

# The Orthopaedic Sports Medicine Fellowship Application Process: An Analysis of the Applicant Experience



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**Purpose:** To evaluate the process of applying to orthopaedic sports medicine fellowships from the applicant's perspective, with a focus on number of program applications, interviews, interview day importance, and financial burden. **Methods:** An anonymous electronic survey was distributed to all orthopaedic surgery residents who applied to orthopaedic sports medicine fellowships in the United States in 2016 and 2017. The survey contained 26 questions, with 10 pertaining to applicant demographics, accolades, and examination scores. A follow up e-mail was distributed at 2 and 4 weeks to increase participation. **Results:** The survey was distributed to 453 sports medicine fellowship applicants; 148 (34.1%) completed the survey. Of the respondents, 130 (87.8%) were male and 18 (12.2%) were female. When analyzing United States Medical Licensing Examination scores, respondents who scored above a 251 on Step 2 CK were more likely to receive more than 20 interviews compared with those who scored lower ( $P = .013$ ). Previous collegiate or professional athlete status did not influence the number of interviews received. In total, 94 of 147 (64.0%) respondents applied to more than 20 programs, and 73 respondents (49.7%) attended between 11 and 15 interviews. The majority of respondents spent between \$4001 and \$6000 (49; 33.1%) throughout the application process. Interaction with faculty and case volume/complexity were the most important factors in ranking programs. **Conclusions:** The majority of orthopaedic surgery residents pursue at least 1 year of fellowship training following residency, with sports medicine being one of the most popular specialties. The application process for sports medicine fellowships is complex, competitive, and a financial burden for applicants. Most applicants apply to more than 20 programs, spend between \$4000 and \$6,000 over the course of the application process, and value faculty interaction and case volume/complexity over other factors associated with a program. **Clinical Relevance:** As other surgical fellowships have detailed their application process from the applicant's perspective, there remains a need for increased transparency of the sports medicine fellowship application in order to offer additional insight and guidance for future applicants.

The majority of orthopaedic surgery residents pursue at least 1 year of fellowship training following graduation from residency. A recent study demonstrated that 90% of orthopaedic residents pursue fellowship training.<sup>1</sup> A separate study found that 91% of orthopaedic

surgeons pursued fellowship training in 2011, which is up from 59% in 2008.<sup>2</sup> There are several reasons cited for the increase in specialization within orthopaedics, including residents seeking opportunities to fill training voids, pursue intellectual curiosities, prestige, or even for financial

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incentives.<sup>1,3</sup> The trend to pursue fellowship training mirrors the orthopaedic job market, which in recent years has reflected a steady increase in positions geared specifically for fellowship-trained orthopaedic surgeons, from 52.2% in 2004 compared with 68.2% in 2009.<sup>3</sup> These studies also illustrate the shrinking job market for orthopaedic generalists. As of 2009, generalists only made up 31% of all orthopaedic job opportunities, which is why many orthopaedic residents elect to pursue fellowship training.<sup>3</sup> Among the 9 orthopaedic subspecialties with fellowships, sports medicine continues to offer the largest number of positions (219). This is met with the greatest number of applicants per year, with roughly 245 applicants each cycle.<sup>1</sup> Although Baweja et al.<sup>4</sup> worked to understand established institutional guidelines for assessing sports medicine fellowship applicants, others, such as Yayac et al.,<sup>5</sup> illustrated the barriers to accessing information pertaining to orthopaedic sports medicine fellowship programs online. There remains a need for increased transparency of the sports medicine fellowship application process itself, with a focus on the applicant's experience.

Surveys have been used to evaluate the fellowship application process in a variety of surgical specialties, including pediatrics, pediatric otolaryngology, and laryngology.<sup>6</sup> These studies have elucidated key findings that help guide fellowship applicants in their respective fields. For instance, a study by Chun et al.<sup>6</sup> demonstrated that location and faculty reputation were the 2 most important factors for selecting a pediatric otolaryngology fellowship. Moreover, in a study by Niesen et al.,<sup>7</sup> which evaluated all orthopaedic residents pursuing fellowships, the authors found that applicants value operative experience, autonomy, and fellowship staff and place less emphasis on research opportunities and salary. While these are just a few of the many data points applicants could be using to evaluate sports medicine fellowship programs, the financial and logistical burdens surrounding the fellowship application further complicate the process. These burdens often are navigated with limited insight and guidance.<sup>4</sup> The purpose of this study was to evaluate the process of applying to orthopaedic sports medicine fellowships from the applicant's perspective, with a focus on number of program applications, interviews, interview day importance, and financial burden. We hypothesize that the orthopaedic sports medicine fellowship application experience is a financial burden to applicants and that applicants value case volume more than any other factor when choosing a fellowship program.

## Methods

Following approval from the institutional review board at the senior author's institution, an anonymous electronic survey was distributed using Survey Monkey (SurveyMonkey Inc., San Mateo, CA) to all

orthopaedic surgery residents who applied to orthopaedic sports medicine fellowships in the United States in 2016 and 2017. The list for all potential participants was obtained from the American Orthopaedic Society for Sports Medicine. The survey contained a total of 26 questions, with 10 questions pertaining to applicant demographics, accolades, and exam scores. Sixteen questions pertained directly to the sports medicine fellowship application process. The complete list of questions included in the survey can be found in [Table 1](#). After initial distribution, a follow-up e-mail was sent at 2 and 4 weeks to encourage more participation. Descriptive statistics was used to analyze the data. Applicant demographics, athlete status and United States Medical Licensing Examination (USMLE) scores were tested against the number of programs an applicant applied to and the number of interviews they were offered. For each of the associations, the  $\chi^2$  test was used. Any value of  $<.05$  was considered statistically significant.

## Results

The survey was distributed to all 453 sports medicine fellowship applicants between 2016 and 2017; however, 19 messages were returned as undeliverable, leaving 434 potential recipients. A total of 150 applicants started the survey, but 2 of them completed less than 50% of the questions and therefore were excluded from analysis. This resulted in a total of 148 (34.1%) completed surveys.

### Sex

Of the 148 respondents who completed more than 50% of the survey, 18 (12.2%) were female. Of these female respondents, 11 (61.1%) were either collegiate or professional athletes, in comparison with 49 (37.7%) of the male respondents ( $P = .0579$ ). Eleven (61.1%) of the female respondents applied to more than 20 programs compared with 83 (64.3%) of the male respondents. No significant association was identified between female sex and applying to more than 20 programs ( $P = .0715$ ). Four female (2.7%) respondents received more than 20 interviews in comparison with 16 male respondents (10.8%), which was not statistically significant ( $P = .2677$ ).

### Geographic Region of Residency

At least 1 respondent was from an orthopaedic residency program in each geographic region of the United States. The regions with the most respondents were the Northeast – Middle Atlantic (NJ, NY, PA, MD) region, with 34 (23.0%) respondents and the Midwest – East North Central (IN, IL, MI, OH, WI, WV) region, with 32 (21.6%) respondents. Each of the other regions had less than a total of 14 respondents and are depicted in [Table 2](#).

**Table 1.** Complete List of Survey Questions

Q1	What is Your sex?
Q2	In what geographic region of the country is your residency program located?
Q3	What was your Step 1 score?
Q4	What was your Step 2 CK score?
Q5	Were you elected to AOA during medical school?
Q6	Were you a collegiate or professional athlete?
Q7	Did you take a year off to do research before or while in medical school?
Q8	Did you take a year off to do research during residency?
Q9	Do you have any other graduate degrees?
Q10	When did you decide that you wanted to specialize in sports medicine?
Q11	Did you apply for a sports medicine fellowship more than once?
Q12	How many sports medicine fellowship programs did you apply to in the year that you matched?
Q13	How many fellowship interviews were you offered during the year you matched?
Q14	How many interview invitations did you accept?
Q15	How much money on average did you spend attending each interview (i.e., including accommodations, travel expenses, food)?
Q16	What is your best estimate of the total cost for your interview expenses (including application fees, travel, food, lodging, etc.) for all the interviews that you attended?
Q17	In total, how many days of residency work did you miss because of interviews?
Q18	How many sports medicine fellowship programs did you rank?
Q19	How many programs did you contact after applying, but before receiving an interview, to express interest?
Q20	How many people, including yourself, were monitoring your e-mail account for interview offers?
Q21	If applicable, what were the main reasons for turning down interview offers?
Q22	How many programs solicited their rank or requested to be ranked first from you?
Q23	How important of a factor were the following in forming your impression of a program? (see Table 4)
Q24	How many programs did you tell were ranked number one?
Q25	How many total programs did you contact after interview day to express interest?
Q26	How many programs contacted you after interview day to express interest or ask if you had any remaining questions?

AOA, Alpha Omega Alpha.

### United States Medical Licensing Examinations

Respondents were asked to record the scores obtained on USMLE Step 1 and Step 2 examinations. A summary of the score breakdown is shown in Fig 1. Using the  $\chi^2$  test, respondents who scored greater than 251 on Step 1 and Step 2 CK were compared with those who scored lower. No significant results were seen when comparing USMLE Step 1 or Step 2 CK scores with the number of programs to which respondents applied. The association between Step 1 and Step 2 CK score and number of interviews offered also was evaluated. No significant association was identified between Step 1 score and interviews offered. Those who scored greater than a 251 on Step 2 CK were significantly more likely to receive more than 11 interviews than those who scored lower ( $P = .009$ ). When specifically looking at those respondents who received more than 20 interviews, scoring above a 251 on Step 2 CK was also found to be statistically significant ( $P = .013$ ). No other statistical significance was seen with any range of Step 2 CK score and number of interviews offered.

### Alpha Omega Alpha

A total of 147 respondents answered the question regarding their Alpha Omega Alpha (AOA) status during medical school; however, 25 of the respondents noted that their medical school did not have AOA. Of the 122 respondents who did have AOA at their medical school, 39 (32.0%) were elected to join.

### Athlete Status

All of the respondents answered the question about whether they were a collegiate or professional athlete. In total, 57 of the 148 respondents (38.5%) were collegiate athletes and 3 (2.0%) were professional athletes. There was no significant association between being a collegiate or professional athlete and the number of programs to which an applicant applied ( $P = .95$ ) or number of interviews offered ( $P = 1.0$ ).

### When in Career They Decided on Sports Medicine

The majority of respondents reported that they decided on pursuing a career in sports medicine during their third year of orthopaedic residency (54 respondents [36.5%]) with the second most common response being during their second year of residency (21 respondents [14.2%]). Interestingly, the third most common response was before college (20 [13.5%]).

### Number of Times Applying

A total of 143 respondents (96.6%) were accepted into a sports medicine fellowship on their first attempt, with only 5 (3.4%) respondents having to apply more than once.

### Number of Applications, Interviews Offered, Programs Applied, and Time Taken Off

In total, 94 of 147 (64.0%) respondents applied to more than 20 programs, and 24 (16.3%) applied to 16

**Table 2.** Demographics of Respondents

Geographic Region of Residency	Number of Respondents	Female	Male	College Athlete	Professional Athlete	Not an Athlete
Northeast – New England (CT, ME, MA, NH, RI, VT)	12	1	11	8	0	4
Northeast – Middle Atlantic (NJ, NY, PA, MD)	34	4	30	17	2	15
Midwest – East North Central (IN, IL, MI, OH, WI, WV)	32	2	30	7	0	25
Midwest – West North Central (IA, KS, MN, MO, NE, ND, SD)	7	2	5	5	1	1
South – South Atlantic (DE, DC, FL, GA, NC, SC, VA)	14	0	14	2	0	12
South – East South Central (AL, KY, MS, TN)	7	0	7	2	0	5
South – West South Central (AR, LA, OK, TX)	10	1	9	2	0	8
West – Mountain (AZ, CO, ID, NM, MT, UT, NV, WY)	5	1	4	4	0	1
West – Pacific (AK, CA, HI, OR, WA)	21	6	15	9	0	12

to 20 programs. In total, 45 (31.0%) were offered 11 to 15 interviews, whereas only 20 (13.8%) respondents received more than 20 interview invitations. A total of 73 respondents (49.7%) attended between 11 and 15 interviews, 53 (36.0%) attended between 6 and 10, and 19 (12.9%) attended between 1 and 5. Only 1 (0.7%) respondent attended 16 to 20 and 1 (0.7%) attended more than 20 interviews.

When asked about the total number of residency days missed to attend interviews, the majority of respondents (73; 49.3%) reported missing between 8 and 12 days. Four (2.7%) respondents reported missing between 21 and 30 days. The lowest number of days missed was 0, which was reported by 6 (4.0%) respondents.

A total of 114 (77.6%) respondents reported turning down interview offers during their application cycle. The main reason cited was that it directly overlapped with another interview

(105; 71.4%). A variety of other reasons were reported, including a loss of interest in the program (46; 31.3%), lack of financial resources (32; 21.8%), inability to get time off (23; 15.7%), already reaching the goal number of interviews (2; 1.4%), having too many interviews (1; 0.7%), receiving the interview offer too late (1; 0.7%) and having reservations about

the location (1; 0.7%). A summary of reasons for declining interviews can be seen in [Table 3](#).

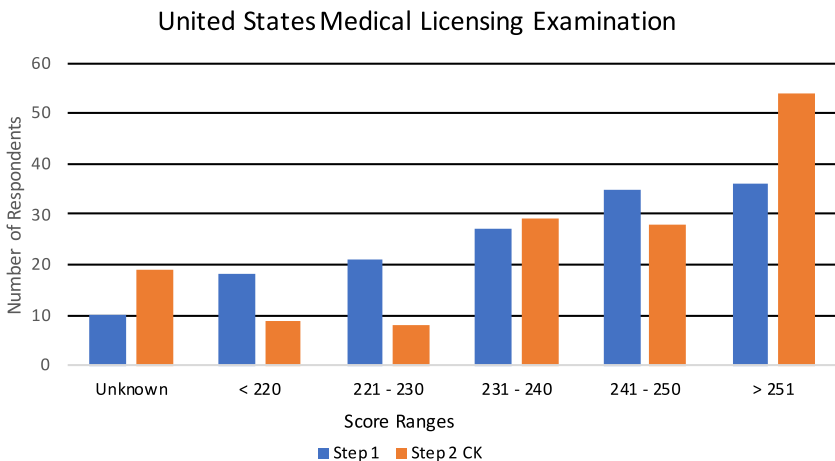
**Cost**

A total of 32 (21.6%) respondents reported spending more than \$601 per interview, 37 (25.0%) between \$501 and \$600, 31 (20.9%) between \$401 and \$500, and 27 (18.2%) between \$301 and \$400. When asked about total cost of all interviews combined, the majority of respondents reported spending between \$4001 and \$6000 (49; 33.1%) and 40 (27.0%) spent between \$2001 and \$4000.

**Number of Programs Ranked and Contacted After Applying**

The most common number of programs ranked was 10-11 (36; 24.3%), followed by 12-13 (25; 16.9%), and 8-9 (24; 16.2%). Only 2 (1.4%) respondents ranked more than 16 programs and 7 (4.7%) ranked between 1-2 programs.

When asked about contact with programs after applying, but before receiving an interview, 89 respondents (60.1%) reported that they did not contact any programs, whereas 53 (35.8%) reported contacting between 1 and 5 programs. Four (2.7%) respondents reported contacting between 6 and 10 programs, 2 (1.4%)



**Fig 1.** USMLE Step 1 and Step 2 CK score breakdown. (USMLE, United States Medical Licensing Examination.)

**Table 3.** Respondent Reasons for Declining Interview Offers

Reason for Declining Interview	Number of Respondents	Percent of Respondents
Overlapped with another interview	105	71.4
Loss of interest in program	46	31.3
Lack of financial resources	32	21.8
Inability to get time off	23	15.7
Already received goal number of interviews	2	1.4
Having too many interviews	1	0.7
Receiving interview offer late	1	0.7
Reservations about location	1	0.7

respondents contacted between 11 and 15 programs, and no one reported contacting more than 15 programs.

### E-mail Monitoring

The vast majority of respondents only monitored their e-mail for interview requests themselves (137; 92.6%), whereas 11 (7.4%) reported having at least one other person monitoring their e-mail in addition to themselves.

### Impression of the Program

Respondents were asked to rank whether specific factors were “not important, slightly important, important, very important or extremely important.” In total, 86 (61.4%) respondents reported that their interaction with faculty during interview day was “extremely important.” Case volume and complexity was the next factor considered to be “extremely important” (64 respondents; 46.0%). A summary of respondent’s impressions of the program can be seen in Fig 2, and a description of the factors asked to each respondent can be seen in Table 4.

### Contact After Interview

Respondents were asked to report both how many programs they contacted after their interview and how many programs contacted them after their interview. A total of 84 respondents (56.8%) reported contacting between 1 and 5 programs after the interview, whereas 59 (39.9%) reported not contacting any programs. Only 31 respondents (21.0%) reported being contacted by 1 to 5 programs, 1 respondent (0.7%) reported being contacted by 6 to 10 programs, and the rest (116; 78.4%) were not contacted by any programs after their interview.

## Discussion

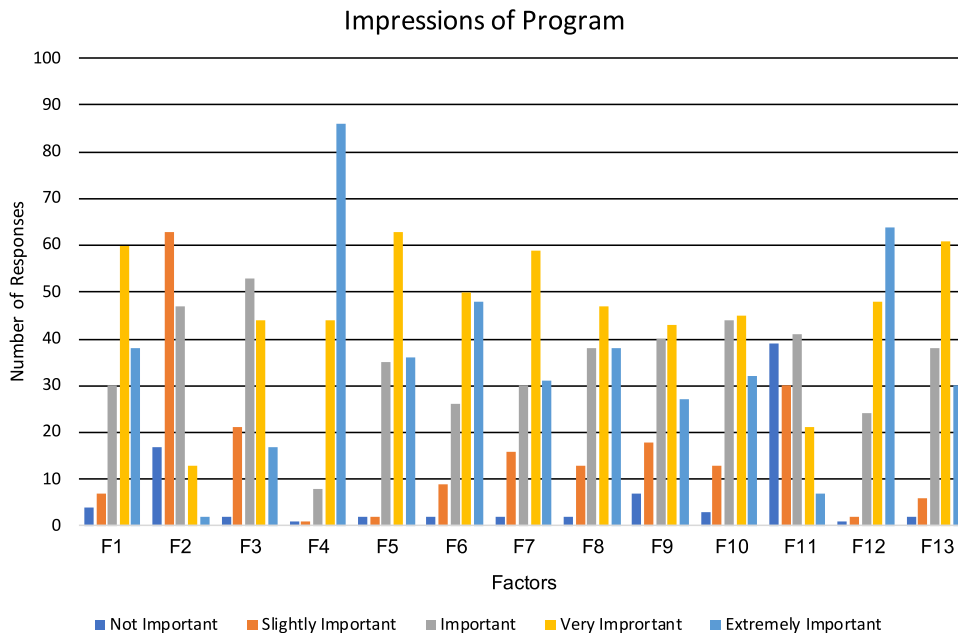
The vast majority of respondents (94; 64.0%) applied to more than 20 sports medicine fellowships in the year they were accepted to a program. However, most of the respondents (45, 31.0%) only received between 11 and 15 interviews. The only predictor of receiving more interviews that was found to be

significant in our study was an applicant’s Step 2 CK score. Applicants who scored greater than 251 on Step 2 CK were more likely to receive more than 20 interviews ( $P = .013$ ) compared with those who scored lower on this examination. Other factors including Step 1 score, sex, or athlete status were not significantly associated with receiving more interviews. Applicants considered faculty interaction, case volume, and complexity as the most important factors for selecting a sports medicine fellowship with the opportunity to conduct research being the least important factor.

Application to more than 20 programs is not uncommon for any resident applying to surgical fellowship programs. Watson et al.<sup>8</sup> found that 38.9% of general surgery residents applied to more than 20 fellowship programs and 35.2% attended between 8 and 12 interviews. A greater number of orthopaedic residents seem to apply to more than 20 sports medicine fellowships on average than general surgery residents applying to fellowships (64.0% vs 38.9%); however, sports medicine applicants received a similar number of interviews (31.0% received 11 and 15 interviews), indicating that sports medicine fellowships are very competitive.

Communication between the applicant and sports medicine fellowship programs both before and after the interview was not extensive in the application process. Only 59 respondents (39.9%) contacted at least 1 institution to express interest before receiving an interview. After completion of the interview, this number increased to 89 (60.1%); however, only 32 respondents (21.6%) reported being contacted by an institution after the interview to express interest in the applicant or ask if they had any remaining questions. This may not be unusual with regards to orthopaedic fellowship programs in general. Meals and Osterman<sup>9</sup> surveyed hand surgery fellowship applicants and fellowship program directors to determine expectations, logistics, and costs relevant to the hand surgery fellowship application process. They found that 88% of program directors reported not contacting applicants after the interview to express interest in an applicant. The lack of postinterview communication is not surprising, as both the SF match and the National Resident Matching Program discourage unnecessary postinterview communication between program directors and applicants.

When we investigated the financial cost of the application process, sports medicine fellowship applicants seem to spend a similar amount compared with residents applying for other surgical fellowships. Watson et al.<sup>8</sup> found that 62.3% of general surgery residents spent more than \$4000 during the interview process (including travel, lodging, etc.) with 21.7% spending more than \$8000. For the pediatric surgery



**Fig 2.** Respondents' impression of the program. Interaction with faculty on day of interview and case volume complexity were considered to be "extremely important" by respondents.

fellowship, Beres et al.<sup>10</sup> found that the total average cost for applicants was \$8821. Interestingly, they also found a significant difference in average application cost between those who matched and those who did not, \$10,320 versus \$6,520 ( $P = .025$ ). Finally, applicants to hand surgery fellowships reported spending between \$2500 and \$5000 on interview related travel expenses.<sup>9</sup> These numbers are all similar to the findings of our study, which showed that most applicants spent between \$4001 and \$6000 over the course of the interview process. Financial burden must be taken into consideration by applicants when deciding on the number of programs to apply to. In our study, 32 respondents (21.8%) reported turning down at least 1 interview due to lack of financial resources. Given the financial burden of the application process, discussion of alternative options to conduct interviews is warranted. A possible alternative that could decrease the

cost would be to hold all interviews at annual meetings such as the American Orthopaedic Society for Sports Medicine or the American Academy of Orthopaedic Surgeons. Another alternative could be holding interviews at agreed-on regional sites where multiple programs would host joint interview sessions. Finally, fellowship programs may pivot to virtual interviews in the future, as this is the requirement for the 2020-2021 application cycle.

It has been previously reported that orthopaedic residents value operative experience, autonomy, and fellowship staff and find less value in research opportunities when ranking orthopaedic surgery fellowships.<sup>7</sup> This is corroborated by our study, which demonstrated that applicants valued their interaction with the faculty, case volume, and complexity more than any other factors. In addition, the factor that was found to be least important in our study was the opportunity to conduct research, with 39 respondents (28.3%) indicating this was "not at all important" in their decision-making. In 2018, Ramkumar et al.<sup>11</sup> surveyed medical students applying to orthopaedic residency to describe the application process from the applicant's perspective. The authors found that research potential was the least important factor for applicants when determining their rank order. This suggests that applicants perform research to improve their competitiveness, but may not actually value the research itself, a trend that may continue through residency into fellowship training.

### Limitations

There are several limitations to this study. The sample size is relatively small, with only 34.1% (148/434) of the applicant pool being represented from the years

**Table 4.** Factors Asked About the Impression of the Program

F1	The Convenience of the Interview day
F2	The tour given during interview day
F3	The organization during interview day
F4	Your interaction with the faculty during interview day
F5	Your interview sessions during interview day
F6	The fellow-faculty interaction during interview day
F7	Location of program
F8	Perceived reputation of program
F9	Reputation of faculty (e.g., number of publications and experience)
F10	Your interaction with current fellows
F11	The opportunity to do research
F12	Case volume and complexity
F13	The interview day experience

2016-2017. Of the 148 respondents, not every respondent completed all of the questions. A number of respondents failed to rank the importance of certain factors on their impression of a sports medicine fellowship program. In addition, the design of our survey may not have included every aspect of the sports medicine fellowship application process that is important to applicants. Finally, this study may be impacted by recall bias as applicants may not remember their impressions from the application cycle and many did not remember certain aspects of their application (e.g., Step 1 or Step 2 CK scores).

### Conclusions

The majority of orthopaedic surgery residents pursue at least 1 year of fellowship training following residency, with sports medicine being one of the most popular specialties. The application process for sports medicine fellowships is complex, competitive, and a financial burden for applicants. Most applicants apply to more than 20 programs, spend between \$4000 and \$6000 over the course of the application process, and value faculty interaction and case volume/complexity over other factors associated with a program.

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