 academic plastic surgeons were included in the study. Classified collectively as nonwhite, this group graduated more recently than other academic plastic surgeons (2006 versus 2001;  $p < 0.0001$ ) and had greater rates of clinical fellowship attainment (OR, 1.62; 95 percent CI, 1.16 to 2.26). Nonwhite individuals were less likely to be employed in the full professor position compared with their white colleagues (OR, 0.6; 95 percent CI, 0.42 to 0.88;  $p = 0.0077$ ). However, after adjustment for differences in years of postresidency experience, this disparity was no longer significant (OR, 1.06; 95 percent CI, 0.62 to 1.83;  $p = 0.82$ ), indicating the importance of current cohort experience differences. Assessment of program leadership found that nonwhite chairs employed significantly more nonwhite faculty (42.5 percent versus 20.9 percent;  $p < 0.0001$ ).

**Conclusions:** Academic plastic surgery continues to face disparities in representation of both ethnic and racial minorities. Current inequalities are most severe at senior academic positions and may be linked to cohort experience differences along with leadership and promotion biases. (*Plast. Reconstr. Surg.* 145: 268, 2020.)

The field of medicine has faced longstanding disparities in ethnic representation.<sup>1-5</sup> Plastic surgery is no exception, containing a myriad of racial inequalities in resident education, professional societal involvement, and patient access to care.<sup>6-9</sup> Racially and ethnically underrepresented plastic surgeons seeking professional development regularly encounter barriers to advancement and difficulties obtaining leadership positions.<sup>9,10</sup> Visible deficits of minority mentors and role models, a downstream effect of these historic inequalities, serve to further exacerbate minority underrepresentation in plastic surgery.<sup>9,11</sup>

However, these disparities have not gone unnoticed. Wider efforts to diversify the field of

medicine have produced an increasingly nonwhite cohort of rising medical students and residents.<sup>5</sup> Within plastic surgery, national groups such as the American Society of Plastic Surgeons have advocated for the establishment of a diversity task force to improve ethnic representation among plastic surgery practitioners and leadership.<sup>11,12</sup> However, the development and implementation of new policy changes to meet these goals has remained a decentralized process, relying on individual institutions to manage their own diversification.<sup>13,14</sup>

Although highly publicized, the effect of these efforts remains unknown. Recent studies have examined rising ethnic and racial representation in plastic surgery trainees.<sup>6</sup> However, current literature

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has sparingly explored the career pathways of minority academics—individuals who serve as a key source of mentorship for budding residents and form a pool of qualified candidates for many senior leadership positions.<sup>9</sup> Furthermore, little has been done to establish a timeline of expected positional advancement for these academics or predict when recent policy changes will affect nonwhite representation at the most senior academic and leadership positions. Finally, for minority practitioners already in leadership positions, the downstream effects of minority program leadership toward program diversification have also been poorly explored or quantified. Therefore, the goals of our study were to (1) measure ethnic and racial minority representation among current academic plastic surgeons, (2) compare the qualifications and career pathways of white and nonwhite academics, and (3) quantify the effects of nonwhite leadership on the hiring and advancement of diverse academic groups.

## METHODS

### Study Sample

Data for this study were collected as part of a cross-sectional analysis of academic plastic surgeons conducted in June of 2018. Plastic surgery programs to be included in this study were identified through 2018 Accreditation Council for Graduate Medical Education program listings for accredited integrated and independent plastic surgery programs. The combined list of independent and integrated programs ( $n = 140$ ) was further assessed for program duplicates ( $n = 40$ ), which were removed. Faculty websites were then identified for all but one of the remaining programs ( $n = 99$ ). Individuals from these websites were included for cross-sectional analysis if they had been listed as clinical, adjunct, tenure-track or non-tenure-track plastic surgery faculty, and had obtained plastic surgery board certification ( $n = 932$ ). Exclusions included faculty without plastic surgery training, research faculty without medical degrees, and emeritus professors.

### Data Collection

Data collected on academic faculty were primarily obtained from program website listings, but also included private-practice websites, public records websites, Doximity, and LinkedIn. Assessed factors included age, race, sex, plastic surgery training type (independent or integrated), training graduation year, clinical or research fellowship training, additional advanced

degrees, academic position (assistant, associate, or full professor), and any leadership positions held (residency director, fellowship director, and/or chief/chair). Confirmation of board certification was obtained through search of the American Board of Plastic Surgery database.<sup>15</sup> Determination of race and ethnic background was accomplished using photographic and surname data at the discretion of data collectors. Ethnic backgrounds included Asian, American Indian, black, Hispanic, and white, and were organized into white and nonwhite groupings. U.S. Census Bureau standards on race and ethnicity were used for regional ethnic classifications, with individuals of Latino or Hispanic descent classified singularly under the Hispanic heading.<sup>16</sup> Documentation of faculty size and size of city of practice were made with continuous variables calculated from the total faculty size listed on program websites and city population noted on U.S. Census 2017 Population Estimates.<sup>17</sup> Association of American Medical Colleges estimates of academic surgery representation were retrieved from the 2017 U.S. Medical School Faculty Survey.<sup>18</sup> Postresidency clinical fellowship training was organized into aesthetic surgery, craniofacial surgery, hand surgery, microsurgery, and “other.” Individuals who led their division or department of plastic surgery were grouped under the single term of “chair” to indicate their leadership position. Historical leadership data highlighting presidential leadership for professional societies were collected from website listings of the American Association of Plastic Surgeons, the American Society of Plastic Surgeons, and the Plastic Surgery Research Council. Leadership positions, including residency director and fellowship director, were confirmed for accuracy using San Francisco Match listings. Data collected at the program level included faculty size, population of co-located city, and size of academic organization (department or division).

### Analysis

The *t* test was used to test comparisons of continuous faculty characteristics. Exceptions included year of residency training completion and number of years of postresidency experience, which were both assessed by Wilcoxon rank sum test because of their nonnormal distribution. Categorical comparisons of academic rank, advanced degree attainment, sex, leadership positions, race, region of practice, type of plastic surgery training, and subspecialty or research fellowship completion were performed by Pearson chi-square analysis. For categories that did not have enough observations

to meet Pearson chi-square specifications, Fisher's exact test was used. Additional calculation of odds ratio was performed for all Pearson chi-square and Fisher's exact tests. Adjustment of odds ratios to compensate for unequal distribution of years of postresidency experience was completed by use of multivariate logistic regression models with measurement of the area under the receiver operating characteristic curve and area under the receiver operating characteristic Wald confidence intervals.

Programs were further classified into those that had a white chair ( $n = 74$ ) and those that had a nonwhite chair ( $n = 25$ ) to measure the influence of leadership ethnicity on nonwhite hiring and advancement. Proportional nonwhite faculty representation was measured per program and comparisons between the white and nonwhite leadership groups were made by the  $t$  test. Assessment of the overall differences in nonwhite academic rank between programs with white and nonwhite leadership were conducted by Pearson chi-square test. Analyses for this study were considered statistically significant when  $p < 0.05$  and performed using SAS University Edition 9.04.01 (SAS Institute, Inc., Cary, N.C.).<sup>19</sup> The University of Pittsburgh Institutional Review Board determined this study to be exempt from review.

## RESULTS

Using outlined search criteria of independent and integrated Accreditation Council for Graduate Medical Education plastic surgery training programs, 140 programs were identified. Forty duplicates were removed from this listing, yielding 100 individual institution websites for faculty search and assessment. Website listings identified 930 academic plastic surgeons meeting inclusion criteria for the study.

### Characteristics of Academic Plastic Surgeons

Minority groups represented 24.7 percent of all academic plastic surgeons (Table 1). Among the nonwhite group, Asians had the greatest

representation among academic plastic surgeons at 17.7 percent, followed by Hispanic (5.3 percent) and black (1.7 percent) individuals. When compared to the overall U.S. population, academic plastic surgery showed an 11.9 percent increase in Asian representation, in contrast to an 11.7 percent decrease in black representation and a 12.8 percent decrease in Hispanic representation. Demographic information and workplace characteristics of white and nonwhite plastic surgeons involved in the study are listed in Table 2. Overall, nonwhite academic plastic surgeons did not have a significantly different gender distribution (white female, 21.3 percent; nonwhite female, 19.3 percent;  $p =$  not significant), were significantly *younger* than their white colleagues (nonwhite, 46.1 years; white, 51.5 years;  $p < 0.0001$ ), and graduated *more recently* (nonwhite, 2006; white, 2001;  $p < 0.0001$ ). Minorities and whites in academia worked in programs with comparable faculty size (nonwhite,  $n = 14.8$ ; white,  $n = 15.5$ ;  $p =$  not significant) and served similar population sizes (nonwhite, 130,000 people; white, 120,000 people;  $p =$  not significant).

### Career Training and Qualifications of Ethnic Minorities in Academic Plastic Surgery

Minorities in academic plastic surgery were significantly *more* likely than whites to have received clinical fellowship training (OR, 1.62; 95 percent CI, 1.16 to 2.26;  $p = 0.0048$ ) and, more specifically, microsurgery fellowship training (OR, 1.78; 95 percent CI, 1.24 to 2.54;  $p = 0.0014$ ). However, no difference was found among other clinical fellowship training types. There were no differences between whites and nonwhites in the rates of residency training type, advanced degree attainment, or research fellowship attainment. The distribution of career training and qualifications for academic plastic surgeons, by ethnicity, is listed in Table 3.

### Academic Rank and Leadership Positions for Nonwhites

Measuring academic rank and leadership roles (Table 4), nonwhites represent 47.2 percent of all

**Table 1. Comparison of Demographics to National Average**

Race	Academic Plastic Surgery (%)	U.S. National Census* (%)	Change from U.S. Average (%)	Academic Surgery (%)†	Change from Academic Surgery (%)	$p$ ‡
White	700 (75.3)	76.6	-1.3	70.7	4.6	0.003
Nonwhite	230 (24.7)	23.4	1.3	29.3	-4.6	0.003
Asian	165 (17.7)	5.8	11.9	18	-0.3	<0.0001
Black	16 (1.7)	13.4	-11.7	3.5	-1.8	0.003
Hispanic	49 (5.3)	18.1	-12.8	7.8	-2.5	0.005

\*2018 U.S. Census Records.

†Comparison of academic plastic surgery to Association of American Medical Colleges academic surgery survey using two proportion analysis.

‡2017 Association of American Medical Colleges report on U.S. medical school faculty.

**Table 2. Characteristics of Academic Plastic Surgeons in the United States**

Characteristic	Nonwhite (%)	White (%)	<i>p</i>
No.	230	700	
Mean age ± SD, yr	46.1 ± 8.7	51.5 ± 11.8	<0.0001
Sex			
Male	181 (78.7)	565 (80.7)	0.76*
Female	49 (21.3)	135 (19.3)	—
Median residency graduation year ± IQR	2006 ± 8	2001 ± 11	<0.0001†
Region			0.11*
Northeast	47 (22.3)	164 (77.7)	—
South	68 (24.3)	212 (75.7)	—
Midwest	66 (23.5)	215 (76.5)	—
West	49 (32.7)	100 (67.3)	—
Mean program size ± SD‡	14.8 ± 10.4	15.5 ± 11.6	0.39
Mean city population ± SD, × 10 <sup>5</sup>	1.3 ± 1.8	1.2 ± 1.7	0.099

IQR, interquartile range.

\*Pearson  $\chi^2$  analysis was performed to test differences in proportion.

†Wilcoxon rank sum analysis for differences in nonparametric data.

‡Indicates total number of faculty in employing program.

assistant professors, 24.7 percent of associate professors, and 18.2 percent of full professors. When compared to whites, nonwhites were significantly more likely to be assistant professors (OR, 1.31; 95 percent CI, 0.97 to 1.77; *p* = 0.076) and less likely to be full professors (OR, 0.60; 95 percent CI, 0.42 to 0.88; *p* = 0.0077). An analysis of current and historic leadership of major plastic surgery societies (Plastic Surgery Research Council, American Society of Plastic Surgeons, and American Association of Plastic Surgeons) established that none has had more than two nonwhite leaders during their history, indicating that the overall presence of nonwhite academic plastic surgeons in society leadership positions is limited (Table 5).

**Impact of Experience in Academic Advancement and Current Disparities**

The majority (53.1 percent) of current nonwhite academic plastic surgeons have 10 or fewer years of postresidency experience, compared to 36.5 percent of all white academic plastic surgeons (Fig. 1). The differing curves in Figure 1 highlight the disproportionately large grouping of nonwhite academic plastic surgeons at junior experience levels and points out the more homogenous distribution of white surgeons possessing a wider range of postresidency experience. Nonwhites had, on average, fewer years of postresidency experience in the associate professor position (nonwhites, 12 years; whites, 13 years; *p* = 0.029), full professor position (nonwhites, 20 years; whites, 28 years; *p* = 0.0011), residency director position (nonwhites, 14 years; whites, 20 years; *p* = 0.007), or chair (nonwhites, 19 years; whites, 26 years; *p* = 0.011), and had a comparable number of years of experience at the assistant professor position (nonwhites, 6 years; whites, 7 years; *p* = not significant) and fellowship director position (nonwhites, 13.5; whites, 14; *p* = 0.5) as shown in Table 6.

White plastic surgeons in the chair position had an average of 26 years of postresidency experience, and although 25.6 percent of whites met or exceeded 26 years of postresidency experience, just 7.4 percent of nonwhites met or exceeded 26 years of postresidency experience, indicating a possible underrepresentation of nonwhite academics with years of postresidency experience typical of the chair position (Fig. 2). The average white full professor had 28 years of postresidency experience in the field. Of the academic cohort,

**Table 3. Qualifications Held by Academic Plastic Surgeons**

Qualification	Nonwhite (%)	White (%)	OR (White Ref.)	95% CI	<i>p</i>
Residency training type					
Integrated	42 (18.5)	123 (18.2)	1.02	0.69–1.50	0.92
Independent	185 (81.5)	553 (81.8)	0.98	0.67–1.45	—
Additional advanced degree	33 (14.3)	85 (12.3)	1.18	0.77–1.83	0.43
D.D.S.	5 (2.2)	14 (2.0)	1.06	0.38–3.00	>0.999*
D.M.D.	4 (1.7)	9 (1.3)	1.34	0.41–4.38	0.75*
M.B.A.	7 (3.0)	6 (0.86)	3.58	1.19–10.73	0.024*
M.H.S.	0 (0)	2 (0.29)	1	0.99–1.01	>0.999*
M.P.H.	7 (3.0)	8 (1.2)	2.67	0.96–7.44	0.068*
M.S.	5 (2.2)	22 (3.2)	0.67	0.25–1.79	0.43
Ph.D.	9 (3.9)	30 (4.3)	0.89	0.42–1.91	0.77
Clinical fellowship training	173 (74.9)	448 (64.8)	1.62	1.16–2.26	0.0048
Aesthetic fellowship	12 (5.2)	35 (5.1)	1.03	0.52–2.03	0.92
Craniofacial fellowship	53 (34.5)	152 (65.5)	1.06	0.74–1.51	0.76
Hand fellowship	54 (23.4)	166 (24.0)	0.96	0.68–1.37	0.84
Microsurgery fellowship	60 (25.9)	114 (16.5)	1.78	1.24–2.54	0.0014
Other fellowship	15 (6.5)	21 (6.0)	1.08	0.59–1.99	0.81
Research fellowship training	41 (17.7)	92 (13.3)	1.41	0.94–2.10	0.097

Ref. reference; D.D.S., Doctor of Dental Surgery; D.M.D., Doctor of Medicine in Dentistry; M.B.A., Master of Business Administration; M.H.S., Master of Health Science; M.P.H., Master of Public Health; M.S., Master of Science; Ph.D., Doctor of Philosophy.

\*Fisher's exact test used for analysis of qualifications not meeting Pearson  $\chi^2$  assumptions.



**Table 4. Academic Rank and Leadership Positions**

Position	Nonwhite (%)	White (%)	OR (White Ref.)	95% CI	<i>p</i>
Overall	230 (24.7)	700 (75.3)	—	—	—
Assistant professor	109 (28.0)	280 (71.9)	1.31	0.97–1.77	0.076
Associate professor	57 (28.8)	141 (71.2)	1.28	0.89–1.82	0.17
Full professor	42 (18.4)	186 (81.6)	0.6	0.42–0.88	0.0077
Residency director	20 (18.3)	89 (81.7)	0.64	0.39–1.07	0.085
Fellowship director	18 (27.3)	47 (72.3)	1.16	0.66–2.04	0.61
Chair	25 (25.3)	74 (74.7)	0.98	0.49–1.29	0.37

Ref., reference.

**Table 5. National Leadership Positions**

Society	Nonwhite Leaders (%)	White Leaders (%)
AAPS	2 (3)	78 (97)
ASPS	1 (1)	74 (99)
PSRC	2 (4)	39 (96)
Overall	5 (2)	191 (98)

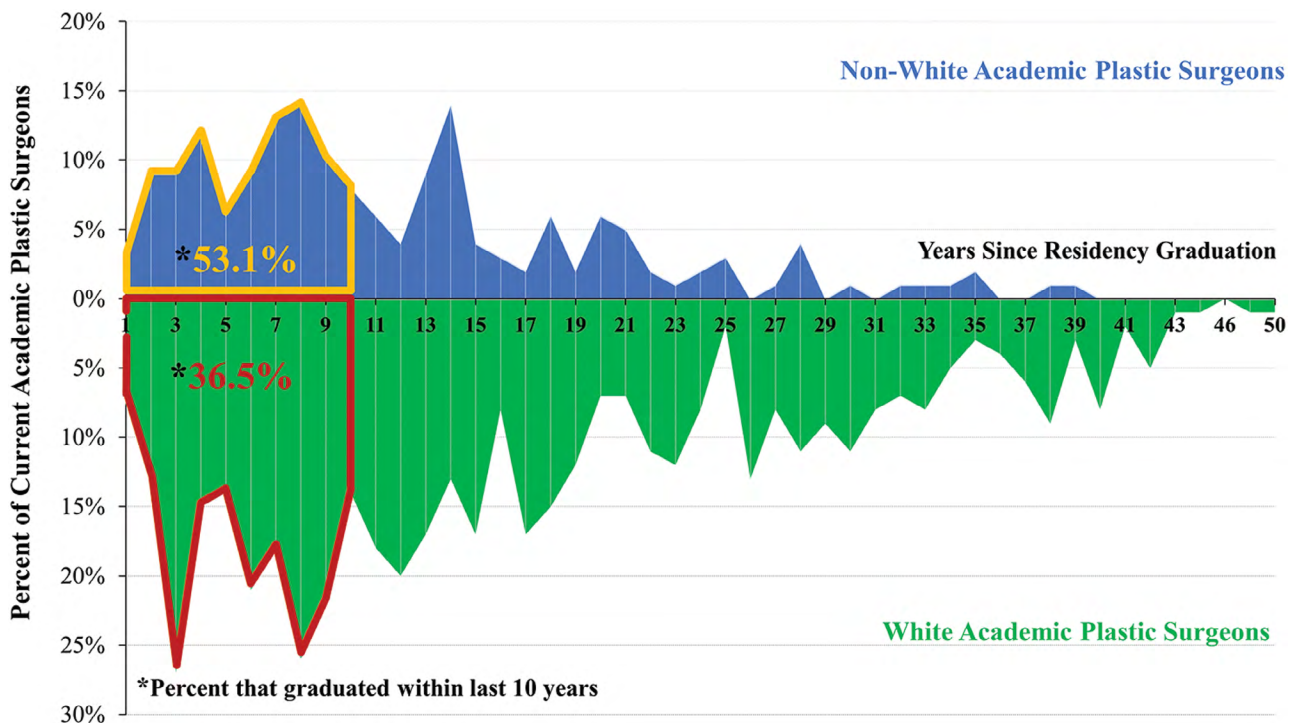
AAPS, American Association of Plastic Surgeons (1921 to 2018); ASPS, American Society of Plastic Surgeons (1932 to 2018); PSRC, Plastic Surgery Research Council (1955 to 2017).

21.2 percent of whites met or exceeded this level of postresidency experience, whereas 6.9 percent of nonwhites met or exceeded this level of postresidency experience. After taking level of experience into account through adjustment using multivariate logistic regression (Table 7), none of the previously observed positional disparities remained

significant, highlighting the significant role of experience in current positional disparities. The area under the receiver operating characteristic curve of 0.892 associated with the experience-adjusted full professor model further indicates the importance of experience as a significant variable associated with obtaining a full professor position.

**Effects of Diversity in Leadership**

Programs led by a nonwhite chair employed significantly *more* nonwhite faculty than programs led by programs led by a white chair (nonwhite chair, 42.5 percent nonwhite faculty; white chair, 20.9 percent nonwhite faculty; *p* < 0.0001) (Table 8). Of the 100 percent of minority faculty working under nonwhite chairs, 30.8 percent were



**Fig. 1.** Distribution of white/black physicians grouped by years of postresidency experience. *Brown* indicates the number of nonwhite academic plastic surgeons. *Green* indicates the percentage of white academic plastic surgeons. *Blue* indicates the percentage of nonwhite academic plastic surgeons. *Colored lines and numbers with asterisks* highlight the proportion of each cohort that graduated within the past 10 years.

**Table 6. Median Years of Postresidency Experience, by Position**

Position	Nonwhite (IQR)	White (IQR)	<i>p</i>
Assistant professor	6 (6)	7 (8)	0.073
Associate professor	12 (8)	13 (9)	0.029
Full professor	20 (7)	28 (14)	0.0011
Residency director	14 (9)	20 (17)	0.007
Fellowship director	13.5 (7.5)	14 (11)	0.5
Chair	19 (11)	26 (13)	0.011

IQR, interquartile range.

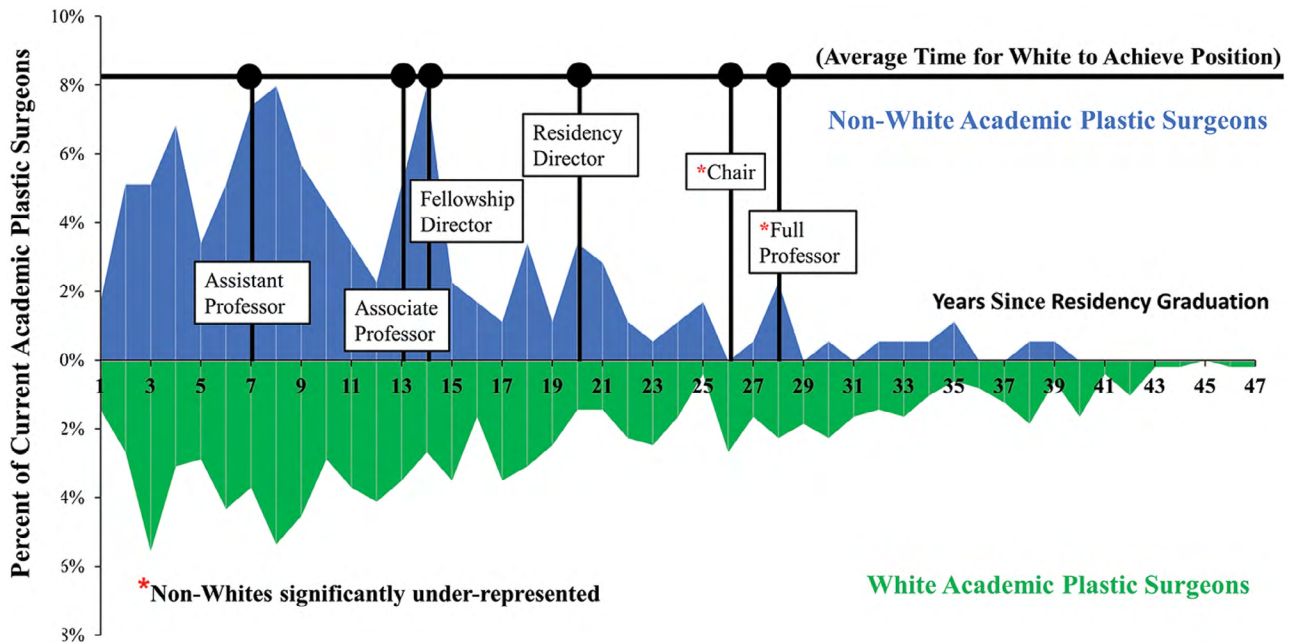
in the assistant professor position, 33.9 percent were in the associate professor position, and 35.5 percent were in the full professor position. Of the 100 percent of minority faculty working under white chairs, 62.7 percent were in the assistant professor position, 24.6 percent were in the associate professor position, and 12.7 percent were in the full professor position. Programs led by a nonwhite chair compared to programs led by a white chair had a 31.9 percent decrease in the proportion of nonwhites in the assistant professor position and a 22.6 percent increase in the proportion of nonwhites in the full professor position.

### DISCUSSION

Disparities in the representation of minority racial and ethnic groups have been well documented in the academic literature.<sup>2-4,20-23</sup> Minority groups interested in academic practice have faced

stark challenges obstructing entry into the field and prohibiting advancement to senior academic positions.<sup>24-27</sup> For the field of plastic surgery, historic efforts to improve minority ethnic representation have largely proven ineffective. In 2006, minority groups represented 25.1 percent of academic plastic surgeons and 18 percent of plastic surgeon full professors (Table 9). This study found that overall minority representation among academic plastic surgeons has decreased by 0.4 percent, but that representation at the full professor position has remained nearly constant. However, among underrepresented minorities—African Americans, American Indians, and Latino Americans—overall representation in academic plastic surgery has improved 0.3 percent for African Americans and 1.7 percent for Latino Americans since 2006. Representation among Asian Americans in academic plastic surgery has further improved from 10.9 percent in 2006 to 17.7 percent in 2018, with Asian Americans now constituting 71.7 percent of minority academic practitioners.<sup>9</sup>

The role of field experience in attaining greater academic positions has been frequently acknowledged but rarely explored.<sup>28,29</sup> In measuring years of postresidency experience, this study highlighted the role of experience inequalities in many of the positional disparities observed among minority groups. Rising minority experience, despite decreasing diversity among academics, may



**Fig. 2.** Proportion of white/nonwhite academic plastic surgeons by years of postresidency experience. Overlay of white averages of postresidency experience for academic and leadership positions. The red asterisk highlights positions where nonwhites are significantly underrepresented.

**Table 7. Position Racial Differences with Adjustment for Years of Postresidency Experience**

Position	Unadjusted			Adjusted for Years of Experience			AUROC	95% CI AUROC
	OR (White Ref.)	95% CI	<i>p</i>	OR (White Ref.)	95% CI	<i>p</i>		
Assistant professor	1.31	0.97–1.77	0.076	0.86	0.56–1.30	0.48	0.849	0.818–0.880
Associate professor	1.28	0.89–1.82	0.17	1.18	0.77–1.81	0.44	0.518	0.469–0.566
Full professor*	0.6	0.42–0.88	0.0077	1.06	0.62–1.83	0.82	0.892	0.868–0.915
Residency director	0.64	0.39–1.07	0.085	0.73	0.39–1.37	0.33	0.649	0.591–0.708
Fellowship director	1.16	0.66–2.04	0.61	0.91	0.46–1.81	0.79	0.529	0.457–0.602
Chair	0.67	0.40–1.12	0.097	0.88	0.49–1.57	0.65	0.776	0.733–0.819

Ref., reference; AUROC, area under the receiver operating characteristic curve.

\*Full professor only position to retain significant sex difference after adjustment for years of experience.

**Table 8. Leadership Differences in Institution Diversity and Faculty Advancement**

	Programs with Nonwhite Chair (%)	Programs with White Chair	Change with Nonwhite Chair (%)	<i>p</i>
No.	25	74		
Mean no. of nonwhite faculty per institution	6.70 (42.5)	4.12 (20.9)	21.6	<0.0001
Academic rank				<0.0001*
Nonwhite assistant professor	20 (30.8)	89 (62.7)	-31.9	—
Nonwhite associate professor	22 (33.9)	35 (24.6)	9.3	—
Nonwhite full professor	23 (35.3)	18 (12.7)	22.6	—

\*Comparison of overall distribution of academic rank by Pearson  $\chi^2$  analysis.

**Table 9. Comparison to Previous Studies of Ethnic Diversity in Academic Plastic Surgery**

Race	2018 Academic Plastic Surgery (%)	2006 Butler et al.* (%)	Change from 2006 (%)	<i>p</i> †
White	700 (75.3)	74.9	0.4	0.903
Nonwhite	230 (24.7)	25.1	-0.4	0.903
Asian	165 (17.7)	10.9	6.8	0.016
Black	16 (1.7)	1.4	0.3	0.757
Hispanic	49 (5.3)	3.6	1.7	0.306

\*Evaluation of Butler PD, Britt LD, Longaker MT. Ethnic diversity remains scarce in academic plastic and reconstructive surgery. *Plast Reconstr Surg*. 2009;123:1618–1627.

†Comparison by two-proportion analysis.

explain why ethnic diversity among full professors has remained paradoxically constant in the face of overall decreases in minority academic representation. As highlighted by the nonwhite cohort peaks present in Figure 2, it appears that appreciable numbers of minority academics currently in the field are only now starting to reach experience milestones typical of academic advancement for white academics. As this cohort gains experience over the next 10 to 20 years, further gains in proportional representation at senior academic positions may be expected. However, these gains are largely reliant on the ability for plastic surgery programs to retain minority faculty throughout the career development process.<sup>30–32</sup>

Minorities interested in pursuing a career in academic medicine routinely encounter a range of career barriers, including racial discrimination from colleagues, isolation, and low morale.<sup>27,33,34</sup> When faced with these challenges, minority physicians overwhelmingly prefer to seek the assistance

of senior personnel who have encountered similar issues.<sup>26,33</sup> However, lack of effective mentorship remains a persistent issue affecting academic entry and promotion for many minority physicians.<sup>26</sup> Improving minority faculty representation has brought regular benefits, including improved student education, academic productivity, and an increased diversity of research interests.<sup>35–37</sup> The Harold Amos Medical Faculty Development Program developed by the Robert Wood Johnson Foundation achieved an 80 percent retention rate for underrepresented minority faculty in academic medicine over a 21-year period by connecting minority clinician-researchers with multiple underrepresented minority mentors within their own institution and as part of a national network of program alumni.<sup>38</sup> However, it is important to ensure that these programs do not become a burden to minority faculty. The growth in interest in minority mentorship initiatives has created concurrent concern about a growing drain on faculty

time, or “minority tax,” where minority faculty are forced to divert time and attention to school-led mentorship initiatives.<sup>25,36</sup> Establishing that participation in these initiatives is voluntary and requires a reasonable time commitment ensures that minority faculty are able to engage in mentorship while still maintaining their career development.

Finally, biases against racial and ethnic minorities at the leadership level have played a historic role in hindering department diversification and impeding nonwhite faculty advancement.<sup>33,39</sup> This study is the first to quantify these biases in the field of plastic surgery and demonstrate the significant impact of leadership ethnicity on minority faculty hiring and advancement. The role of implicit or “unconscious” bias is commonly advanced as one of the key drivers of leadership-linked disparities.<sup>40</sup> Minority faculty reporting on these biases often felt they experienced an inadequate recognition of work, exclusion from faculty activities, and alienation from fellow faculty.<sup>39,41</sup> Programs have reported success in reducing the impact of these subconscious partialities by improving bias literacy training and reforming institutional governing bodies to be more ethnically and racially representative.<sup>42,43</sup> Disadvantaged groups across the medical spectrum have also called for improved transparency in leadership decision-making and the establishment of clearer faculty expectations for advancement.<sup>44,45</sup> For the longer term goal of reducing leadership bias through diversification, leadership training programs such as the Northeast Consortium for Minority Faculty Development allow for early engagement and preparation of minority faculty to enter into roles as division chief, chair of a department, and dean.<sup>46</sup> Integrating short-term behavioral and organizational changes with a long-term commitment toward expanding minority leadership provides a foundation for greater faculty satisfaction and diversification.<sup>47</sup>

This study was subject to several notable limitations. Data collection for this study occurred through the use of information listed on public-use websites and open-source institutional listings. Checks for accuracy of leadership positions held were made against listings provided by the Accreditation Council for Graduate Medical Education, San Francisco Match, and existing program director lists. However, it is possible that portions of the online information provided by specific individuals or institutions were not updated in a timely manner and did not reflect all of the up-to-date qualifications or positional achievements made by subjects. Board certifications for 54 individuals (5.8 percent) were obtained from international medical bodies and were unable to be verified independently.

Determinations of race for this study, made using photographic and surname data, may not have reflected self-identified race. However, this collection method did capture perceptions of race and ethnicity, which may have played a part in hiring and advancement discrimination. In addition, data were unable to be collected for 68 individuals (7.3 percent), and a larger group of 273 individuals (29.4 percent) did not have residency graduation data available. Individuals with missing residency graduation data were found to disproportionately consist of older academic plastic surgeons. Previous studies have demonstrated that this older cohort has decreased use of online networking and social media websites, possibly explaining their overrepresentation in missing online data. Data measuring the current clinical practice volume of academic plastic surgeons included in the study were similarly unavailable. Finally, it should be noted that study comparisons were made through cross-sectional analysis because of the limited availability of historical faculty data. Despite these limitations, this study obtained improved collection rates for academic rank compared with similar studies in the field.<sup>48,49</sup>

## CONCLUSIONS

Disparities in ethnic representation remain a pressing issue affecting academic plastic surgery. However, current disparities in representation appear to be closely linked to differences in ethnic cohort experience. It is possible that, with rising experience, the growing number of nonwhite academics will begin to reduce some of the present disparities in representation. However, strong associations between leadership ethnicity and the employment of minority faculty remain. Implementing policies to manage implicit bias, improve leadership training, and forge stronger mentorship networks among minority groups can improve current discriminatory practices and promote more diverse ethnic representation in the field. For the field of plastic surgery, promoting a more ethnically diverse academic workforce is essential to serve the changing patient community and develop the next generation of aspiring plastic surgeons.

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