Insights From the San Francisco Match Rank List Data

How Many Interviews Does It Take to Match?

Menyoli Michael Malafa, MD, Purushottam A. Nagarkar, MD,* and Jeffrey E. Janis, MD†*

Background: For many years, the independent plastic surgery match has been regarded as a competitive process. Applicants expend significant time and resources applying to, and interviewing with, many programs to increase their chance for success. Public data from the San Francisco (SF) Match provide no predictors of success in the Match. Previous survey-based studies have provided some data, but suffer from recall and sampling bias. The purpose of this study was to provide match participants with objective primary-source data that can aid them in making informed decisions with regard to planning their interviews.

Methods: Four years of fully deidentified individual-level and program-level data from the SF Match (2010–2013) were analyzed. Data included number of programs applied to, interview offers, and length of rank lists. For applicants who matched, data included the applicant's rank of program and the program's rank of applicant.

Results: During the 4 match years, 434 (86.3%) of 503 applicants received at least 1 interview offer. Of these candidates, 355 (82%) matched. Match rate increased with number of interviews, reaching 96% for those with 5 or more interview offers; 95% of applicants matched within their top 7 choices. On average, applicants matched at number 2.9 on their rank lists.

Conclusions: Number of interview invitations is a strong predictor of success in the independent plastic surgery match, with the "magic number" being 5. Applicants rarely match to programs below number 7 on their rank lists. These data can aid applicants wishing to maximize their potential while minimizing unnecessary expenditures.

Key Words: San Francisco match, SF match, plastic surgery match, independent match, independent plastic surgery

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Before the advent of the National Residency Match Program (NRMP) in the 1950s, the residency application process was an asynchronous process, forcing both programs and applicants into early decisions with limited information.[1] The Match was designed to fairly pair applicants and programs in a more structured manner. During the subsequent decades, matching systems were put in place for several medical and surgical fellowships. In general, the various match processes provide applicants an opportunity to fairly evaluate training programs and vice versa, and they guarantee an ideal outcome for all participants.[2] Although this represents a significant improvement over the previous ad hoc process, applicants often expend a significant amount of time, money, and energy to succeed in the Match. The application process can cost thousands of dollars in the form of application fees, travel, and lodging costs. Further, interviews require time that is borrowed from an already labor-intensive schedule. Although students in the fourth year of medical school are generally able to accommodate this rigorous schedule, the time requirement is far more burdensome for fellowship ("independent") applicants who are actively and intricately involved with clinical duties in their categorical residencies.

For some time now, Plastic Surgery has been regarded as one of the most competitive surgical specialties. Integrated Plastic Surgery applicants continue to face a highly competitive process despite an increasing number of positions offered each year through the NRMP match.[3] On the other hand, match rates for independent applicants [who apply through the San Francisco Match ("SF Match")] have increased significantly during the last half decade.[4] Although this higher match rate may be somewhat reassuring, it is insufficient for guiding individual applicants who each have a unique probability of matching. The purpose of this study is to examine raw individual-level data from the SF Match to determine whether the likelihood of matching and the expected rank at which applicants match can be predicted. Such accurate data will improve the ability of independent Plastic Surgery Match applicants to plan for the interview process and set realistic expectations of the probability of success.

We hypothesize that a higher number of interview invitations predict a higher likelihood of matching, and that most successful applicants, regardless of the number of interviews received/attended, match near the top of their rank list.

METHODS

Institutional review board approval was not required for this study as it did not meet the definition of human subject research. Data requested and received were completely deidentified and did not involve any intervention or interaction with the individuals and institutions involved.

Five years of deidentified rank list and application data were formally requested from the NRMP and the SF Match. The NRMP denied our request, responding with their policy that "individual level data, even de-identified, will not be released, especially when it concerns the rank order list." We received 4 years of fully deidentified data from the SF Match (match years 2010 through 2013). No individually identifiable information about applicants or programs was available to us—all participants were identified by random, unique, alphanumeric codes.

Data included the match year in which the applicant participated, number of programs applied to, number of interviews offered, length of rank list, and whether applicant matched. For each matching applicant, data also included the applicant's rank of the matched program and the program's rank of the matched applicant.

Data were organized and statistical analyses carried out using a spreadsheet software program (Excel; Microsoft Corp, Redmond, Wash). Applicants who registered with SF Match but did not file a rank list were excluded from the analysis. Similarly, programs that registered with SF Match but were not offering any resident positions were excluded from the analysis. Applicant ranks on program rank lists were normalized based on the number of positions offered by the program

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From the *Department of Plastic Surgery, University of Texas Southwestern Medical Center at Dallas, Dallas, TX; and †Department of Plastic Surgery, Ohio State University Wexner Medical Center, Columbus, OH.

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Reprints: Jeffrey E. Janis, MD, Department of Plastic Surgery, Ohio State University Wexner Medical Center, 915 Olentangy River Rd, Suite 2100, Room 2114, Columbus, OH 43212. E-mail: Jeffrey.janis@osumc.edu.

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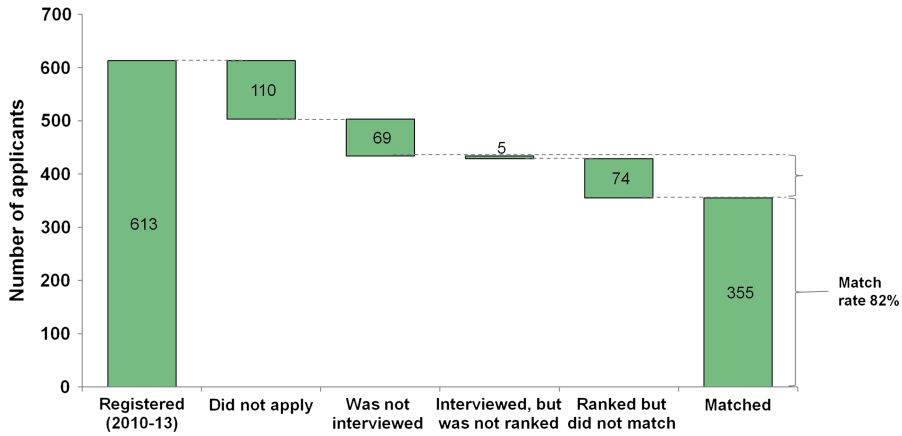

FIGURE 1. SF Match registered applicants 2010 to 2013. ''Match rate'' refers to the percentage of interviewed applicants (''potential candidates'') that matched.

[program rank of applicant (PRA)]. For example, any resident who was "ranked to match" by a program had a normalized PRA of 1 or lower and so on. This allowed comparative analysis of program ranks of matched applicants. Means were used to summarize the categorical data. χ^2 analysis was used to compare match success rates between different applicant subgroups. Unpaired *t* tests were used to compare means between subgroups. A value of $P < 0.05$ was considered significant. Linear regression analysis was used to evaluate the relationship between the number of interview invitations and the match probability and applicant rank of matched program.

RESULTS

During the 4 match periods from 2010 to 2013, 503 individuals submitted at least 1 application through the Plastic Surgery SF Match, and 434 of these individuals received at least 1 interview offer. Of these candidates, 355 successfully matched, for an overall match rate of 82%. The number of applicants and match rate were not significantly different between the different match periods (Fig. 1). Potential candidates (those receiving at least 1 interview invitation) applied to a mean of 37.6 programs and received 8.4 interviews; however, these numbers varied significantly between matched and unmatched applicants (Fig. 2, matched vs unmatched applicants, $P < 0.0001$). On average, successful applicants matched at number 2.9 on their rank lists (range, 1–15; standard deviation, 2.4) and had a normalized rank by the matching program of 3.5 (range, 0.25–21; standard deviation, 3.1).

Number of Interviews Offered, Match Rate, and Rank List Position

Match success rate was analyzed based on number of interviews offered. The match rate rose from 33% for those receiving 1 or 2 interview offers (group 1), to 59% for those with 3 or 4 offers (group 2). Applicants with 5 or more interview offers (group 3) had a 96% match rate. These values were statistically significant (group 1 vs 2, $P = 0.02$; group 2 vs 3, $P < 0.0001$). Applicants in the 3 groups matched

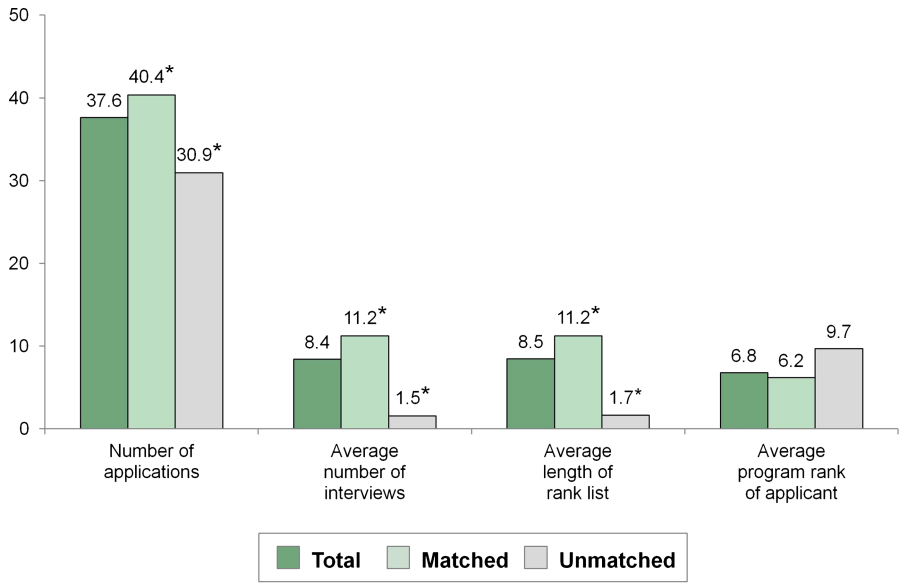

FIGURE 2. Average number of applications, interview offers, length of rank list, and PRA for potential candidates (*statistically significant).

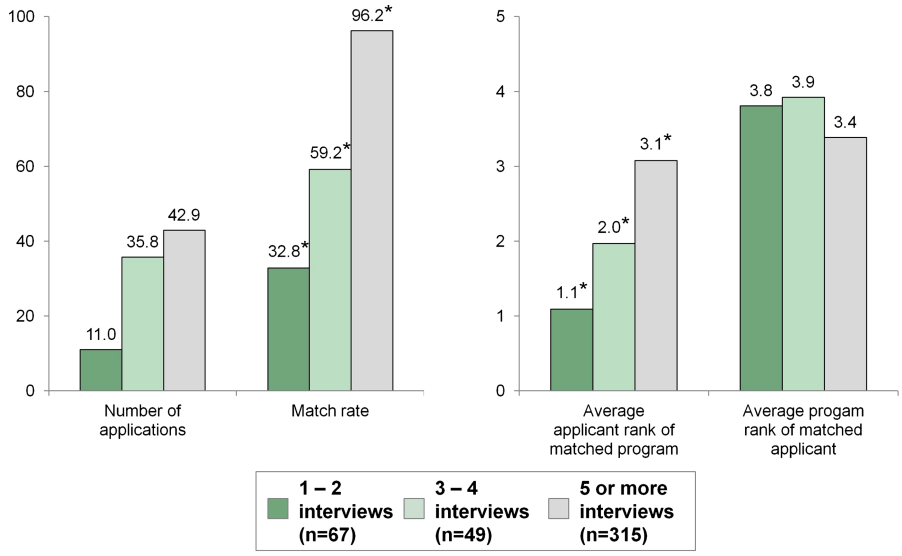

FIGURE 3. Number of applications and match rate for applicants grouped by number of interview invitations (left). Average rank of matched program and average PRA for matched applicants grouped by number of interview invitations (right) (*statistically significant).

at a mean position of 1.1, 2.0, and 3.1 on their respective rank lists (group 1 vs 2, $P = 0.0006$; group 2 vs 3, $P = 0.018$), and had a mean normalized PRA of 3.8, 3.9, and 3.4 ($P > 0.05$) (Fig. 3). We also analyzed the rank of the matched program as a percentage of the total length of the rank list (relative match rank). Applicants in these 3 groups matched at a mean relative match rank of 91%, 53%, and 26%.

Most applicants (71%) matched within their top 3 choices, and almost all (95%) matched within their top 7 choices (Fig. 4). In the 4 years analyzed, there were only 17 applicants who matched outside their top 7 choices (3, 7, 4, and 3 applicants in 2010, 2011, 2012, and 2013, respectively), or an average of 4 in each year. The number of interview invitations was positively correlated with both the match probability ($R^2 = 0.72$, $P < 0.001$) and the applicant rank of the matched program ($R^2 = 0.70$, $P < 0.001$) (Fig. 5). The number of interview offers did increase with the number of applications submitted (Fig. 3, left); however, the correlation between match rate and the number of applications submitted was much weaker ($R^2 = 0.37$) (Fig. 6).

DISCUSSION

In recent years, the independent Plastic Surgery match has seen a decline in competitiveness, with a match rate that has increased from 50% between 2004 and 2008 to 80% between 2009 and 2013.[4] However, this group-level statistic has no ability to guide individual applicants. Unfortunately, beyond the aggregate data published by SF Match, there are very few other data available to an applicant that can help guide him or her during the application process. In the absence of individual-level data, and given the high stakes involved, it is no surprise that applicants to the Plastic Surgery match are willing to expend significant time and money in an effort to maximize their odds of success.

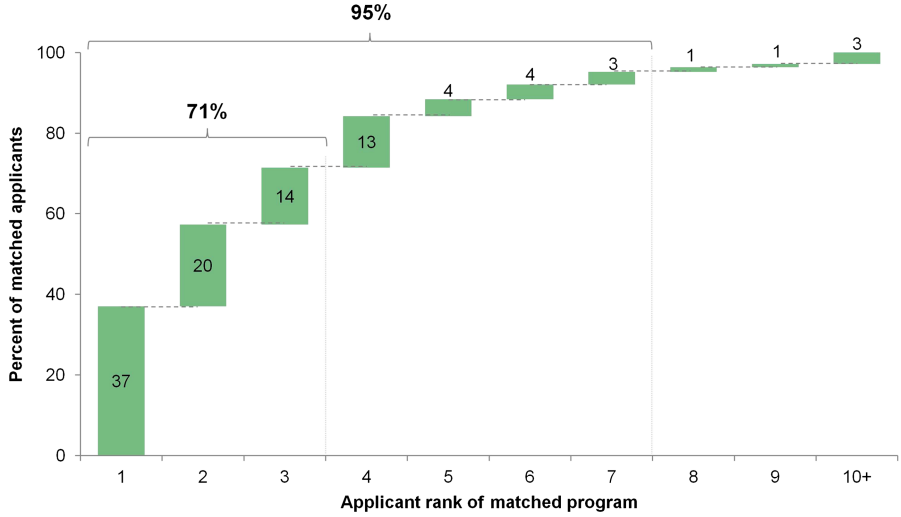

FIGURE 4. Percentage of matched applicants versus applicant rank of matched program.

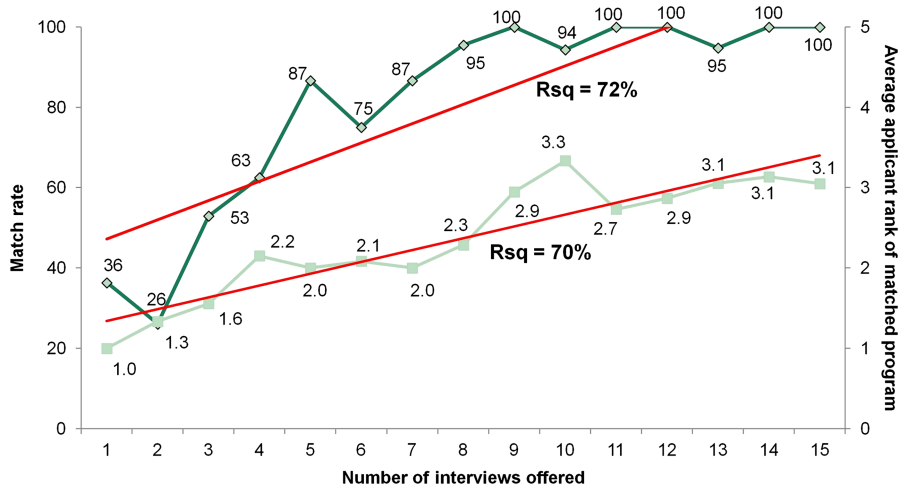

FIGURE 5. Relationship between number of interviews offered and match rate, and average applicant rank of matched program.

Before this study, the only available individual-level data came from survey-based studies. Harper et al[5] conducted a survey of applicants to the independent Plastic Surgery match over 3 match years (2006–2008), with a 29% response rate. They found a steady increase in the match rate after 5 interviews were attended, and that applicants attending 13 or more interviews had a 100% match rate. They also found that matched applicants, on average, received 13.6 interview invitations, attended 10.02 interviews, and, on average, matched to number 2.5 on their rank list. Nearly two thirds of successful matchers spent more than $4000 on the process. These data suggest that many applicants attend more interviews and spend more money than what is required to achieve match success. However, survey-based data are subject to recall and sampling bias, thereby limiting the ability of this study in guiding applicants.

Our study found that the likelihood of matching increased with the number of interview invitations (Fig. 5). We identified 3 subgroups of potential candidates with a statistically significant difference in match rates based on the number of interviews offered. In our analysis, we found that the likelihood of matching was 96% for applicants with 5 or more interview invitations. This conclusion is unsurprising, as one expects stronger applicants to have more interview offers and a higher rate of match success. Of note, we did find that submitting more applications was strongly correlated with receiving more interview offers, and weakly correlated with match rate.

Beyond confirming number of interview invitations to be a good predictor of match success, one of the goals of this study was to find out where successful applicants match (ie, at what position on their rank lists applicants matched). Such information would be useful for applicants deciding how many interviews to attend to maximize success while minimizing unnecessary expenditure of time and money. We hypothesized that most applicants matched high on their rank lists and overestimated the number of interviews they needed to attend. Our study found that the average successful applicant matched within the top 3 programs on their rank lists (median, 2; average, 2.86; range, 1–15; SD, 2.38). The number of interviews offered was positively correlated with the average applicant rank of the matched program (Fig. 5). This likely reflects the fact that highly competitive applicants will tend to compete against each other for the most desirable programs, resulting in a few applicants who have to go relatively further down their rank lists to match. In other words, there may still be a larger number of highly competitive applicants than there are highly desirable residency positions. Nevertheless, 80% of applicants with 5 or

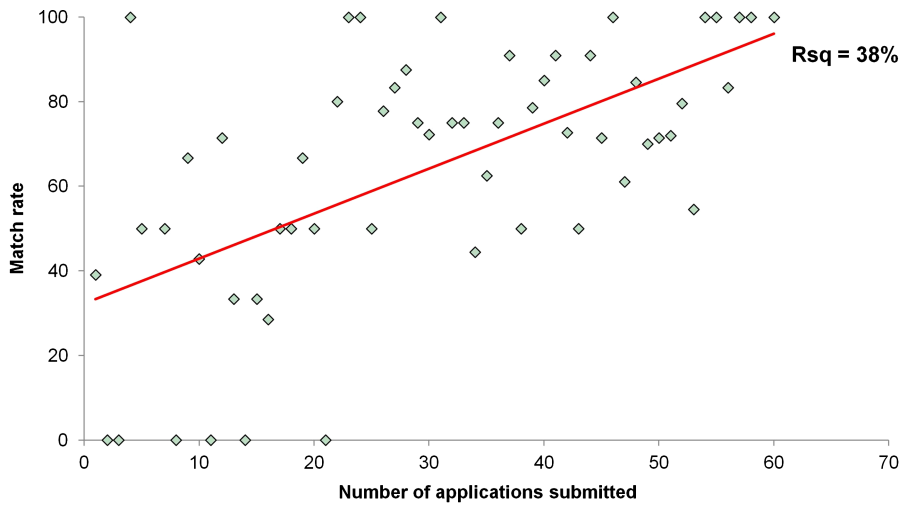

FIGURE 6. Relationship between number of applications submitted and match rate.

more interviews matched within the top half of their rank lists, and 94% within their top 7 choices, regardless of number of interviews offered.

One interpretation of these data is that an applicant is best served by applying to a large number of programs. However, having done so, any applicant who is offered 5 or more interviews can rest assured that he/she is very competitive, and has an "almost" guarantee (96%) of matching somewhere. Further, most of these competitive applicants are attending more interviews than they need, since only 17 applicants matched outside their top 7 choices during the 4-year period in question, whereas the average number of interviews attended by those who were offered 5 or more was 12.5.

The power of this study lies in its use of the most recent data to evaluate the current state of the match and provide an up-to-date snapshot of the field. In addition, our data are derived not from surveys, but directly from raw SF Match data. It, nevertheless, suffers from several limitations. First, our study is limited by a lack of access to NRMP data regarding integrated Plastic Surgery applicants. Second, while we have presented strong evidence that applicants can, in general, be successful in the independent Plastic Surgery match while attending fewer interviews than they have in the past, it must be noted that the stakes are high enough that an applicant approaching the process may consider it entirely worthwhile to "waste" some resources just to have a wider safety net. After all, there were 3 applicants in our data set who were offered more than 10 interviews and still did not match. Statistics may be cold comfort—surely these applicants wish they had been offered and attended a few more interviews.

Finally, the suggestion that applicants can safely cut down the number of interviews they attend, or the programs they rank, is predicated on the assumption that an applicant can predict the position of a program on his rank list before attending the interview. At the very least, an applicant needs to be able to predict whether a program is likely to fall within his top 7 choices. However, the interview is as much an opportunity for applicants to assess programs as vice versa. Therefore, it is always possible that by refusing an interview that an applicant believes will fall outside his top 7, he/she is in fact refusing a program that he would have ended up ranking very highly. A take home point from this, though, is that applying to a program and spending resources interviewing at a program are two different entities. Applying to a program (and getting accepted for an interview) can help the applicant roughly gauge their relative stature in the applicant pool, and with the data presented previously, can give them a sense for their chances of matching into a residency program. However, the decision on whether to actually interview at a program, and therefore spend the time and money, remains an individual decision based on the "cost-benefit" ratio and risk aversion personality of the applicant.

CONCLUSIONS

Those applying into Plastic Surgery through the SF Match face a competitive process. Receiving 5 or more interview offers is an excellent predictor of success, with a 96% match rate for this group. Most applicants (71%), regardless of number of interview invitations, match within the top 3 programs on their rank lists, and there were only 4 applicants on average who matched outside their top 7 choices in each match year. Nevertheless, candidates should make sure they rank enough programs to back up their top picks, especially if their top picks are highly competitive programs. These data can aid independent Plastic Surgery applicants in maximizing their potential to match while minimizing unnecessary expenditures.

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