Influence of Interviewer Number on Applicant Rank Position

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Introduction

Interview performance for both residency and fellowship applicants is consistently cited by program directors across multiple specialties to be one of the most important factors affecting an applicant's chances of matching at a particular institution (1-6). Often, a large number of interviewers are involved because a larger group may more effectively reduce the impact of outlier scores and perception bias when discussing applicants. On the other hand, having too few interviewers can lead to a situation where one interview proves detrimental for an applicant due to the strong influence of outliers in a small sample size (7, 8). Additionally, interviews themselves typically require significant time and resource investment on behalf of the institution (9, 10). Thus, the primary purpose of this study was to retrospectively examine how having fewer interviewers involved in the residency application process might have changed applicant interview scores and the eventual rank list position at our institution.

Another common concern among residency applicants relates to the timing of their interview session and whether or not this will impact how they are ranked by an institution. Therefore, we secondarily sought to determine if the timing of the interview sessions and potential interviewer decision fatigue impacted interview scores.

Methods

This was a retrospective exploratory study of interview scores for 77 orthopedic residency program candidates (pre-existing in a completely redacted form) for the 2016-2017 application cycle. Each applicant was individually scored by the same 16 interviewers using a previously described semi-structured interview methodology (11). Completion of all interviews required four sessions over the course of two days.

Each individual interviewer assigns applicants an overall score ranging from one to six (1 = exceptional candidate, 6 = interviewer had strong concerns). After all interviews are completed, the 16 interview scores are averaged to produce a final, overall interview score for a given applicant; this score can be ordered in a rank list of interview scores from highest to lowest for all candidates.

In order to determine how having fewer interviewers might have changed interview scores, we modelled the ranges of scores that a candidate could have received if a random sample of the 16 original interview scores was instead used to determine an applicant's final interview score. Random sample sizes of interview scores ranged from 15 interviewers down to just 2 interviewers. For each applicant, each unique combination of scores was then compared to the average score from the original set of 16 interviewers. The highest/lowest possible average interview score for each applicant based on these combinations of scores was also calculated. Those averages were then used to determine the highest/lowest possible rank that the applicant could have achieved based on the original interview score rank list. This was a ranked list of applicants based solely on their interview scores. From there, the absolute distance that the applicant could have risen or fallen in this rank list was determined. A significance threshold of $p < 0.05$ was used for all tests.

Results

Sequential reduction in the number of interviews included for comparison to an applicant's original interview scores revealed few differences across all possible combinations (Table 1). It was, however, found that applicants could move considerable distances with large reductions in the number of interviews conducted (Figure 1) when the average scores were used as a basis for generating an initial post-interview rank list. For combinations composed of 15 scores, top applicants rarely moved more than a few spots in the rank list, but with two and three-score combinations, the top applicants could fall as much as 50 or 60 places in the interview score rank list.

There was no difference for any individual interviewer and the scores he or she assigned across the four interview sessions (Table 2), nor was there a difference collectively for the interview scores assigned across the sessions (p=0.345). Additionally, the session during which an applicant was interviewed did not affect where he or she placed in the interview score rank list (p=0.931; model could not be rejected, p=0.523).

Table 1. Number of significantly different interview score combinations across all applicants

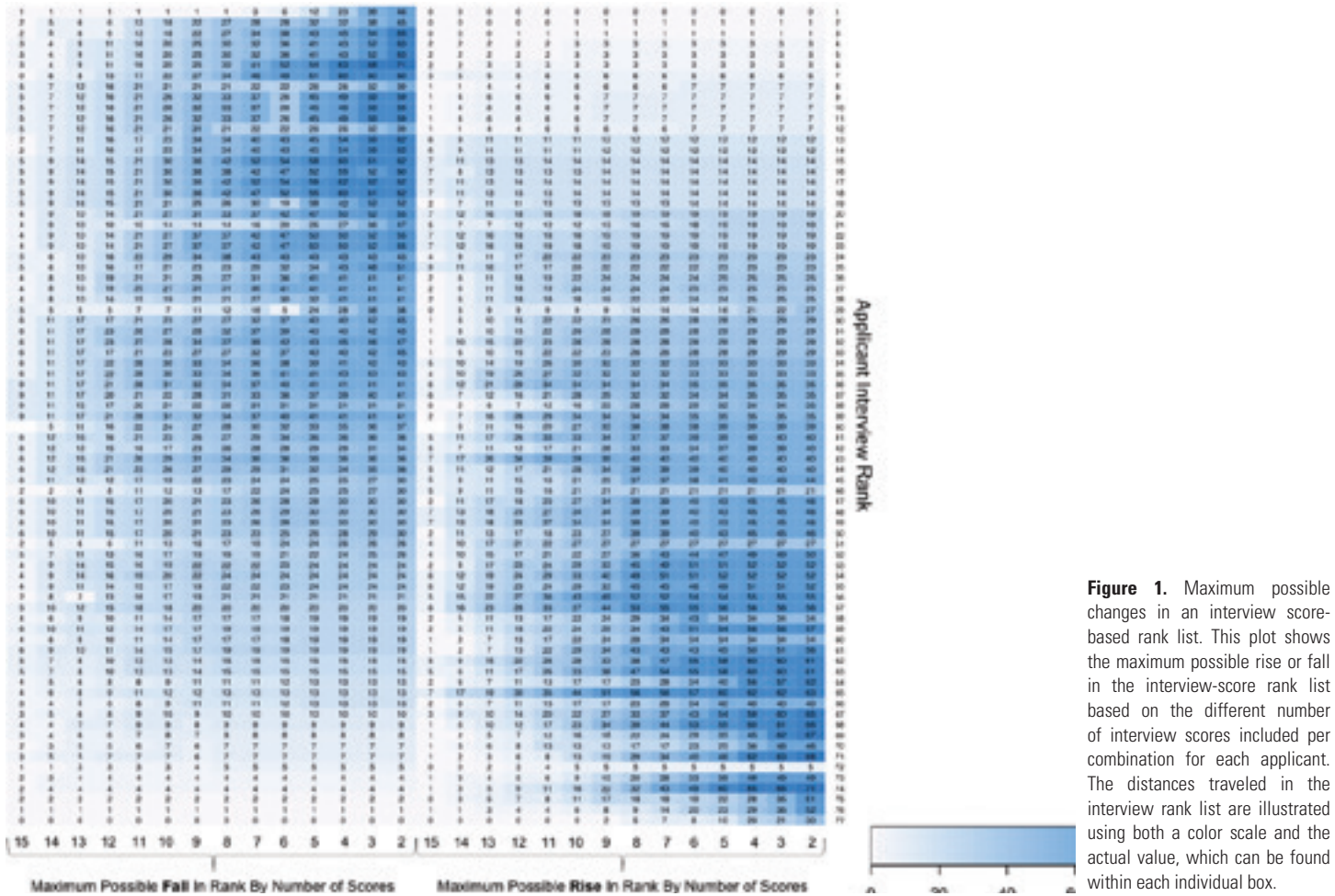| Number of Interviews	Combination	Number of combinations per applicant	Number of total possible combinations	Number of significant combinations	Percent significant (%)	Average Increase in Rank	Average Decrease in Rank
15	16 choose 15	16	1,216	0	0	4.3	3.3
14	16 choose 14	120	9,135	0	0	7.3	7.1
13	16 choose 13	560	42,665	0	0	10.2	10.7
12	16 choose 12	1,820	138,775	0	0	12.8	14.1
11	16 choose 11	4,368	333,333	0	0	16.0	16.6
10	16 choose 10	8,008	611,611	0	0	18.6	19.3
9	16 choose 9	11,440	874,445	0	0	21.6	21.6
8	16 choose 8	12,870	984,555	0	0	23.1	24.7
7	16 choose 7	11,440	875,875	63	0.007	25.8	26.1
6	16 choose 6	8,008	613,613	376	0.061	27.0	27.7
5	16 choose 5	4,368	334,971	261	0.078	29.6	29.0
4	16 choose 4	1,820	139,685	392	0.281	31.3	30.9
3	16 choose 3	560	43,015	164	0.381	33.5	31.5
2	16 choose 2	120	9,225	0	0	35.1	32.8
Total	---	65,518	5,012,119	1,256	0.025	---	---

Figure 1. Maximum possible changes in an interview score-based rank list. This plot shows the maximum possible rise or fall in the interview-score rank list based on the different number of interview scores included per combination for each applicant. The distances traveled in the interview rank list are illustrated using both a color scale and the actual value, which can be found within each individual box.

Maximum Possible **Fall** In Rank By Number of Scores

Maximum Possible **Rise** In Rank By Number of Scores

Table 2. The effect of interview session on scores assigned by the interviewers

Interviewer	P value
1	0.147
2	0.142
3	0.653
4	0.729
5	0.284
6	0.240
7	0.288
8	0.262
9	0.310
10	0.645
11	0.295
12	0.689
13	0.095
14	0.871
15	0.134
16	0.108
Overall	0.345

Discussion

The results of this study demonstrate that changes in the number of interviewers would not lead to many different interview score averages for applicants. However, an applicant's post-interview rank was observed to undergo progressively larger magnitude changes with fewer interviewers due to the effects of outlier scores. While decreasing the number of interviewers would allow for a reduction in the total time and resource investment by an institution, residency selection committees must keep in the mind the increased variability that a small number of interviews may infuse into the rank order as fewer interviews are conducted.

Our data also show that none of our interviewers experienced decision fatigue, with consistent interview scores assigned across the different sessions. This suggests that our semi-structured interview format is working as intended to ensure consistent evaluation of residency candidates across a large number of applicants (11).

Residency applicants may also take solace in the fact that our study demonstrates that the timing of an interview will not impact the interview scores they receive (12). The residency application process is already stressful, and our work shows that applicants need not worry too greatly about how the interview date impacts their chances of matching to a dream residency program.

The main limitation of this study was the study design as we are generating large theoretical combinations from a small sample size in each calculation. However, we feel that the broad differences in program application formats actually warrants these types of studies to better understand the implications and consequences of our methods over time.

Conclusions

Our study demonstrated that reductions in the number of interviewers for residency programs is unlikely to statistically change the average interview scores, but that greater reductions in the number of interviewers can cause increasingly large changes in such scores and, therefore, strongly influence a score-based rank list. We also show that the timing of an applicant's interview likely does not affect perception or scoring by a residency program.

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