

# Analysis of Reapplications to Integrated and Independent Plastic Surgery Residency

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**Background:** Plastic surgery is one of the most competitive specialties to match, with integrated plastic surgery having the highest rate of unmatched applicants in all categorical specialties. Unmatched applicants face difficult challenges, especially because there is a lack of data to help inform and guide both reapplicants and their advisors.

**Method:** A national survey targeting plastic surgery applicants to both integrated and independent tracks from 2014 to 2020 was conducted in August 2020 to identify reapplicants, their application characteristics, and their outcomes.

**Results:** Eighteen of the 54 (33.3%) integrated reapplicants responded to the survey, as well as 7 of the 42 (16.7%) independent reapplicants. Fifty percent of integrated reapplicants and 43% of independent reapplicants successfully eventually matched. For integrated reapplicants, the mean (SD) number of first cycle invites was the greatest predictor of eventual match success, 9.00 (5.93) invites for reapplicants that eventually successfully matched compared with 2.89 (2.89) for those that remained unmatched,  $P = 0.025$ . Integrated reapplicants obtained on average 2.47 less invites during the reapplicant cycle compared with the initial cycle,  $P = 0.046$ . A Fisher exact test revealed no differences in match outcomes of those integrated reapplicants who spent time in between cycles pursuing research compared with a preliminary surgical year,  $P = 0.99$ .

**Conclusions:** Reapplication to both integrated and independent plastic surgery may result in worse matching outcomes compared with the initial match. Applicants should attempt to preemptively address potential initial application weaknesses as reapplication after a failed initial attempt may carry disadvantages. (*Plast Reconstr Surg Glob Open* 2021;9:e3508; doi: [10.1097/GOX.0000000000003508](https://doi.org/10.1097/GOX.0000000000003508); Published online 22 March 2021.)

## INTRODUCTION

As of 2020, categorical integrated plastic surgery is the most competitive residency application with a 72% match rate, lowest among all specialties, as reported by the National Residency Matching Program.<sup>1</sup> When considering the ratio of the number of positions available versus applicants, it remains one of the most coveted specialties at 57% available spots for the number of total applicants.

This is comparable to 62% for otolaryngology, 48% for orthopedic surgery, and 52% for neurosurgery.<sup>2</sup> The independent plastic surgery match may have a slightly higher match rate than the integrated route, but still remains increasingly competitive, with a decreasing match rate from 82% in 2019 to 78% in 2020.<sup>3-7</sup>

Many studies have looked at factors that determine success in both the integrated and independent plastic surgery matches.<sup>8-11</sup> High USMLE scores, strong letters of recommendation, AOA status, prolific research, and outstanding performances on acting internships have all been hypothesized to play a role.<sup>12-20</sup> Some of these studies have found considerable differences between applicant and faculty perspectives. For example, 63% of applicants believed that research is very important compared with 31% of American Council of Academic Plastic Surgeons members.<sup>21</sup> These differences in views make it difficult for applicants to prioritize and plan ways to maximize their success.

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Many applicants face the difficult decision of whether or not to take a research year before initially applying. Although some studies point to the benefit of a research fellowship, many applicants may not be able to afford taking off an extra year, or believe that they might already have enough research to proceed. For these applicants, their backup plan may be to reapply after a failed initial application. Applicants of all types need appropriate contingency plans due to the highly competitive nature of the plastic surgery match. Currently, there is no literature on the outcomes of reapplicants in plastic surgery. Therefore, plastic surgery advisors and applicants have been making decisions and backup plans with insufficient data. We hope to address this by analyzing the outcomes of reapplicants in both integrated and independent plastic surgery tracks to provide insight into historical outcomes and make data-driven recommendations.

## METHODS

An exemption from IRB review was granted to this study, from the Ohio State University Office of Responsible Research Practices (IRB Study# 2020E0531), and the study was conducted in accordance with the ethical principles stated in the Declaration of Helsinki. To establish a list of all plastic surgery residency applicants from 2014 to 2020, annual applicant lists were collected from the plastic surgery programs at The Ohio State University Wexner Medical Center, University of Pittsburgh Medical Center, and University California Davis Health, all of whom run both tracks. Each program's list was aggregated into a master list, in which duplicates were analyzed to confirm whether they existed in the same year (hence a true duplicate) or in separate years (representing a reapplicant). Since plastic surgery applicants tend to apply broadly, the aim was to capture as many plastic surgery residency applicants as possible by including 3 institutions of varying geographic locations. Using the Association of American Medical Colleges and San Francisco match data, we were able to cross reference the listed number of applicants each year to those collected from the 3 institutions. We confirmed that we captured the majority of applicants each year.<sup>2,6</sup> For example, in 2019–2020, the Association of American Medical Colleges listed a total of 301 applicants to integrated plastic surgery, while the data collected from the institutions also showed 301 email addresses for that year. For independent applicants we observed a similar trend. There were year-to-year discrepancies, but we believe we captured a majority of applicants representative of the entire pool each year.

A total of 1463 applicants were identified from 2014 to 2020 as applying to integrated plastic surgery using each program's annual list. A total of 753 independent applicants were identified using the same process. A total of 2216 emails were sent in August 2020 to applicants of the respective track explaining the study goals of researching reapplication to plastic surgery residency along with a link to a 20-question Qualtrics powered survey. Emails were sent to the entire applicant pool, not just identified reapplicants as there may exist reapplicants who did not apply

to any of the 3 programs the subsequent year. The questions were designed to investigate the most important factors involved in successful reapplication to plastic surgery residency. (See appendix, Supplemental Digital Content 1, which details the integrated reapplicant survey questionnaire. <http://links.lww.com/PRSGO/B607>.) (See appendix, Supplemental Digital Content 2, which details the independent reapplicant survey questionnaire. <http://links.lww.com/PRSGO/B608>.) A second-round reminder email was sent after 5 days from the initial email, and a third round was sent 2 weeks later. Branched logic was used for efficiency. The survey's first question confirmed that the responder was a reapplicant to plastic surgery residency; if not, the survey was terminated. The remaining questions collected information related to a reapplicant's demographic, base-line applicant characteristics, key changes from first to second application cycles, and a final matching outcome. Finally, a fourth and final reminder email was sent 3 weeks later only to identified reapplicants to maximize response rate to the target subpopulation.

## Statistical Analysis

All continuous variables were compared using an unpaired *t*-test between the matched and unmatched groups, and a paired *t*-test for first and second cycle differences. A Fisher exact test was performed to discover any differences in categorical variables with low sample sizes. A Pearson's product-moment correlation coefficient was calculated with an accompanying *P*-value to determine any association between continuous variables.  $P < 0.05$  was deemed statistically significant for all performed statistics. Descriptive statistics (including the mean, SD, median, and range) were tabulated for most variables. Any missing value was excluded from analysis. All data analysis was conducted in R 4.0.2 (R Core Team, 2020).

## RESULTS

### Integrated Applicant Demographics

When estimating the number of integrated reapplicants by identifying duplicate emails year over year, a total of at least 54 reapplicants were counted from 2014 to 2020. However, we recognized that more may exist that did not reapply to any of the 3 programs included in this study, or that changed their email addresses. For these reasons, we deployed the survey to all integrated plastic surgery applicants for the 2014–2020 cycles to the three aforementioned institutions. This included the 54 pre-identified reapplicants. A total of 18 integrated reapplicant responses were collected, translating to a possible 33% response rate. Nine reapplicants ultimately matched, whereas 9 did not, resulting in a final match rate of 50% for reapplicants (Table 1). Sixty-six percent of reapplicants were men, whereas 33% were women. International medical graduates consisted of 28% of reapplicants. Seventeen reapplicants were from an allopathic medical school, whereas 1 was from an osteopathic medical school. In between cycles, 44% of reapplicants pursued a preliminary surgical year, while 28% engaged in research, and

**Table 1. Integrated Reapplicant Demographics**

|   | Matched<br>(N = 9) | Unmatched<br>(N = 9) | Overall<br>(N = 18) |
|---|--------------------|----------------------|---------------------|
| Race and/or ethnicity                         |                    |                      |                     |
| Asian   | 2 (22.2%)          | 2 (22.2%)            | 4 (22.2%)           |
| Black/African American                        | 1 (11.1%)          | 0 (0%)               | 1 (5.6%)            |
| Hispanic, Latino, or Spanish origin and White | 1 (11.1%)          | 0 (0%)               | 1 (5.6%)            |
| Middle Eastern or North African and White     | 1 (11.1%)          | 0 (0%)               | 1 (5.6%)            |
| White   | 4 (44.4%)          | 4 (44.4%)            | 8 (44.4%)           |
| Hispanic, Latino, or Spanish origin           | 0 (0%)             | 2 (22.2%)            | 2 (11.1%)           |
| Middle Eastern or North African               | 0 (0%)             | 1 (11.1%)            | 1 (5.6%)            |
| Gender  |                    |                      |                     |
| Women   | 4 (44.4%)          | 2 (22.2%)            | 6 (33.3%)           |
| Men   | 5 (55.6%)          | 7 (77.8%)            | 12 (66.7%)          |
| International medical graduate                |                    |                      |                     |
| No  | 7 (77.8%)          | 6 (66.7%)            | 13 (72.2%)          |
| Yes   | 2 (22.2%)          | 3 (33.3%)            | 5 (27.8%)           |
| MD/DO   |                    |                      |                     |
| MD  | 9 (100%)           | 8 (88.9%)            | 17 (94.4%)          |
| DO  | 0 (0%)             | 1 (11.1%)            | 1 (5.6%)            |

17% spent their time on “other,” which included taking time off.

### Integrated Applicant Characteristics

The mean (SD) Step 1 scores for matched and unmatched integrated reapplicants respectively were 250 (10.6) and 236 (17.1),  $P = 0.108$  (Table 2). Less dramatic of a difference was the Step 2 CK score, which was 248 (16.1) compared with 245 (15.4),  $P = 0.715$ . However, none of these differences was statistically significant. The AOA status of reapplicants were also comparable amongst the 2 groups at 11.1% and 22.2%,  $P = 0.467$  for matched and unmatched reapplicants, respectively. Research publications, both by the first author and total, were higher for matched applicants compared with unmatched by the time of the second cycle (Table 2, Fig. 1). Thirty-three percent of matched applicants had 5 or more first author publications compared with 22%,  $P = 0.580$  for unmatched applicants. Sixty-six percent of matched applicants had 5 or more total publications at the time of reapplication compared with 33%,  $P = 0.119$  of unmatched applicants.

### Integrated Applicant Outcomes

Matched integrated reapplicants were more likely to have higher mean (SD) first cycle interview invites, 9.00 (5.93) invites compared with unmatched, 2.89 (2.89),  $P = 0.025$  (Table 2). All reapplicants received an average of 2.47 less invites upon reapplication than during the initial cycle,  $P = 0.046$ . Figure 2 shows the distribution in Step 1 and Step 2 CK scores for unmatched and matched reapplicants as well as the difference in interview invites from the first to the second cycle. A Pearson correlation coefficient of 0.69 ( $P = 0.007$ ) indicated an association between higher Step 1 scores and lower invite numbers in the second cycle. However, higher Step 1 scores were more likely to have received more interview invites initially ( $P < 0.001$ ). A Fisher exact test revealed no differences in match outcomes of those reapplicants who spent time in between cycles pursuing research compared with a preliminary surgical year ( $P = 0.99$ ) (Table 3). The majority of matched reapplicants (66.6%) matched at a program other than their home institution or an institution where

they performed an acting internship. For those reapplicants who went unmatched, they either pursued training in general surgery, initiated research in plastic surgery, or took time off.

### Independent Applicant Demographics, Characteristics, and Outcomes

For independent reapplicants, a total of 42 reapplicants were identified from duplicate emails found over more than 1 application cycle. A total of 7 complete responses were collected, resulting in an estimated 16.7% response rate. 3 of the 7 reapplicants (43%) ultimately matched. All reapplicants were MDs; none were DOs. One reapplicant had a home independent plastic surgery residency program. The majority of reapplicants, 4/7 (57.1%), in the independent reapplicant pool were international medical graduates (Table 4).

Step 1, Step 2CK, and Step 3 mean scores were all higher in the matched reapplicant group compared with the unmatched, but recent ABSITE scores were higher for unmatched (Table 5). Due to the paucity of data, statistical analysis was not possible. In general, matched reapplicants had more research compared with unmatched before both cycles (Table 5). The most common activity for all reapplicants in between cycles was pursuing a Burn Fellowship.

Matched reapplicants had higher interview numbers in both rounds, although the difference was not as great during the first cycle (Table 5). None of the successful reapplicants matched at their home program. Of the 4 reapplicants who did not match on their second attempt, 2 planned on reapplying.

## DISCUSSION

Integrated plastic surgery remains one of the most competitive specialties in all of medicine with the highest rates of unmatched applicants.<sup>1</sup> These unmatched applicants may choose to pursue the independent route, which is increasing in its competitiveness as well. Analysis and outcomes of reapplicants is critical to help guide applicants and program directors. To our knowledge, this is

**Table 2. Integrated Reapplicant Characteristics and Outcomes**

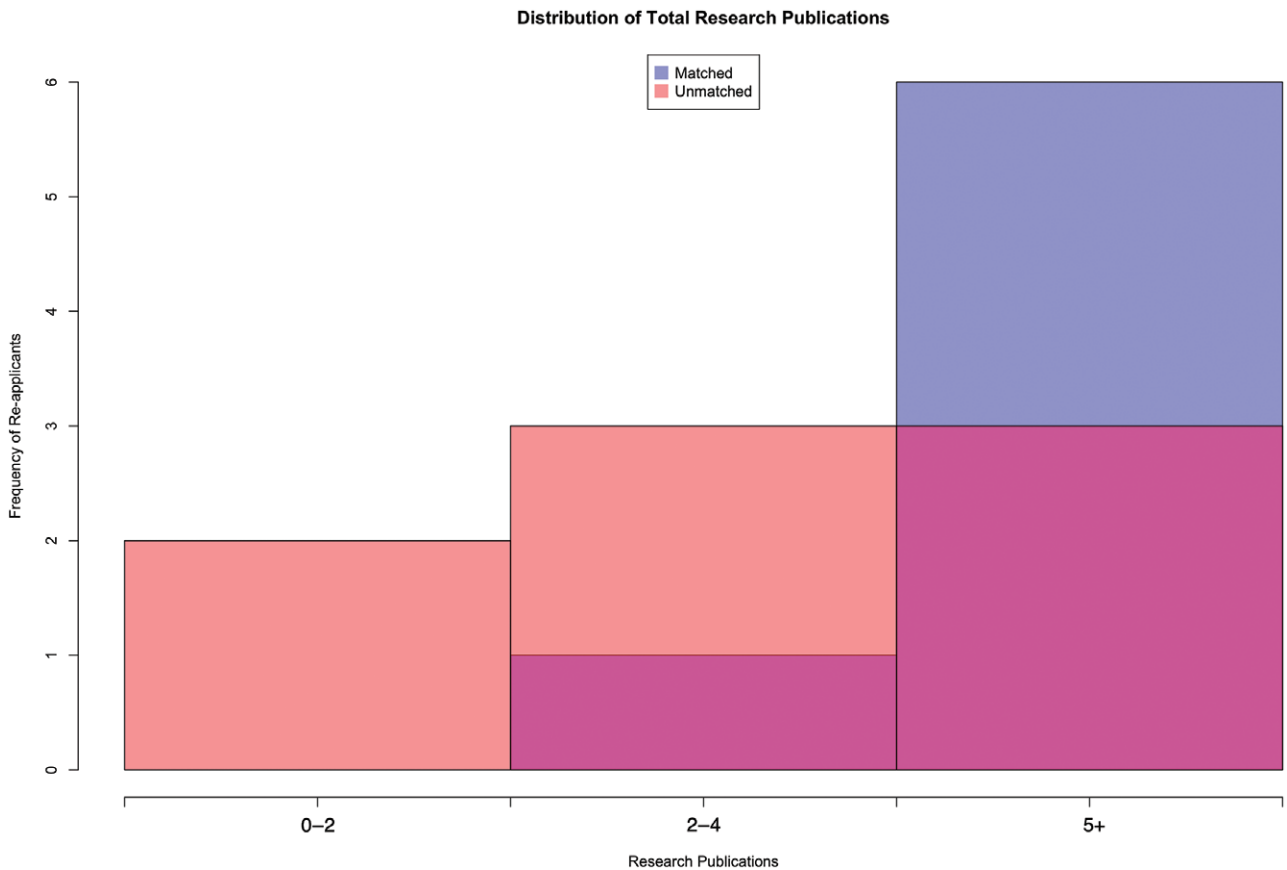
|  | Matched<br>(N = 9) | Unmatched<br>(N = 9) | Overall<br>(N = 18) |
|--|--------------------|----------------------|---------------------|
| Step 1   |                    |                      |                     |
| Mean (SD)  | 250 (10.6)         | 236 (17.1)           | 243 (15.3)          |
| Step 2CK   |                    |                      |                     |
| Mean (SD)  | 248 (16.1)         | 245 (15.4)           | 246 (15.2)          |
| AOA Status   |                    |                      |                     |
| My medical school did not have AOA                   | 1 (11.1%)          | 2 (22.2%)            | 3 (16.7%)           |
| No   | 6 (66.7%)          | 7 (77.8%)            | 13 (72.2%)          |
| Yes  | 2 (22.2%)          | 0 (0%)               | 2 (11.1%)           |
| Home PRS program                                     |                    |                      |                     |
| No   | 5 (55.6%)          | 4 (44.4%)            | 9 (50.0%)           |
| Yes  | 4 (44.4%)          | 5 (55.6%)            | 9 (50.0%)           |
| Dedicated research years before the first cycle      |                    |                      |                     |
| Mean (SD)  | 1.06 (1.18)        | 0.222 (0.667)        | 0.639 (1.03)        |
| Dedicated research years before the second cycle     |                    |                      |                     |
| Mean (SD)  | 1.44 (1.45)        | 0.556 (0.882)        | 1.00 (1.25)         |
| First cycle total number of publications             |                    |                      |                     |
| 0  | 0 (0%)             | 1 (11.1%)            | 1 (5.6%)            |
| 1–2  | 1 (11.1%)          | 3 (33.3%)            | 4 (22.2%)           |
| 2–4  | 2 (22.2%)          | 2 (22.2%)            | 4 (22.2%)           |
| 5+   | 4 (44.4%)          | 3 (33.3%)            | 7 (38.9%)           |
| Second cycle total number of publications            |                    |                      |                     |
| 0  | 0 (0%)             | 1 (11.1%)            | 1 (5.6%)            |
| 1–2  | 0 (0%)             | 1 (11.1%)            | 1 (5.6%)            |
| 2–4  | 1 (11.1%)          | 3 (33.3%)            | 4 (22.2%)           |
| 5+   | 6 (66.7%)          | 3 (33.3%)            | 9 (50.0%)           |
| First cycle number of AIs                            |                    |                      |                     |
| Mean (SD)  | 3.25 (1.49)        | 2.33 (1.12)          | 2.76 (1.35)         |
| Second cycle number of AIs                           |                    |                      |                     |
| Mean (SD)  | 2.50 (1.85)        | 1.44 (1.51)          | 1.94 (1.71)         |
| First cycle number of LORs                           |                    |                      |                     |
| Mean (SD)  | 3.33 (0.500)       | 3.33 (0.500)         | 3.33 (0.485)        |
| Second cycle number of LORs                          |                    |                      |                     |
| Mean (SD)  | 3.33 (0.500)       | 3.33 (0.500)         | 3.33 (0.485)        |
| First cycle had mentors make calls                   |                    |                      |                     |
| No   | 4 (44.4%)          | 4 (44.4%)            | 8 (44.4%)           |
| Yes  | 5 (55.6%)          | 5 (55.6%)            | 10 (55.6%)          |
| Second cycle had mentors make calls                  |                    |                      |                     |
| No   | 2 (22.2%)          | 5 (55.6%)            | 7 (38.9%)           |
| Yes  | 7 (77.8%)          | 4 (44.4%)            | 11 (61.1%)          |
| Changed letters from the first to the second cycle   |                    |                      |                     |
| No   | 1 (11.1%)          | 2 (22.2%)            | 3 (16.7%)           |
| Yes  | 8 (88.9%)          | 7 (77.8%)            | 15 (83.3%)          |
| Time spent in between cycles                         |                    |                      |                     |
| Formal paid research fellowship                      | 1 (11.1%)          | 1 (11.1%)            | 2 (11.1%)           |
| Other  | 2 (22.2%)          | 2 (22.2%)            | 4 (22.2%)           |
| Preliminary surgical year                            | 4 (44.4%)          | 4 (44.4%)            | 8 (44.4%)           |
| Research year  | 2 (22.2%)          | 1 (11.1%)            | 3 (16.7%)           |
| Applied to all programs                              |                    |                      |                     |
| No   | 2 (22.2%)          | 2 (22.2%)            | 4 (22.2%)           |
| Yes  | 7 (77.8%)          | 7 (77.8%)            | 14 (77.8%)          |
| First cycle invites                                  |                    |                      |                     |
| Mean (SD)  | 9.00 (5.93)        | 2.89 (2.89)          | 5.76 (5.43)         |
| Second cycle invites                                 |                    |                      |                     |
| Mean (SD)  | 4.88 (3.91)        | 1.89 (1.62)          | 3.29 (3.22)         |
| Matched at home program or where an AI was performed |                    |                      |                     |
| No   | 6 (66.7%)          | NA                   | NA                  |
| Yes  | 3 (33.3%)          | NA                   | NA                  |
| If did not match, what career path?                  |                    |                      |                     |
| Apply again into plastic surgery                     | NA                 | 2 (22.2%)            | NA                  |
| General surgery                                      | NA                 | 2 (22.2%)            | NA                  |
| Research in plastic surgery                          | NA                 | 1 (11.1%)            | NA                  |
| Plastic surgery independent program                  | NA                 | 1 (11.1%)            | NA                  |
| Time off   | NA                 | 1 (11.1%)            | NA                  |

the first study to analyze reapplicant outcomes in plastic surgery between matched and unmatched reapplicants. By reaching out to 3 geographically diverse application pools from the last 6 cycles, we believe we were able to contact most of the reapplicant pool. Although determining survey response rate in this study is inherently difficult without knowing the true number of reapplicants, our estimated 33% response rate from the integrated track fairs well compared with an approximate 11% gathered

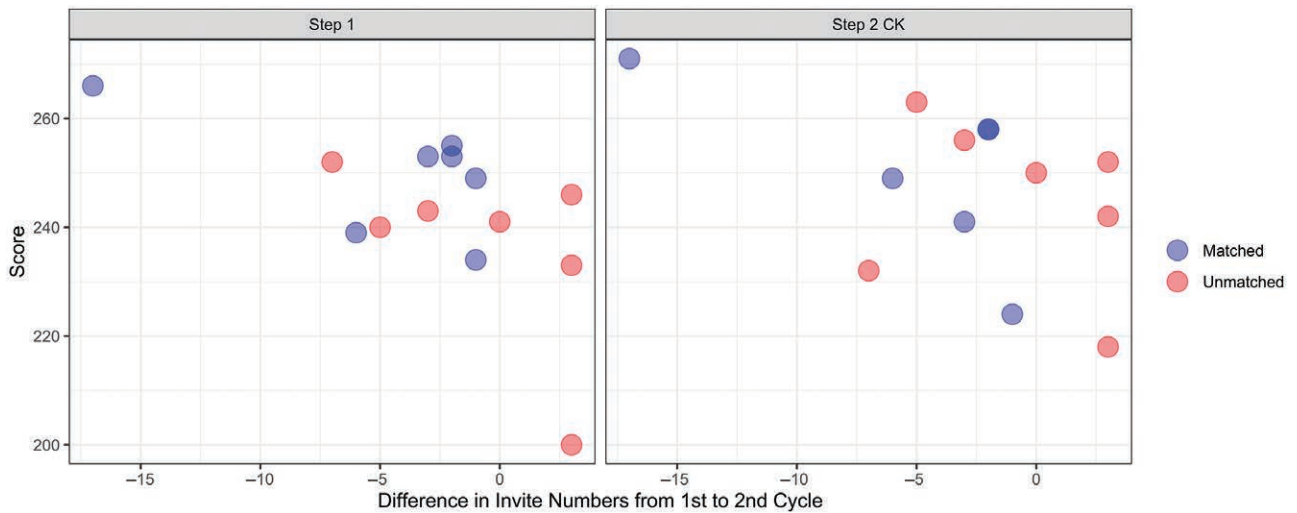
from other surveys studies to the American Society of Plastic Surgeons (Christopher Simmons, email communication, June 2020) and gives us confidence and validity in our results.<sup>21–23</sup>

**Integrated Plastic Surgery**

A 50% match rate success in integrated reapplicants is significantly less than the regular integrated applicant pool, especially the most recent 72% listed by the



**Fig. 1.** Distribution of total research publications at second application attempt and matching outcome for integrated reapplicants. Matched applicants are shown in blue, unmatched in red, and their overlap as a combination.



**Fig. 2.** Integrated reapplicant Step 1 and Step 2CK scores are plotted against the change in their interview invites from the first to second applications cycles. The majority of integrated reapplicants received less invites the second time around as shown by negative values on the x-axis. Only three integrated reapplicants received more invites the second time around as shown by positive values on the x-axis.

National Residency Matching Program for integrated plastic surgery.<sup>1</sup> When compared with other specialty studies performed on reapplicant outcomes, plastic surgery reapplicants were close to the middle. An otolaryngology reapplicant study found that 86% of reapplicants were successful

in the second attempt.<sup>24</sup> An orthopedic surgery reapplicant study found that 39.7% of reapplicants were successful at eventually obtaining an orthopedic surgery residency.<sup>25</sup> Reapplicant success is highly variable between specialties; however, both of the previously mentioned studies found



**Table 3. Integrated Reapplicant—Research versus Preliminary Surgical Year**

|  | Research<br>(N = 5) | Prelim<br>(N = 8) | Overall<br>(N = 18) |
|--|---------------------|-------------------|---------------------|
| Step 1   |                     |                   |                     |
| Mean (SD)  | 234 (20.9)          | 248 (10.1)        | 243 (15.3)          |
| Step 2 CK  |                     |                   |                     |
| Mean (SD)  | 236 (18.1)          | 254 (12.3)        | 246 (15.2)          |
| AOA Status   |                     |                   |                     |
| My medical school did not have AOA                   |                     |                   |                     |
| No   | 2 (40.0%)           | 0 (0%)            | 3 (16.7%)           |
| Yes  | 2 (40.0%)           | 7 (87.5%)         | 13 (72.2%)          |
| Yes  | 1 (20.0%)           | 1 (12.5%)         | 2 (11.1%)           |
| Second cycle number of first author publications     |                     |                   |                     |
| 0  | 0 (0%)              | 1 (12.5%)         | 2 (11.1%)           |
| 1–2  | 0 (0%)              | 3 (37.5%)         | 4 (22.2%)           |
| 2–4  | 2 (40.0%)           | 0 (0%)            | 3 (16.7%)           |
| 5+   | 1 (20.0%)           | 2 (25.0%)         | 5 (27.8%)           |
| Second cycle total number of publications            |                     |                   |                     |
| 0  | 0 (0%)              | 0 (0%)            | 1 (5.6%)            |
| 1–2  | 0 (0%)              | 1 (12.5%)         | 1 (5.6%)            |
| 2–4  | 1 (20.0%)           | 3 (37.5%)         | 4 (22.2%)           |
| 5+   | 3 (60.0%)           | 2 (25.0%)         | 9 (50.0%)           |
| First cycle invites                                  |                     |                   |                     |
| Mean (SD)  | 4.80 (5.89)         | 8.00 (5.81)       | 5.76 (5.43)         |
| Second cycle invites                                 |                     |                   |                     |
| Mean (SD)  | 5.20 (4.15)         | 2.88 (2.70)       | 3.29 (3.22)         |
| Matched as reapplicant                               |                     |                   |                     |
| No   | 2 (40.0%)           | 4 (50.0%)         | 9 (50.0%)           |
| Yes  | 3 (60.0%)           | 4 (50.0%)         | 9 (50.0%)           |
| Matched at home program or where an AI was performed |                     |                   |                     |
| No   | 3 (60.0%)           | 6 (75.0%)         | 11 (61.1%)          |
| Yes  | 1 (20.0%)           | 1 (12.5%)         | 3 (16.7%)           |

**Table 4. Independent Reapplicant Demographics**

|                                 | Matched<br>(N = 3) | Unmatched<br>(N = 4) | Overall<br>(N = 7) |
|---------------------------------|--------------------|----------------------|--------------------|
| Race and/or ethnicity           |                    |                      |                    |
| Asian                           | 1 (33.3%)          | 1 (25.0%)            | 2 (28.6%)          |
| Middle Eastern or North African | 1 (33.3%)          | 1 (25.0%)            | 2 (28.6%)          |
| White                           | 1 (33.3%)          | 2 (50.0%)            | 3 (42.9%)          |
| Gender                          |                    |                      |                    |
| Women                           | 1 (33.3%)          | 1 (25.0%)            | 2 (28.6%)          |
| Men                             | 2 (66.7%)          | 3 (75.0%)            | 5 (71.4%)          |
| International medical graduate  |                    |                      |                    |
| No                              | 2 (66.7%)          | 1 (25.0%)            | 3 (42.9%)          |
| Yes                             | 1 (33.3%)          | 3 (75.0%)            | 4 (57.1%)          |
| MD/DO                           |                    |                      |                    |
| MD                              | 3 (100%)           | 4 (100%)             | 7 (100%)           |

no difference in match success from a research year compared with an intern year.<sup>24,25</sup> The results from our study corroborate this finding in integrated plastic surgery. However, existing literature has shown that research fellowships in plastic surgery can be valuable to increase not only an applicant’s publication authorship, but also their chance of overall match success when compared with an applicant without a research year.<sup>21</sup> Therefore, a research year taken before the initial application may have more benefits than after an unsuccessful match.

USMLE Step 1 scores were, on average, higher in matched reapplicants compared with unmatched, but a statistically significant result was not identified. Given the small sample size of reapplicants, statistical power may not have been reached. However, the number of first cycle interview invites predicted final reapplicant success. This may encourage initially unmatched applicants with high interview numbers to reapply. Interestingly, reapplicants overall received less interview invites during the

reapplicant cycle than initially. This suggests that programs may not be as interested in reapplicants, and that a potential stigma may exist. For example, paradoxically, a statistically significant association was found between higher Step 1 scores and less invites in the reapplicant round, which may imply that reapplication leads to less desirability, even for the most qualified applicants. On the other hand, lower invites in the second round may be due to the reapplicant’s initial weakness that continues to affect them in the second cycle. In any case, there were reapplicants who received far fewer interviews during their second attempt, but still secured an integrated plastic surgery position. This may be potentially attributed to stronger relationships with mentors in between cycles who were able to advocate for them at programs where they received invites. Approximately 78% of reapplicants that matched had mentors that made phone calls on their behalf compared with 44% of those that did not match. Reapplicants more often matched at a program other

**Table 5. Independent Reapplicant Characteristics and Outcomes**

|  | Matched<br>(N = 3) | Unmatched<br>(N = 4) | Overall<br>(N = 7) |
|--|--------------------|----------------------|--------------------|
| Step 1   |                    |                      |                    |
| Mean (SD)  | 257 (33.2)         | 247 (2.12)           | 252 (20.1)         |
| Step 2CK   |                    |                      |                    |
| Mean (SD)  | 258 (19.8)         | 235 (7.07)           | 247 (18.0)         |
| Step 3   |                    |                      |                    |
| Mean (SD)  | 243 (31.8)         | 218 (NA)             | 234 (26.6)         |
| Most recent ABSITE                                 |                    |                      |                    |
| Mean (SD)  | 70.5 (40.3)        | 76.0 (22.6)          | 73.3 (26.9)        |
| AOA status   |                    |                      |                    |
| No   | 2 (66.7%)          | 4 (100%)             | 6 (85.7%)          |
| Yes  | 1 (33.3%)          | 0 (0%)               | 1 (14.3%)          |
| Home Independent Plastics Program                  |                    |                      |                    |
| No   | 2 (66.7%)          | 4 (100%)             | 6 (85.7%)          |
| Yes  | 1 (33.3%)          | 0 (0%)               | 1 (14.3%)          |
| Dedicated research years before the first cycle    |                    |                      |                    |
| Mean (SD)  | 1.33 (1.53)        | 0.333 (0.577)        | 0.833 (1.17)       |
| Dedicated research years before the second cycle   |                    |                      |                    |
| Mean (SD)  | 0.667 (0.577)      | 0.333 (0.577)        | 0.500 (0.548)      |
| First cycle number of first author pubs            |                    |                      |                    |
| 1–2  | 2 (66.7%)          | 2 (50.0%)            | 4 (57.1%)          |
| 2–4  | 0 (0%)             | 2 (50.0%)            | 2 (28.6%)          |
| 5+   | 1 (33.3%)          | 0 (0%)               | 1 (14.3%)          |
| Second cycle number of first author pubs           |                    |                      |                    |
| 1–2  | 2 (66.7%)          | 1 (25.0%)            | 3 (42.9%)          |
| 2–4  | 0 (0%)             | 2 (50.0%)            | 2 (28.6%)          |
| 5+   | 1 (33.3%)          | 0 (0%)               | 1 (14.3%)          |
| First cycle total number of pubs                   |                    |                      |                    |
| 1–2  | 0 (0%)             | 1 (25.0%)            | 1 (14.3%)          |
| 2–4  | 1 (33.3%)          | 1 (25.0%)            | 2 (28.6%)          |
| 5+   | 2 (66.7%)          | 2 (50.0%)            | 4 (57.1%)          |
| Second cycle total number of pubs                  |                    |                      |                    |
| 2–4  | 1 (33.3%)          | 1 (25.0%)            | 2 (28.6%)          |
| 5+   | 2 (66.7%)          | 2 (50.0%)            | 4 (57.1%)          |
| First cycle number of PRS electives                |                    |                      |                    |
| Mean (SD)  | 2.00 (1.41)        | 1.33 (0.577)         | 1.60 (0.894)       |
| Second cycle number of PRS electives               |                    |                      |                    |
| Mean (SD)  | 0.500 (0.707)      | 1.00 (0)             | 0.800 (0.447)      |
| First cycle number of LORs                         |                    |                      |                    |
| Mean (SD)  | 3.67 (1.15)        | 3.00 (0.816)         | 3.29 (0.951)       |
| Second cycle number of LORs                        |                    |                      |                    |
| Mean (SD)  | 3.67 (1.15)        | 3.00 (0.816)         | 3.29 (0.951)       |
| First cycle had mentors make calls                 |                    |                      |                    |
| No   | 1 (33.3%)          | 1 (25.0%)            | 2 (28.6%)          |
| Yes  | 2 (66.7%)          | 3 (75.0%)            | 5 (71.4%)          |
| Second cycle had mentors make calls                |                    |                      |                    |
| No   | 1 (33.3%)          | 1 (25.0%)            | 2 (28.6%)          |
| Yes  | 2 (66.7%)          | 3 (75.0%)            | 5 (71.4%)          |
| Changed letters from the first to the second cycle |                    |                      |                    |
| No   | 2 (66.7%)          | 0 (0%)               | 2 (28.6%)          |
| Yes  | 1 (33.3%)          | 4 (100%)             | 5 (71.4%)          |
| Time spent in between cycles                       |                    |                      |                    |
| Bench research year and locums call                | 1 (33.3%)          | 0 (0%)               | 1 (14.3%)          |
| Burn fellowship                                    | 2 (66.7%)          | 1 (25.0%)            | 3 (42.9%)          |
| Burn and hand fellowship                           | 0 (0%)             | 1 (25.0%)            | 1 (14.3%)          |
| Burn and surgical critical care fellowship         | 0 (0%)             | 1 (25.0%)            | 1 (14.3%)          |
| General surgery attending position                 | 0 (0%)             | 1 (25.0%)            | 1 (14.3%)          |
| Applied to all programs                            |                    |                      |                    |
| No   | 1 (33.3%)          | 1 (25.0%)            | 2 (28.6%)          |
| Yes  | 2 (66.7%)          | 3 (75.0%)            | 5 (71.4%)          |
| First cycle invites                                |                    |                      |                    |
| Mean (SD)  | 10.3 (8.39)        | 9.75 (7.37)          | 10.0 (7.12)        |
| Second cycle invites                               |                    |                      |                    |
| Mean (SD)  | 14.0 (5.57)        | 6.25 (5.32)          | 9.57 (6.45)        |
| Matched at home program                            |                    |                      |                    |
| No   | 3 (100%)           | NA                   | NA                 |
| Yes  | 0 (0%)             | NA                   | NA                 |
| If did not match, future plan?                     |                    |                      |                    |
| Reapplying—3rd attempt                             | NA                 | 2 (50.0%)            | NA                 |

than their “home” institution, further emphasizing inter-faculty and mentor connections among programs as a possible role.<sup>10,26,27</sup>

Of note, reapplicant survey responders were able to fill out comments, sharing their thoughts on the reapplication

process. Many comments echoed a sentiment of frustration with mentorship and guidance related to reapplication and the integrated match process. We hope that the results herein provide added clarity to the existing literature for advisors and applicants of the future.

### Recommendations for Integrated Reapplicants

Given the inherent limitations of survey studies and the low sample size collected, we advise applicants to consider the recommendations listed here with caution. However, given the data herein and the current literature on the topic, we believe that these recommendations may still provide benefit to applicants and mentors alike.

For the reapplicant to integrated plastic surgery residency, to maximize their success, we suggest reflecting on the initial application as a whole to make it as competitive as possible, including entertaining the possibility of a dedicated research year before initially applying. For those reapplicants with fewer initial invites, we predict lower success in the reapplicant round. Those applicants may want to consider a different path through general surgery (which has a higher match rate than integrated plastic surgery),<sup>4</sup> as reapplying is likely to be more challenging.

Although higher Step 1 scores were not statistically significant in the matched compared with those in the unmatched groups, matched applicants did have an average Step 1 score of 250 compared with 236 of unmatched. Applicants with Step 1 scores closer to the average for plastic surgery (249),<sup>1</sup> higher number of initial invites, and having 5 or more publications by the second cycle may be more likely to have success in reapplication. However, due to the upcoming pass-fail nature of the Step 1 examination, there may be greater emphasis on the letter of recommendations, Step 2CK scores, and research for all applicants.<sup>28</sup>

Whether or not to pursue a dedicated research year compared with a preliminary general surgery year after going unmatched must be considered on an individual basis. This study and others have not found any difference in match outcomes regardless of which path is pursued.<sup>24,25</sup> For those applicants lacking research and substantial relationships with mentors who can write strong letters, a research fellowship may be a better option. However, research fellowships may be difficult to secure after the match process because research fellowship applications occur earlier in the year. Furthermore, many research fellowships in plastic surgery are located in expensive cities and may be unpaid, which can be costly to the future applicant.

A matched preliminary surgical year could be beneficial to those applicants who already have a track record of publication or those comfortable with pursuing additional research while balancing the clinical workload of a surgical intern. A preliminary surgical year may have the added benefit of allowing for electives in plastic surgery where mentors and possible advocates can be identified. In addition, prioritizing preliminary surgical programs with plastic surgery training programs is prudent because spots do occasionally open. However, experiences may be highly variable and program-dependent.

The literature on the integrated plastic surgery match has identified key characteristics necessary for a successful match.<sup>12,13,19–21,29</sup> Applicants who do not fulfill these criteria or have significant weaknesses may find

themselves in a more difficult position when branded as a reapplicant. It may benefit the applicant to take a pre-emptive research year before their initial application in order to develop strong relationships and bolster their application earlier.

### Recommendations for Independent Plastic Surgery

For independent plastic surgery residents, standardized testing scores (ie, ABSITE), interview invites, and strong letters most likely will continue to play a strong role in the reapplicant cycle. Many of the reapplicants in the independent track decided to pursue some form of a Burn Fellowship. The success of these fellowships in reapplication is undetermined. Furthermore, most of the reapplicants in our study were international medical graduates and did not have a home plastic surgery program, which may have made it difficult for them to form strong connections with plastic surgery faculty. Pursuing a plastic surgery research fellowship at an institution with an independent plastic surgery program may help in forming these relationships. Further research is needed to understand the role of various post-residency options in eventual matching success for independent reapplicants.

### Limitations

The greatest limitation in our study is the low number of reapplicants analyzed. To compensate for this, we attempted to gain information over several match cycles across multiple institutions. Many variables, including USMLE scores, had considerable differences numerically from matched and unmatched cohorts, but were not statistically significant due to lower sample sizes. With a greater sample size, these differences might have resulted in statistically significant results. However, due to the small population of reapplicants overall, any study would face a similar limitation.

Additionally, while we aimed to survey the entire plastic surgery applicant pool from 2014 to 2020, it is possible that some applicants did not apply to any of the 3 programs used in this study, which would mean that they would not have received a survey. Finally, the survey-based nature of this study results in many biases, such as recall bias, voluntary response bias, and nonresponse bias.

## CONCLUSIONS

Reapplicant match success in integrated and independent plastic surgery is lower than that of the initial match. Applicants to integrated plastic surgery who are concerned about not matching should spend a year addressing their weaknesses before applying. There may be an inherent disadvantage to applying as a reapplicant, suggesting that applicants should be fully confident in their application before initially proceeding. The number of first cycle interview invites was the best predictor of match success in the integrated reapplicant cycle. For the independent reapplicant, an additional Burn or Hand Fellowship at an institution with an independent plastic surgery program may be useful to build relationships with plastic surgeons. In addition, research fellowships in plastic surgery may also provide similar benefits. Continued research on integrated and independent plastic surgery reapplicants is needed to collect greater sample sizes for a stronger analysis.



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