

# Matching into Integrated Plastic Surgery: The Value of Research Fellowships

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**Background:** Integrated plastic surgery residency applicants sometimes complete research fellowships before residency. The average productivity and the impact of these fellowships on subsequent application to residency are unknown. The purpose of this study was to provide objective data to better understand the utility and productivity of a research fellowship.

**Methods:** A national survey was conducted in which integrated plastic surgery residency applicants from 2013 to 2016 were surveyed regarding their experiences with research fellowships. American Council of Academic Plastic Surgeons members were also surveyed to elicit their perspectives on the value of these fellowships.

**Results:** Six hundred twenty-one integrated plastic surgery applicants from 2013 to 2016 were included in the study. Twenty-five percent of applicants participated in a research fellowship. Applicants who completed research fellowships were more likely to match into plastic surgery compared to those who did not (97 percent versus 81 percent, respectively;  $p < 0.05$ ). Fellows were highly satisfied with their fellowship experience and produced an average of five publications and presentations per fellowship year. Sixty-three percent of research fellowships were performed to strengthen applications to categorical integrated plastic surgery residency. American Council of Academic Plastic Surgeons members considered three or four publications/presentations productive. Most do not recommend research fellowships to all medical students.

**Conclusions:** Research fellowships can effectively prepare for categorical plastic surgery by improving publication and presentation experience. This is the first study to show that applicants who completed research fellowships were highly satisfied with their experience, accomplished higher than expected levels of productivity, and statistically significantly matched into an integrated plastic surgery residency more often than applicants without research fellowships. (*Plast. Reconstr. Surg.* 143: 640, 2019.)

Integrated plastic surgery residency remains one of the most competitive categorical residencies in the National Resident Matching Program match. Applicants routinely exhibit some of the highest United States Medical Licensing Exam board scores, rates of membership in the

Alpha Omega Alpha Honor Medical Society, and graduation rates from top 40 National Institutes of Health–funded medical schools.<sup>1–5</sup>

In addition, plastic surgery residency applicants exhibit the highest mean numbers of abstracts, presentations, publications, and overall research experiences.<sup>6</sup> Indeed, plastic surgery program directors commonly rank research experience as one of the most important factors when evaluating residency candidates.<sup>7</sup> Recent studies have shown that applicants with at least one

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publication have significantly more interviews than those who do not.<sup>8,9</sup>

Given such a strong emphasis on research, there seems to be a rise in the popularity of taking time off from medical school to perform dedicated research fellowships.<sup>10</sup> Currently, few to no objective data exist, however, as to what medical students can expect from research fellowships and/or how they are perceived by residency programs. In addition, program directors currently rely largely on anecdotal evidence when advising medical students whether or not to partake in a research fellowship before residency. The purpose of our study was to be the first study of its kind to provide objective data so that interested medical students can make a more informed decision before performing a research fellowship and to serve as a reference for faculty mentors guiding future plastic surgery residency applicants.

## METHODS

For the initial portion of the study, a 20-question survey was constructed to assess applicant demographics, research fellowship characteristics, research productivity, residency match outcomes, and recommendations for future applicants. Applicants to the integrated plastic surgery residency programs at New York University Medical Center, Albany Medical Center, Montefiore Medical Center, and The Ohio State University Medical Center from the 2013 to 2016 application cycles were included in the study. Given the limited number of residency programs and the tendency of applicants to apply broadly, it was assumed that applicants pooled from these institutions would capture the vast majority of applicants to all programs. The study population was then compared to the total number of applicants listed in the National Resident Matching Program charting outcomes data to confirm an adequate representation of the applicant pool.<sup>1</sup> Before distribution of the survey, redundancies were eliminated from applicant lists to prevent multiple responses from an individual applicant. A cover letter with a link to a survey was then sent. Study participants received two reminder e-mails 2 weeks apart. All responses were collected anonymously. Surveys were sent after the match for each respective year.

For the second portion of the study, a 14-question survey was created to determine program director perceptions of the value of research fellowships. Physical copies of the survey were then given out to members of the American Council of Academic Plastic Surgeons at the 2016 Spring

Retreat and Annual Business Meeting (New York, N.Y.).

For outcomes analysis, descriptive statistics such as percentages and averages were calculated. A chi-square test was also performed. Results from both surveys were then compared.

## RESULTS

### Part I: Residency Applicant Responses

#### Applicant Demographics

A total of 198 applicant responses were received, representing a 30 percent response rate (Table 1). Eighty-four percent of respondents matched into an integrated plastic surgery residency program. A significant portion of respondents (25 percent) participated in research fellowships before residency. Of note, 28 percent of these individuals attempted to initially match without a research fellowship (Table 2).

#### Research Fellowship Characteristics

The majority of research fellowships (41 percent) consisted of both basic science and clinical research and were predominantly (87 percent) plastic surgery based. Seventy-two percent of research fellowships were of 1-year duration and were largely (49 percent) initiated following the third year of medical school. Sixty-three percent of respondents completed research fellowships to strengthen applications for residency and were heavily influenced by mentors when deciding whether to participate in a fellowship and selecting where to participate in one.

#### Research Productivity

On average, research fellows were able to publish 5.25 articles per year (Table 3); 5.4 oral presentations and three poster presentations were given each year. Research fellows attended 4.6 meetings per year of fellowship.

#### Residency Match Outcomes

A significantly greater proportion of respondents who participated in research fellowships matched into plastic surgery compared to applicants who did not complete fellowships (97 percent versus 81 percent, respectively;  $p < 0.05$ ) (Table 4). The majority of research fellows (79 percent) did not match at the institution at which the fellowship was performed.

#### Future Recommendations

Research fellows were highly satisfied with their fellowships, with 87 percent stating that the fellowship met their expectations and 89 percent willing to recommend research fellowships

**Table 1. Applicant Demographics**

	Value (%)
Response rate	198 (30)
Are you a plastic surgery resident?	
Yes	166 (84)
No	32 (16)
Are you a Ph.D.?	
Yes	13 (5)
No	185 (95)
Research fellowship before residency?	
Yes	50 (25)
No	148 (75)

**Table 2. Research Fellowship Characteristics**

	Value (%)
Type of research fellowship	
Basic science	61 (31)
Clinical	55 (28)
Both	82 (41)
Plastic surgery–based research fellowship?	
Yes	172 (87)
No	26 (13)
Length of research fellowship	
<1 yr	6 (3)
1 yr	142 (72)
2 yr	24 (13)
3 yr	19 (10)
≥4 yr	6 (3)
Timing of fellowship	
Before medical school	6 (3)
After medical school year 1	0 (0)
After medical school year 2	39 (20)
After medical school year 3	97 (49)
After medical school year 4	56 (28)
How did you decide to participate in a research fellowship?	
Suggestion from mentor	93 (47)
Suggestion from peers	0 (0)
Self-motivated	105 (53)
Why did you do a research fellowship?	
Strengthen application	124 (63)
General interest	74 (37)
How did you find a research fellowship?	
Suggestion from mentor	116 (59)
Suggestion from peers	43 (22)
Internet forum	6 (3)
Institutional website	33 (16)

**Table 3. Research Productivity**

	Value
No. of articles published per year	5.25
No. of meetings at which work was presented per year	4.6
No. of oral presentations per year	5.4
No. of poster presentations per year	2.9

to others (Table 5). Those dissatisfied with the fellowship cited a lack of opportunities at the research institution as the most common reason. Sixty-three percent of respondents stated that research experience is very important when applying to plastic surgery.

**Table 4. Residency Match Outcomes**

	Value (%)
Percentage of research fellows matching into plastic surgery	49 (97)*
Percentage of applicants matching into plastic surgery without research fellowships	119 (81)*
Did you match where you did research fellowship?	
Yes	41 (21)
No	157 (79)

\*Statistically significant difference,  $p < 0.05$ .

**Table 5. Future Recommendations**

	Value (%)
How important is research when applying for plastic surgery?	
Very important	124 (63)
Somewhat important	63 (32)
Not important	0 (0)
Unsure	11 (5)
Would you recommend research fellowships?	
Yes	176 (89)
No	22 (11)
Did you have adequate support from a research mentor?	
Yes	172 (87)
No	26 (13)
Did your research fellowship meet expectations?	
Yes	172 (87)
No	26 (13)
If not, why?	
Not enough time to complete projects	53 (27)
Not enough opportunities at institution	108 (55)
Poor guidance/mentoring	37 (18)

**Part II: American Council of Academic Plastic Surgeons Survey Data**

Fifty-four percent of American Council of Academic Plastic Surgeons active members in attendance at the meeting responded to the survey (Table 6). Sixty-two percent of respondents were program directors and 25 percent of respondents were associate program directors. Program directors of all levels of experience, size of residency programs, and both integrated and independent programs were represented in the study population. Academic performance, followed by letters of recommendation, was ranked as the most important factor when evaluating a residency candidate. When asked on a scale from “not important” to “very important,” two-thirds of American Council of Academic Plastic Surgeons members viewed research experience as “somewhat important.” Only 3 percent of respondents felt that research experience was “not important.” A “productive” research year was defined as three or four publications and presentations per year

**Table 6. American Council of Academic Plastic Surgeons Member Perspectives**

	Value (%)
Response rate	51 (54)
Are you a program director?	
Yes	31 (62)
No	20 (38)
Are you an associate program director?	
Yes	13 (25)
No	38 (75)
How many years have you been a program director?	
0–2 yr	16 (32)
3–4 yr	9 (17)
5–7 yr	4 (8)
8–10 yr	9 (17)
≥10 yr	13 (26)
How many residents do you graduate per year?	
1	10 (20)
2	23 (45)
3	10 (20)
4	5 (9)
≥5	3 (6)
Please rank in order of importance the following items when evaluating a residency applicant (1 = most important)	
Length of residency	1.9
Academic performance	1.54
Research	2.94
Medical school reputation	3.55
How important is an applicant’s research experience to you?	
Very important	16 (31.3)
Somewhat important	34 (66.6)
Not important	1 (2.1)
What do you consider productive with regard to publications?	
0–2	5 (10.2)
3–4	25 (51)
5–6	14 (28.6)
7–8	4 (8.2)
9–10	0 (0)
≥10	1 (2.0)
What do you consider productive with regard to presentations?	
0–2	5 (10.2)
3–4	23 (47)
5–6	16 (32.6)
7–8	3 (6.1)
9–10	0 (0)
≥10	2 (4.1)
Please rank in order of importance the following items (1 = most important)	
Quantity of publications	3.3
Quality of journal of publication	2.29
Type of publication	2.8
Publications in plastic surgery	3.18
Letter of recommendation from research mentor	3.16
Do you assess productivity differently for basic science vs. clinical research?	
Yes	24 (47)
No	27 (53)
Are you more impressed by applicants who have done significant basic science research vs. clinical research?	
Yes	18 (23.6)
No	40 (76.4)
Do you place greater value on research performed in plastic surgery?	
Yes	33 (64.7)
No	15 (35.3)
Do you encourage students to participate in a research year?	
Yes	26 (37.3)
No	32 (62.7)
Do individuals who complete research fellowships match more often than not?	
Yes	18 (35.3)
No	13 (25.4)
Unsure	20 (39.3)

of fellowship. Quality of journal of publication was viewed as most important when reviewing an applicant's research experience. Basic science research and clinical research were viewed equally; however, research in plastic surgery was viewed more favorably. A majority of respondents (63 percent) do not actively encourage students to partake in research fellowships. Most American Council of Academic Plastic Surgeons members (39.3 percent) were uncertain whether individuals who perform research fellowships match more often than not.

## DISCUSSION

Integrated plastic surgery residency remains one of the most competitive residency matches.<sup>1</sup> Based on prior publications, research experience is an important factor when evaluating applicants.<sup>7</sup> As a result, integrated plastic surgery residency candidates often have the highest number of publications and presentations when compared to their peers, and a significant portion are participating in research fellowships. This is the first study of its kind to analyze research fellowships performed before residency from both the applicant and academic faculty member perspectives. By comparing the total number of integrated plastic surgery residents reported in the National Resident Matching Program charting outcomes data from 2013 to 2016 with our study population, we were able to reach out to over 90 percent of the total number of integrated plastic surgery applicants.<sup>1</sup> Our response rate of 30 percent is acceptable by currently published standards for survey studies.<sup>11</sup> In the second portion of our study, we surveyed 54 percent of American Council of Academic Plastic Surgeons members at the 2016 Annual Spring Meeting/Retreat (87 percent of which were either program directors or associate program directors).

Based on our analysis, research fellows are highly satisfied with their research fellowship experience and would recommend it to others. Fellows averaged productivity levels that exceeded the expectations of polled academic faculty. The average number of publications and presentations per year of fellowship was also greater than that of successfully matched applicants as seen in charting outcomes data.<sup>1</sup> Although surveyed residents exhibited high match rates regardless of whether a research fellowship was completed, the match rate for those completing a research fellowship notably exceeded that of those who did not (97 percent versus 81 percent, respectively). Interestingly, only

21 percent of research fellows matched at the institution at which the fellowship was completed. Reasons for this finding include that not all research institutions offer an integrated plastic surgery residency, research fellows may have preferred other institutions, or the fellow may not have been the best overall fit for the program, an important factor for program directors.<sup>12</sup>

Our data also indicated that applicants placed greater emphasis on the importance of research when applying to categorical integrated plastic surgery compared to that expressed by academic faculty members. Approximately 63 percent of applicants stated that research is very important, compared with only 31 percent of polled American Council of Academic Plastic Surgeons members. This heightened perceived importance may be attributable to National Resident Matching Program data demonstrating the highest research productivity among successfully matched applicants in plastic surgery compared with other specialties.<sup>1</sup> Applicants may therefore feel compelled to perform research to have a chance of matching. This is supported by our data, which indicate that 63 percent of research fellows performed a research fellowship to strengthen his or her application, whereas only 37 percent did so out of general interest. This finding is also echoed in a recently published article by Pathipati and Taleghani showing that the majority of medical students taking time off to conduct research did so to increase the competitiveness of their applications.<sup>10</sup>

Although it is important, research alone does not determine a successful match. Several other variables, such as academic performance and letters of recommendation, have consistently ranked as the most regarded aspects of a candidate's application, as also shown in this study.<sup>7</sup> This may explain why 63 percent of American Council of Academic Plastic Surgeons members do not encourage medical students to perform additional supplementary research year(s) because it may not be necessary for an applicant to do so based on the strengths and weaknesses of the overall application. This may also demonstrate why most American Council of Academic Plastic Surgeons members were unsure whether applicants who took time off to conduct research matched more often than not. When specifically evaluating an applicant's research background, American Council of Academic Plastic Surgeons members valued the quality of published research over sheer quantity of publications, and preferred research performed in plastic surgery.

A limitation of this study is that only individuals who applied to the institutions participating in

this study were surveyed. However, when compared to National Resident Matching Program data, only a small number of applicants were not included in the study. Another limitation is that by surveying American Council of Academic Plastic Surgeons members at a particular meeting, our data may reflect the opinion of the specific individuals in attendance and some members who are not intimately involved in the resident selection process. Despite this limitation, our respondents still consisted of 87 percent of either program directors or associate program directors. However, it is unclear how many of these individuals were from the same or different programs. It is also unclear how many of the surveyed American Council of Academic Plastic Surgeons members were from independent-only, independent and integrated, or integrated-only programs. This study may also have been affected by survey bias in which applicants who enjoyed their research fellowships and did well in the match were more likely to respond. This may explain our high match rates and the high rates of productivity and satisfaction by the participants of this study. Plastic surgery residency programs are prohibited from contacting applicants before the match and therefore this survey bias may be unavoidable.<sup>13</sup> A further limitation of the study is that 28 percent of respondents performed research fellowships following medical school and possibly after an unsuccessful match. This group of individuals may exhibit important differences when compared to individuals who performed research fellowships during medical school. Given that recently published data have demonstrated a greater likelihood of matching into integrated plastic surgery residency with a greater number of interview invitations offered, it would be interesting to study whether individuals with research fellowships received more interview offers than those without fellowships.<sup>14,15</sup> It would also be interesting to study whether individuals who did not initially match received more interview offers following the research fellowship.

## CONCLUSIONS

Research fellowships are an excellent way to strengthen one's involvement in the field of plastic surgery. Applicants who performed research fellowships were highly satisfied with their experiences and were able to achieve levels of productivity that exceeded the expectations of academic faculty members and previously matched applicants. Ultimately, applicants with research fellowships significantly increased their chances of landing a coveted integrated plastic surgery

residency position and matched more often than those without research fellowships.

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