Unintended Bias and Unintended Consequences: Geographic Bias in the Plastic Surgery Residency Match

Purushottam A. Nagarkar, MD* Jeffrey E. Janis, MD, FACS†

The 2021 Residency Match cycle was marked by unprecedented and sudden changes. As is true of other highly competitive subspecialties, medical students applying for plastic surgery residencies usually complete several visiting clerkships at programs across the country. Applicants also generally attend a large number of interviews—for example, in the 2020 Match half of all US seniors who matched into plastic surgery ranked 15 or more programs.[1]

The COVID-19 pandemic threw a wrench in the process. Visiting clerkships were barred. Students could no longer get letters of recommendation from faculty they worked with during visiting clerkships. Interviews become entirely virtual. Programs and applicants had to come up with new ways of assessing each other because the traditional methods they had used were suddenly proscribed. However, COVID-19 was only the most recent change to a system that has been inexorably changing for several decades. In 2006 there were 148 US medical students applying for 82 plastic surgery residency positions, and the mean number of programs an applicant ranked was about seven.[2] In 2020—14 years later—there were 214 such applicants for 158 positions, and the mean number of programs ranked was about 14.[1] The number of positions doubled, but although the number of applicants grew far more slowly, applicants were attending twice as many interviews.

The phenomenon was not limited to plastic surgery. The average length of rank lists grew across all specialties during the same period—from 8.4 in 2006 to 12.8 in 2020 (a 3% annual rate of growth).[3] Moreover, this was before the COVID-19 pandemic. With the relative ease and cost benefit of virtual interviewing, one would have predicted that the numbers would be even higher in 2021. And, as expected, in 2021, US medical graduate applicants' average rank list length grew by a whopping 10%.

As the COVID-19 pandemic begins to wane, some of these changes will no doubt be unwound. Visiting clerkships will restart. Letters of recommendation will be the coin of the realm once more. However, other changes may be here to stay, and there are more changes coming. Virtual interviews cost less in time and money. The USMLE Step 1 is switching to a pass/fail format.[4,5] These changes might exacerbate another bias in the plastic surgery match that has been brought to light by several recent articles. Glener et al[6] looked at current residents in integrated plastic surgery programs (ie, mostly residents who had matched in the 2015–2020 cycles), and found that a quarter of them remained in the same state where they received their medical degree. Half remained in the same geographic region. Our work from 2018 looked at the Independent Plastic Surgery match,[7] and found that, in making their rank lists, programs statistically favored applicants who had gone to medical school in the same state as the program. Not unexpectedly, Asadourian[8] found that the effect was even stronger in the COVID-19 affected year of 2021, with 36% of matched applicants having matched into their home program (compared with 24% in the 2015–2020 period).

Interpreting these data is not simple. The match is a complex interplay of program and applicant preferences—as such, it is hard to definitively determine how much of this effect is caused by applicant preferences and how much by program preferences. Further, it is not possible to know from the data whether these effects are caused by implicit bias, or explicit bias. For example, the effects seen by Glener et al and Asadourian et al could well be caused by explicit applicant preference. It is not hard to imagine that applicants might explicitly favor programs that are in a geographic area closer to their homes or extended families, for good reason. On the other hand, we showed that programs have a preference for applicants with a strong connection to their geographic region. However, we could not differentiate implicit and explicit reasons for this preference. For example, did programs favor applicants with a strong geographic connection because they explicitly judged that such applicants would be a better "fit"? Or was this an implicit effect—ie, all else being equal, an applicant that had a geographic connection to a program was likely to have more in common with the interviewers at that program, and was

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therefore more likely to be rated somewhat higher than an applicant without such a connection?

Bias does not have to be a four-letter word—but unintended bias can have unintended consequences. For example, we found in our analysis[7] that modifying program rank lists to remove the effects of geographic bias increased the applicant match rate, and improved the mean program number needed to match. Geographic bias was producing objectively worse outcomes for programs and applicants alike.

One of the first steps in addressing implicit bias is simply becoming aware of it. We are deeply involved in the interview and rank list creation processes in our own programs, and we have found it very helpful to be aware that an applicant's geographic connections can influence our judgment. As a new match cycle commences, we believe it is beneficial for programs and applicants to be aware of their geographic biases. Bringing biases into the open is helpful—not necessarily to eliminate them, but to apply them only with intention and care.

Jeffrey E. Janis, MD, FACS
Department of Plastic and Reconstructive Surgery
Ohio State University Wexner Medical Center
915 Olentangy River Rd., Suite 2100, Room 2114
Columbus, OH 43212
E-mail: jeffrey.janis@osumc.edu
Twitter: @jjanismd
Instagram: jeffreyjanismd

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