Medical Education

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Examining differences in trends in the orthopedic surgery match for osteopathic and allopathic medical graduates after the transition to single accreditation

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Abstract

Context: The landscape of medical education in the United States has undergone significant changes, particularly with the rise of osteopathic medical students, constituting a substantial portion of medical school entrants. The merger of the Accreditation Council for Graduate Medical Education (ACGME) and the American Osteopathic Association (AOA) in 2020 opened residency slots to allopathic graduates that were previously historically allocated to osteopathic (Doctor of Osteopathic Medicine [DO]) physicians. This has impacted various medical specialties, notably orthopedic surgery. Despite an increase in orthopedic surgery applicants, the match rates for DO candidates have faced challenges, raising concerns about the impact of this merger on the future of orthopedic training for DO students.

Objectives: This research aims to analyze the trends in orthopedic surgery match rates for DO vs MD applicants since the single accreditation merger, which began in 2015 with a 5-year transition period that was finalized by 2020. By examining factors such as application numbers, research output, standardized test scores, and program director preferences, the study seeks to identify disparities and challenges faced by DO applicants in securing orthopedic surgery residencies.

Methods: This study utilized publicly available data from the National Residency Match Program (NRMP) 2018, 2020, and 2022 reports. Data encompassed applicant characteristics, including standardized test scores, research experiences, and match outcomes. The study also incorporated insights from NRMP program director surveys, focusing on interview and ranking practices. The analysis involved comparisons of application numbers, match rates, research productivity, and test scores between DO and MD applicants. Statistical analysis was employed to identify any statistically significant differences among the examined variables for the 3 years included in the study.

Results: The research revealed a consistent increase in orthopedic surgery applicants from both DO and MD backgrounds. However, MD applicants consistently had higher match rates compared to their DO counterparts, with the gap narrowing over the years. Notably, disparities persisted in research output, with MD applicants demonstrating a significant advantage in publications and presentations. Standardized test scores, although slightly higher for MD applicants, did not significantly impact the differences in match rates. MD applicants had statistically significantly higher numbers of applicants (P = .0010), number of publications (P = .0091), and number of research experiences (P = .0216) over the years examined. However, there was no statistically significant difference in the scores on Step 1 (P = .5038) or Step 2 (P = .4714) between MD and DO candidates.

Conclusions: Despite progress in the acceptance and ranking of DO applicants by program directors, the study highlights enduring challenges in orthopedic surgery match rates between DO and MD candidates. The lack of research opportunities for DO students stands out as a crucial area for improvement, necessitating systemic changes within medical education. Addressing this disparity and ensuring equal access to research experiences could mitigate the gap in match rates, promoting a more equitable environment for all aspiring orthopedic surgeons, regardless of their medical background. Such efforts are vital to fostering inclusivity and enhancing opportunities for osteopathic medical students pursuing competitive specialties like orthopedic surgery.

Keywords: graduate medical education; NRMP; orthopedic surgery; osteopathic medicine; residency; residency match
Osteopathic medical students now make up 1 in every 4 medical students in the United States. With new osteopathic medical schools continuing to open, the number of osteopathic medical graduates (Doctors of Osteopathic Medicine [DOs]) will continue to increase in the coming years [1, 2]. Historically, DO graduates utilized the American Osteopathic Association (AOA) match to acquire residency positions [3]. However, in 2015, a 5-year transition to a single match began. In 2020, the merger between the Accreditation Council for Graduate Medical Education (ACGME) was completed [4]. One of the consequences of this merger was the opening of residency slots to allopathic graduates (MDs) that were traditionally restricted to DO graduates. The transition has influenced match rates throughout all specialties but has had a significant impact on several of the more competitive surgical subspecialties [5]. Orthopedic surgery has consistently remained among the most difficult specialties to match into and has seen a recent increase in the number of applicants. The total number of applicants almost doubled between 2003 and 2022 from 830 to 1,460. This led to an associated decrease in the overall match rate from 70 % in 2003 to 59.5 % in 2022 [6]. This trend needs to be addressed in order to ensure that DO applicants remain competitive for the match in orthopedic surgery and other surgical subspecialties.

The National Residency Match Program (NRMP) administers a program director survey each year to examine and identify the factors that are emphasized in deciding to interview and rank applicants. Results of the 2022 survey showed that program directors in orthopedic surgery programs receive on average 742 applications but only rank an average of 51 applicants. In regard to DO applicants specifically, only 37 % of surveyed program directors stated that they frequently interviewed DO students. Conversely, 22 % of respondents said that they never interview and never rank applicants from osteopathic medical schools. Additionally, 68 % of orthopedic surgery program directors indicated that they required a target score on the United States Medical Licensing Exam (USMLE) Step 1. This is not a test that has been historically taken by DO applicants because the Comprehensive Osteopathic Medical Licensing Examination (COMLEX) is the test required for graduation from an osteopathic medical college [7]. Although Step 1 of the USMLE is now pass-fail rather than scored, the findings of this survey underscore the biases remaining in orthopedic surgery residencies that increase the obstacles present for DO students to successfully match [8]. The difficulty of matching into orthopedic surgery for DO applicants has been highlighted in another survey sent to program directors in 2022. Results of the survey showed that 37.8 % of programs surveyed were not currently training an osteopathic physician [9].

Another issue facing DO applicants when applying to orthopedic surgery residency is the accessibility to research opportunities. Research output in orthopedic surgery resident applicants quadrupled between 2003 and 2022 from an average of three publications to an average of 14 publications, respectively. Over the study period, the average number of reported research publications increased in DO applicants from 4.0 to 7.0 and in MD applicants from 11.5 to 16.5 [6]. Access to research opportunities can be difficult for osteopathic medical students; one recent survey found that only 12 % of research at osteopathic medical colleges received outside funding [10]. Additionally, 76.8 % of DO students felt that they had encountered significant barriers to obtaining research opportunities [11]. In 2022, MD applicants averaged 6.6 research experiences compared to just 4.0 research experiences for DO applicants. Given the importance of research output for matching into surgical subspecialties such as orthopedic surgery, this will likely continue to be another impediment for DO students in navigating a successful orthopedic match. This paper examines the differences in the trends in orthopedic surgery match rates for DO vs. MD applicants since the single accreditation merger transition began in 2015. The authors hypothesized that MD candidates would match at higher rates in each of the examined years when compared to DO applicants.

Methods

This study was conducted with the use of publicly available data collected and published by the NRMP in the 2018, 2020, and 2022 Charting Outcomes in the Match reports for both allopathic and osteopathic seniors. Data were originally collected from the main residency match program.

The original data utilized in this study were gathered from student applications in the Main Residency Match. The data included information on factors such as match outcome, specialty preference, and ranking. Additionally, self-reported student background information, including COMLEX and USMLE scores, publications and presentations, and research experiences, was considered. The accuracy of the board scores was verified by the students’ medical schools, with high intercorrelation coefficients observed. Microsoft Excel was utilized to visualize and compare the extracted data. Statistical analysis was accomplished by performing unpaired t tests to examine the differences in applicant type, match rate, publication number, research experience, and test scores.

Results

Analysis of the raw number of applicants showed continued increases in the applications received from both DO and MD applicants (Figure 1). The largest jump in applicants occurred for DO candidates from 2018 to 2020, with a greater
than tenfold increase from 17 in 2018 to 172 in 2020 [12, 13]. However, this is likely partially explained by 36 formerly AOA accredited programs that transitioned to ACGME accreditation during the intervening 2 years [14]. Aside from this anomaly, the remainder of the data showed a steady increase in the number of both MD and DO applicants from 2018 to 2022. In each year examined, there were more MD applicants and successfully matched MD candidates compared to prospective DO candidates [13, 15, 16]. When comparing the number of applicants by applicant type, there was a statistically significant difference, with an average of 922 MD seniors applying per year compared to an average of 128 DO applicants (p=0.0010).

Examination of the match rates from 2018, 2020, and 2022 showed considerable differences in match rates between DO and MD applicants in each year (Figure 2). The most pronounced difference was observed in 2018, with a difference of 58.9%. This disparity likely reflects the fact that the 2018 match cycle took place prior to many of the historically AOA accredited programs transitioning to ACGME accreditation. This likely led to both a lower number of DO applicants and a similarly lower percentage of matched DO applicants. The differences in match rates in 2020 and 2022 revealed 14.6 and 9.5% higher percentage of matching into orthopedic surgery for MD applicants in 2020 and 2022, respectively. This shows that although seniors from allopathic medical schools continue to match at higher rates than their osteopathic counterparts, the magnitude of difference is decreasing. On analysis, the average match rate over the 3-year period for DOs was 48.3%, which was lower than the average match rate of MD seniors (75.96%) but failed to reach statistical significance (p=0.1129).

Reported rates of research are also showing trends of increasing numbers of research experiences as well as abstracts, publications, and presentations for both DO and MD applicants (Figure 3). Although MD applicants had far more research experiences as well as reported abstracts, publications, and presentations in each of the examined years, both groups have increased their reported research output. However, MD applicants have demonstrated a greater increase in publications and research experience, leading to a larger gap between the two groups. The number of reported research experiences among matched DO applicants increased from an average of 2.7 in 2018 to an
average of 4.0 in 2022. Similarly, there was in increase in research experiences by MD applicants from 4.9 in 2018 to 6.6 in 2022. In the case of abstracts, publications, and presentations, DO applicants had an increased average reported value from 4.0 to 7.0 over the time frame evaluated. Likewise, there was a comparable increase from an average of 11.5–16.5 reported by MD candidates from 2018 to 2022. Analysis of research experience and publications were found to be significantly higher on average in the MD group. The average number of research publications were 5.9 and 14.1 for DO and MD candidates, respectively (p=0.0091). Similarly, DO applicants averaged 3.3 research experiences compared to the MD average of 5.63 (p=0.0216).

The analysis of test scores in successfully matched applicants revealed more modest discrepancies between DO and MD candidates (Figure 4). In each of the examined years, both DO and MD applicants scored higher than the reported average on the USMLE Step 1 and Step 2 examinations [17]. Seniors from allopathic schools outscored DO seniors on the USMLE Step 1 in 2020 and 2022 by an average difference of 6 points and 5 points, respectively. However, DO seniors outscored MD applicants by an average of 4 points on the Step 1 examination in 2018. Similar trends were found upon examination of the USMLE Step 2 scores. Allopathic seniors achieved higher scores than osteopathic applicants in each year but only outscored them by 6 points, 5 points, and 6 points in 2018, 2020, and 2022, respectively. Of note, the score discrepancies fell within one standard deviation for all of the years analyzed for both the USMLE Step 1 and Step 2 examinations. Scores on both examinations have remained relatively constant throughout the analyzed years for both osteopathic seniors and allopathic seniors and thus may have not had a significant impact on differences in match rates. There was no statistically significant difference between test scores between DO students and MD students for either Step 1 or Step 2 in the examined years. The average Step 1 score was 245.7 for DO applicants and 248.0 for MD applicants (p=0.5038). Similarly, on Step 2, DO students averaged 249.7, whereas MD students averaged 255.3 (p=0.4714).

**Discussion**

Surgical subspecialties remain competitive and frequently have lower match rates when compared to many of the nonprocedural medical specialties. Orthopedic surgery has consistently remained among the most competitive specialties, and recent evaluation has shown an upward trend in the competitive index when match results were analyzed from 2004 to 2021 [6]. This increase in competitiveness has affected both DO and MD graduates’ ability to successfully obtain an orthopedic residency position. Since the single accreditation, DO graduates have continued to match at lower rates than their MD colleagues in all surgical subspecialties. This has remained true in orthopedic surgery when the match results are analyzed and compared since the single accreditation occurred. There are promising findings present in the increased percentage of program directors that interview and rank DO applicants across the time period analyzed in this study. In 2018, only 33% of surveyed program directors interviewed DO applicants. This increased to 70 and 78% in 2020 and 2022, respectively. A similar trend was observed in the percentage of program directors who stated that they ranked DO applicants. The survey in 2018 found that only 28% of program directors ranked osteopathic students, whereas 79 and 78% ranked osteopathic students in 2020 and 2022 [18, 19]. While this represents progress, there are fewer programs that give consideration to applicants from osteopathic schools when compared to allopathic schools, which is reflected in the continued lower match rates of DO students into orthopedic surgery residency.

There are many factors that may contribute to the lower match rates in orthopedic surgery of DO students when compared to MD students. One of the factors that may play a significant role is the relative lack of home orthopedic surgery residency programs associated with osteopathic medical schools when compared to allopathic schools. As of 2021, only six osteopathic medical schools had an associated home orthopedic residency program [19]. The importance of having a home program was recently highlighted by a paper published in the Journal of the American Osteopathic Association (JAOA) that showed that approximately 28.2% of orthopedic residency slots were filled by home program students [20]. Without a home orthopedic surgery program, most DO students must arrange multiple away rotations to increase their odds of a successful match. A study published in the Journal of Bone and Joint Surgery (JBJS) found that fourth-year medical students completed an average of four away audition orthopedic surgery rotations [21]. Previous studies have found that doing an away rotation increases an individual student’s odds of matching in that program over 1.5-fold [22]. Further compounding this issue is the disparity in opportunities for away rotations for osteopathic medical students when compared to students studying at allopathic schools. A cross-sectional analysis published in JBJS in 2022 found that 8.3% of orthopedic surgery programs prohibited student rotators from an osteopathic medical school. Additionally, 2.6% of programs reported having a higher rotation cost for osteopathic medical students than allopathic medical students [23]. These factors likely play a contributory role into
increasing the difficulties for osteopathic medical students to match into an already competitive specialty such as orthopedic surgery. Although these factors have likely remained the same and not contributed to any trends seen in the study time frame, they do continue to provide some rationalization for potential future issues because the number of applicants continues to increase without a similar increase in the number of residency slots offered.

One area that continues to be an area of interest in the evolution of the match process is standardized testing. As of January 26, 2022, the USMLE Step 1 has now transitioned to a pass-fail examination, and neither applicants nor programs will receive a numerical score [24]. Likewise, as of May 10, 2022, the COMLEX abandoned utilizing a numerical score in favor of a pass-fail system [25]. The elimination of this previously heavily weighted objective measure may lead to changes in the methodology utilized by program directors both for offering interviews and ranking potential applicants. This could actually represent a potential challenge to DO applicants because the USMLE Step 1 score provided a standardized score for leveling the playing field in the match [26]. This is evidenced by the fact that Step 1 scores of matched applicants were similar in both DO and MD applicants throughout the period of study. Results of the program director survey did show that the number of programs that consider COMLEX scores increased over the study period. The number of programs that considered COMLEX Level 1 scores increased from 19% in 2018 to 81% in 2022 [18, 19]. However, this still pales in comparison to the 97% of programs that considered USMLE test results per the program director survey. A recent study found that among DO students applying for all surgical subspecialties after the single accreditation, the greatest predictor for a successful match was the numerical score on COMLEX Level 2 and USMLE Step 2 [27]. If this trend continues, and a greater emphasis is placed onto Step 2 scores, DO students may face further difficulties requiring them to take both Step 1 and Step 2 in order to remain competitive. At minimum, this represents a financial disparity for many DO students who may find themselves paying for four sets of standardized tests prior to completing the application cycle.

The most glaring difference identified between MD and DO applicants to orthopedic surgery programs since the single accreditation merger remains the difference in the number of research publications and presentations. Access to research opportunities remains limited when compared to students in allopathic schools. This is evidenced by a cross-sectional survey performed in 2022 that found that only 40.7% of current osteopathic medical students were involved in some form of research. Perhaps more troubling, of the students involved in research, only 25.6% were able to obtain the research experience through their school [11]. This means that many DO students are forced to look outside of their institution to identify possible research opportunities. Additionally, most formerly AOA-accredited programs can be found at community hospitals, which tend to have significantly lower access to public research funding when compared to Academic Medical Centers (AMCs) [20, 28]. This can lead to a trickle-down effect in which residents and medical students affiliated with osteopathic training are in a position of disadvantage with a disparate opportunity to engage in publicly funded research projects.

In contrast to the AOA, the ACGME has historically emphasized AMC training and pushed for heavy research participation [29]. With the ACGME focus on research responsibilities, there may be an unintended consequence of bias toward programs housed at AMC as opposed to those at community hospitals, which could disproportionately affect DO applicants. With the importance placed on research participation by program directors of competitive residency programs in general and specifically orthopedic surgery residency programs, there needs to be a systemic and sustained effort to provide greater opportunities for osteopathic medical students to participate in research.

There are several limitations to this study because the data relied upon is provided only by students that elect to participate in NRMP data collection. Additionally, the first year included in the study only encompassed 19 osteopathic medical students and took place during the 2018 match cycle. At that time, the AOA still held a separate match, and it is likely that the majority of osteopathic medical students applying to orthopedic surgery programs participated in the AOA match. Thus, the results examined likely were not representative of osteopathic medical students as a whole for that year.

### Conclusions

Since the single accreditation merger, osteopathic applicants have continued to match into orthopedic surgery residency at lower rates when compared to allopathic medical students. Although there has been a relative increase in the match percentage from 2018 to 2022, there is still a significant gap in the match rates for DO applicants when compared to MD applicants. Although the majority of characteristics are similar between matched applicants regardless of degree type, there continues to be a significant lack of research for DO applicants. This may need to be addressed at a systemic level to reduce the disparity between osteopathic and allopathic match rates.
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