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BACKGROUND

- PSCA consists of standardized and narrative letters of recommendation (NLORs).
- Gender bias has been demonstrated in standardized letters of recommendation for plastic surgery residency.
- Text analysis of NLORs in orthopedic surgery and emergency medicine has demonstrated gender bias.

Project aim: Determine if linguistic bias exists in plastic surgery NLORs.

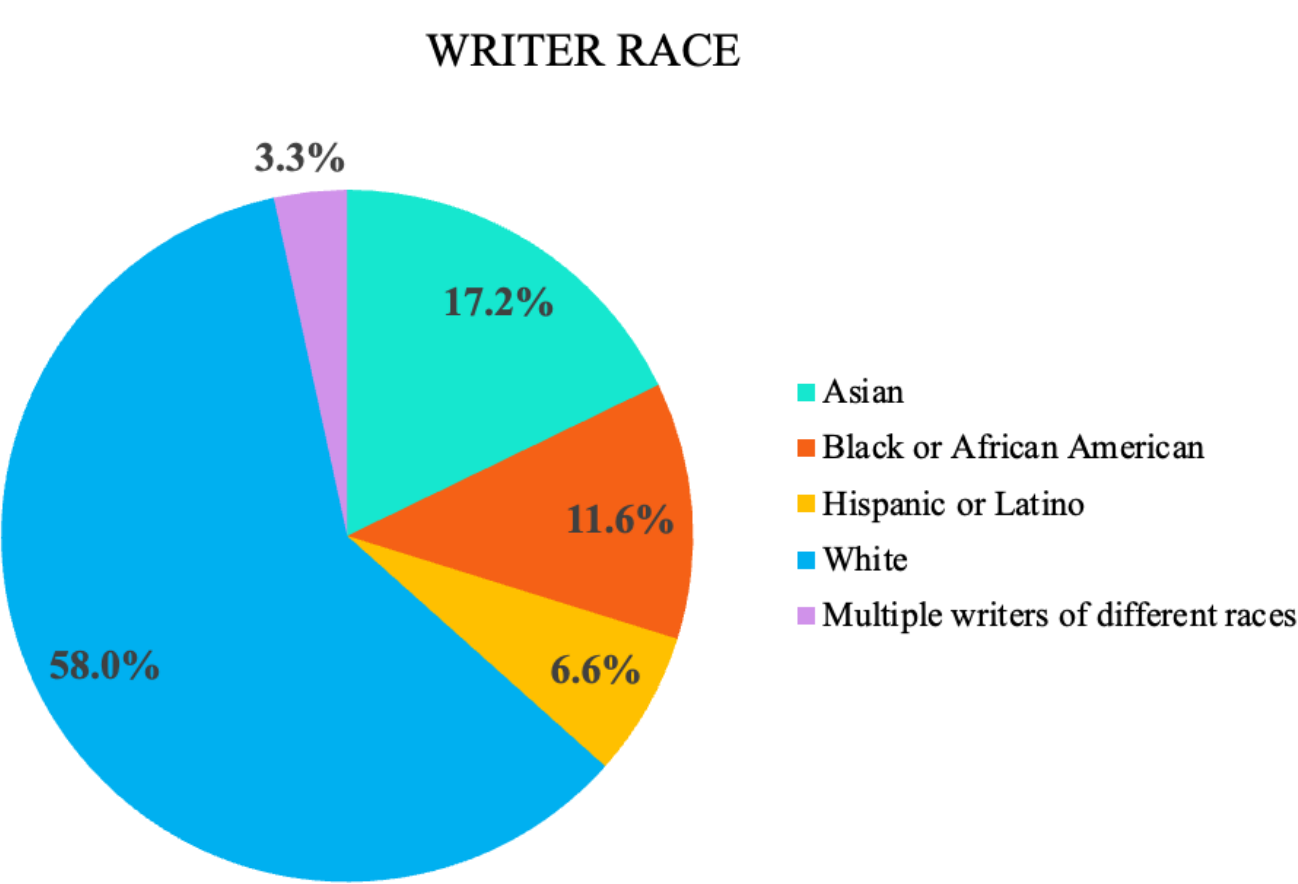
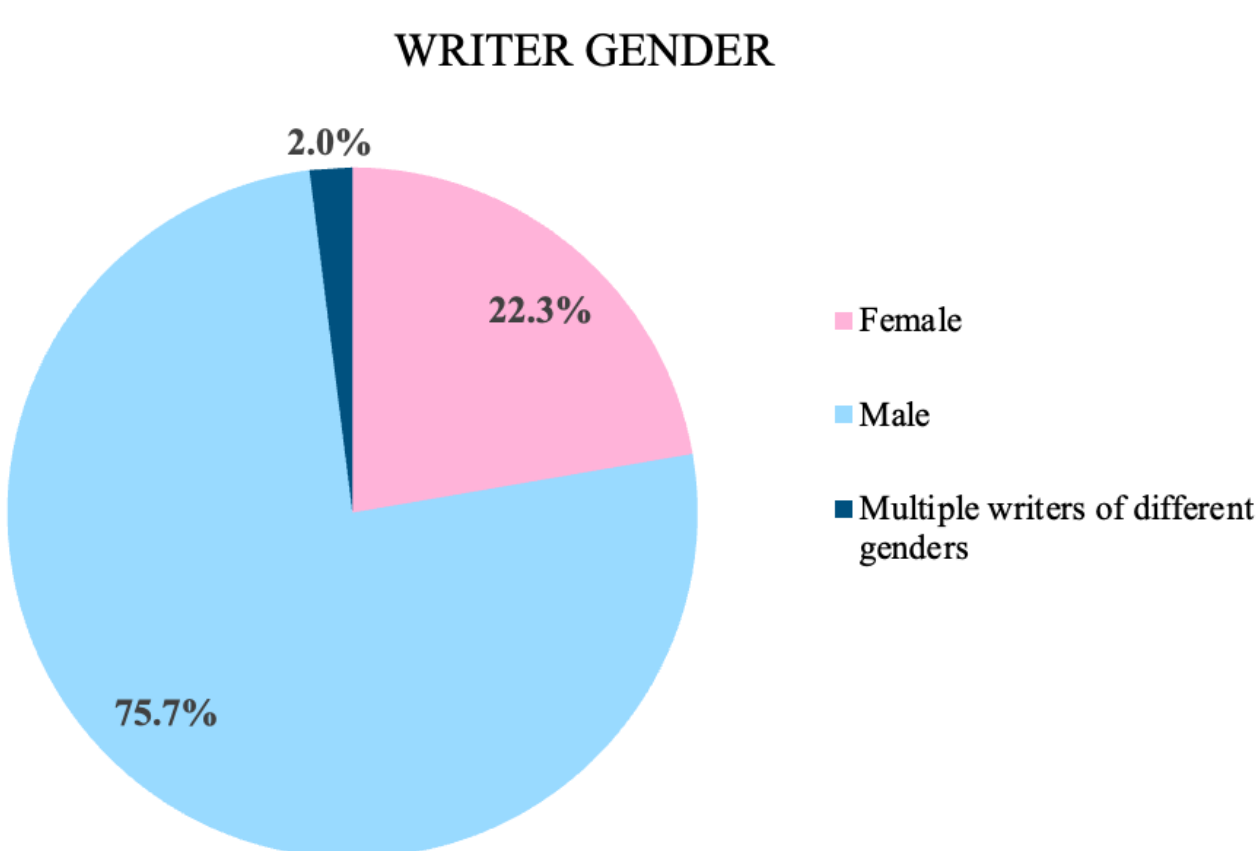
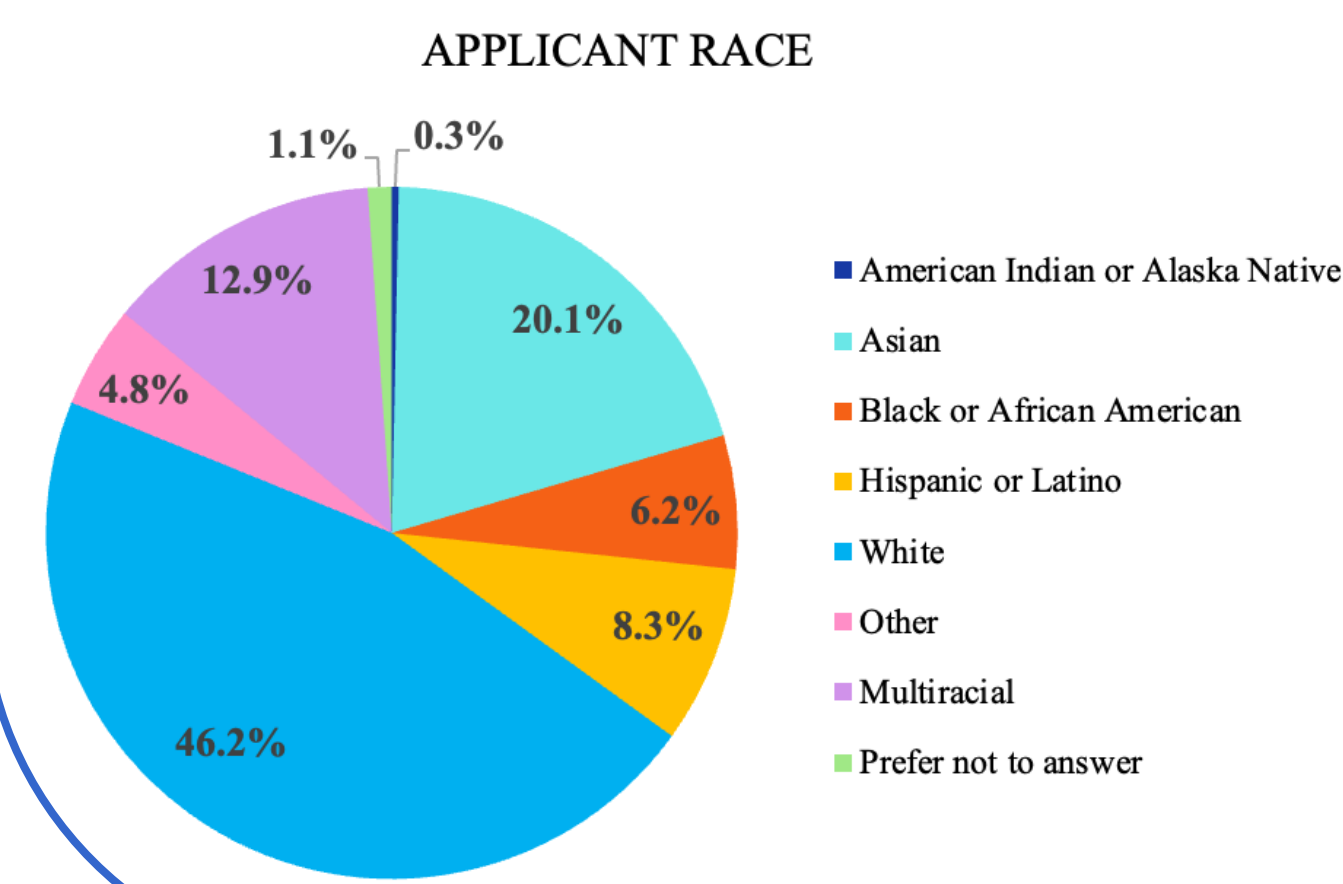
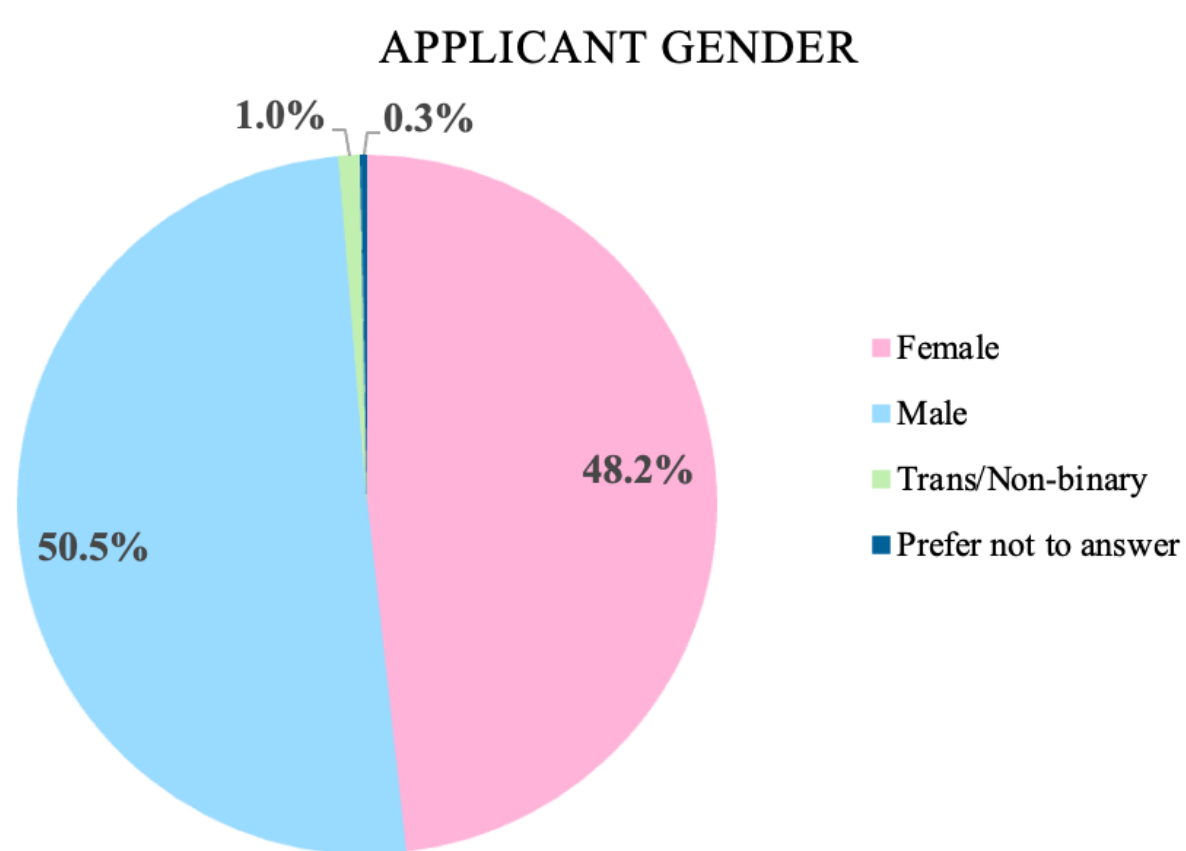
METHODS

- Applicants to Duke plastic surgery from 2021-2023, excluding reapplicants and those without NLORs.
- Applicant demographics were self-identified. Faculty gender was identified through online platforms. Namsor was used to determine faculty race.
- The Linguistic Inquiry and Word Count (LIWC) program was used to calculate the amount of words that fell within predetermined linguistic categories.

RESULTS

Demographic Breakdown:

Of 666 total applicants, 626 were unique applicants who had at least one NLOR.



LIWC comparison between writers and writer-applicant pairings by gender.

Variable	Total (N = 1915)	Female (N = 331)	Male (N = 1446)	p-value**	Female Writer / Female Applicant (N = 179)	Female Writer / Male Applicant (N = 148)	p-value**	Male Writer / Male Applicant (N = 715)	Male Writer / Female Applicant (N = 719)	p-value**
	Mean +/- SD	Mean +/- SD	Mean +/- SD	p	Mean +/- SD	Mean +/- SD	p	Mean +/- SD	Mean +/- SD	p
Word Count	413.80 +/- 168.10	420.60 +/- 153.90	414.30 +/- 174.80	0.54	437.70 +/- 153.10	401.00 +/- 154.50	0.03*	411.90 +/- 184.20	416.00 +/- 164.90	0.66
Power	6.22 +/- 3.96	6.59 +/- 3.99	6.21 +/- 4.04	0.13	6.94 +/- 3.76	6.18 +/- 4.27	0.08	6.16 +/- 4.09	6.26 +/- 4.01	0.66
Positive Emotion	4.45 +/- 2.54	4.79 +/- 2.47	4.32 +/- 2.58	<0.01*	4.92 +/- 2.37	4.60 +/- 2.59	0.24	4.28 +/- 2.65	4.37 +/- 2.50	0.50
Negative Emotion	0.28 +/- 0.68	0.34 +/- 0.76	0.28 +/- 0.68	0.22	0.32 +/- 0.69	0.35 +/- 0.85	0.75	0.31 +/- 0.78	0.26 +/- 0.57	0.21
Positive Tone	21.04 +/- 8.53	22.07 +/- 7.68	20.89 +/- 8.81	0.02*	22.72 +/- 7.65	21.26 +/- 7.72	0.09	20.89 +/- 9.37	20.91 +/- 8.22	0.96
Negative Tone	0.84 +/- 1.34	0.85 +/- 1.19	0.85 +/- 1.40	0.97	0.92 +/- 1.13	0.77 +/- 1.26	0.25	0.88 +/- 1.46	0.84 +/- 1.35	0.63
Prosocial	6.34 +/- 3.83	7.06 +/- 3.85	6.14 +/- 3.83	<0.0001*	6.97 +/- 3.94	7.11 +/- 3.74	0.74	6.08 +/- 3.80	6.21 +/- 3.86	0.53
Cognition	36.05 +/- 17.98	37.59 +/- 16.49	36.24 +/- 18.61	0.22	39.36 +/- 17.64	35.36 +/- 14.97	0.03*	36.49 +/- 20.03	35.99 +/- 17.03	0.61
Drives	29.74 +/- 14.30	30.81 +/- 13.15	29.24 +/- 14.72	0.07	32.00 +/- 12.90	29.40 +/- 13.46	0.08	28.96 +/- 15.31	29.49 +/- 14.12	0.49
Achievement	14.45 +/- 7.89	15.54 +/- 7.86	14.26 +/- 8.01	0.01*	16.06 +/- 7.37	14.93 +/- 8.43	0.20	14.36 +/- 8.43	14.14 +/- 7.53	0.60
Affiliation	10.17 +/- 6.18	9.79 +/- 5.13	9.90 +/- 6.27	0.76	10.17 +/- 5.26	9.32 +/- 5.00	0.14	9.60 +/- 6.45	10.19 +/- 6.10	0.07
Insight	9.88 +/- 5.39	10.72 +/- 5.46	9.82 +/- 5.43	0.01*	10.95 +/- 5.67	10.34 +/- 5.24	0.32	9.90 +/- 5.67	9.72 +/- 5.19	0.53
Tentative	5.26 +/- 3.52	5.30 +/- 3.18	5.31 +/- 3.61	0.97	5.34 +/- 3.39	5.22 +/- 2.94	0.74	5.26 +/- 3.72	5.37 +/- 3.51	0.55
Moral	1.15 +/- 1.26	1.20 +/- 1.21	1.13 +/- 1.27	0.38	1.21 +/- 1.18	1.19 +/- 1.27	0.86	1.15 +/- 1.29	1.12 +/- 1.26	0.61
Social Behavior	18.27 +/- 8.47	19.85 +/- 8.02	17.98 +/- 8.60	<0.001*	20.07 +/- 8.16	19.47 +/- 7.95	0.50	17.83 +/- 9.03	18.12 +/- 8.15	0.52
Affect	22.37 +/- 9.21	23.43 +/- 8.20	22.24 +/- 9.54	0.04*	24.20 +/- 8.25	22.45 +/- 8.13	0.06	22.24 +/- 10.14	22.27 +/- 8.91	0.95

*Denotes significant value

**P-values represent t-test comparing female and male letter writers and t-tests comparing writers and applicants of the same gender to those with different genders.

LIWC comparison between writers and writer-applicant pairings by race.

Variable	White (N = 1134)	Non-white (N = 337)	p-value**	White Writer / White Applicant (N = 510)	White Writer / Non-white Applicant (N = 382)	p-value**	Non-white Writer / Non-white Applicant (N = 176)	Non-white Writer / White Applicant (N = 249)	p-value**
	Mean +/- SD	Mean +/- SD	p	Mean +/- SD	Mean +/- SD	p	Mean +/- SD	Mean +/- SD	p
Word Count	411.20 +/- 170.70	416.80 +/- 162.40	0.51	406.10 +/- 168.20	415.80 +/- 174.70	0.40	428.00 +/- 253.90	394.20 +/- 159.00	0.03*
Power	6.04 +/- 4.01	6.39 +/- 3.90	0.07	5.99 +/- 3.95	6.11 +/- 4.18	0.65	6.80 +/- 3.93	5.71 +/- 3.69	<0.01*
Positive Emotion	4.45 +/- 2.50	4.35 +/- 2.59	0.45	4.45 +/- 2.49	4.52 +/- 2.47	0.69	4.33 +/- 2.61	4.28 +/- 2.52	0.85
Negative Emotion	0.27 +/- 0.67	0.313 +/- 0.73	0.22	0.24 +/- 0.61	0.30 +/- 0.73	0.17	0.28 +/- 0.61	0.33 +/- 0.80	0.53
Positive Tone	21.16 +/- 8.50	21.01 +/- 8.39	0.72	21.17 +/- 8.51	21.12 +/- 8.23	0.93	21.60 +/- 8.07	19.88 +/- 7.82	0.03*
Negative Tone	0.814 +/- 1.32	0.90 +/- 1.44	0.21	0.72 +/- 1.12	0.89 +/- 1.38	0.04*	0.84 +/- 1.08	0.92 +/- 1.76	0.60
Prosocial	6.33 +/- 3.80	6.20 +/- 3.72	0.49	6.36 +/- 3.85	6.29 +/- 3.84	0.79	6.55 +/- 4.04	5.68 +/- 3.64	0.02*
Cognition	36.39 +/- 18.07	36.30 +/- 18.06	0.91	36.10 +/- 17.44	36.51 +/- 18.38	0.73	36.05 +/- 16.27	34.36 +/- 18.06	0.32
Drives	29.38 +/- 14.52	29.35 +/- 13.41	0.97	28.96 +/- 14.34	29.93 +/- 14.73	0.32	30.87 +/- 12.80	26.79 +/- 12.65	<0.01*
Achievement	14.62 +/- 8.20	14.27 +/- 7.32	0.37	14.64 +/- 8.31	14.76 +/- 8.15	0.83	14.51 +/- 6.81	12.97 +/- 7.03	0.02*
Affiliation	9.77 +/- 6.01	9.89 +/- 5.75	0.94	9.35 +/- 5.80	10.08 +/- 5.98	0.07	10.68 +/- 5.67	9.17 +/- 5.41	<0.01*
Insight	9.89 +/- 5.35	10.02 +/- 5.49	0.65	9.68 +/- 5.20	10.04 +/- 5.34	0.31	10.09 +/- 5.36	9.34 +/- 5.41	0.16
Tentative	5.25 +/- 3.50	5.39 +/- 3.60	0.42	5.26 +/- 3.45	5.14 +/- 3.50	0.64	5.11 +/- 3.24	5.25 +/- 3.75	0.70
Moral	1.13 +/- 1.29	1.16 +/- 1.20	0.64	1.15 +/- 1.34	1.12 +/- 1.20	0.70	1.17 +/- 1.27	0.99 +/- 1.15	0.13
Social Behavior	18.27 +/- 8.58	18.18 +/- 8.12	0.83	18.29 +/- 8.64	18.20 +/- 8.49	0.88	18.30 +/- 8.17	17.27 +/- 7.76	0.19
Affect	22.45 +/- 9.13	22.41 +/- 9.19	0.93	22.40 +/- 9.13	22.46 +/- 22.46	0.93	23.05 +/- 8.82	21.22 +/- 8.88	0.04*

*Denotes significant value

**P-values represent t-test comparing White and Non-white letter writers and t-tests comparing writers and applicants of the same racial group to those of different racial groups.

DISCUSSION

- Female letter writers produced more favorable recommendations with greater emphasis on social and emotional qualities than male writers.
- Racial discordance resulted in differences in letter quality. These differences likely indicate unconscious bias amongst letter writers.
- Potential reasons for differences in letter quality include the traditional underrepresentation of women and students of color in the field, gender socialization, and implicit bias.

Conclusion: As NLORs are viewed as important elements of a residency application, faculty education to improve the objectivity of these letters is necessary. This calls for greater engagement in DEI and inclusive excellence initiatives. Implementation of NLOR screening/writing guidelines may also be helpful to reduce implicit bias.

REFERENCES

