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Identifying factors influencing orthodontic residency program selection

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Abstract

Purpose: The desirability of Orthodontic Residency remains high today relative to the past 30 years. This investigation seeks to re-assess factors influencing Orthodontic Residency program selection amidst contemporary challenges and changes, including increasing student debt, reduced residency stipends, and shifting practice models.

Methods: This mixed-methods study consisted of interviews (qualitative) and surveys (quantitative). Fifteen final-year dental students and first-year orthodontic residents were interviewed one-on-one following a topic guide and then transcripts were analyzed using MAXQDA2022 to identify values, factors, and influences related to program selection and ranking. Qualitative findings and previous studies provided the basis for a survey distributed to residency applicants in 2020–22. Data were analyzed with bivariate and descriptive statistics with stratification by debt group.

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Results: Interviews ($N=15$) elevated the importance of location, interview experience, program cost, and clinical education. Surveys ($N=239$) identified the most desirable factors for program selection: satisfied residents, strong clinical training with multiple techniques, good interview impressions, low cost, high patient numbers, a strong reputation, and good clinical facilities with new technology. Less desirable factors include programs that are hospital-based, certificate-only, research-intensive and require considerable after-hours work.

Conclusions: Clinical education and interview experiences are key for residency selection, consistent with prior studies, though program cost has grown in importance. Findings can help guide orthodontic programs in recruiting applicants and suggest a need to limit educational costs.

Keywords

career choices; debt; tuition; education; educational debt; mixed methods; program selection; residency

Introduction

Over the past three decades, the ability of orthodontic programs across the US and Canada to attract highly competitive candidates to one of the 76 CODA-accredited orthodontic programs has not waned.¹ To fill approximately 350 positions within the 61 programs participating in the Match, orthodontic programs showcase various factors including the quality of their faculty, breadth and diversity of their treatment approaches, research opportunities, and the length and cost of attendance.¹ With the exception of a few dental residencies that offer stipends, orthodontics is among the advanced training programs that charge tuition and offer minimal to no stipend.² Tuition costs of orthodontic programs range from \$0 USD per year to \$140,000 USD; in-state tuition, scholarships, and stipends contribute to more modest costs while high private school tuition bills may exceed the \$100,000 mark.^{3,4}

Orthodontic residents are a part of the larger “student debt crisis,” contributing to the educational debt that surpassed \$1.7 trillion in recent decades.^{5–7} From 2010–2018, the percentage of residents with debt greater than \$400,000 more than doubled (15% to 33%).⁸ Additionally, a 2016 report showed that 71.4% of residents had \$200,000 of dental school debt and 44.4% had \$200,000 debt from residency.⁹ The increasing debt from college and dental school coincides with and is compounded by, residency tuition increases and reductions in programs offering stipends and fellowships.^{2,10}

This burden of debt significantly affects orthodontic residents, particularly their ability to repay loans and pursue practice ownership.¹¹ A 2016 study by the American Association of Orthodontics found that 84% of newly graduated orthodontists aspire to practice ownership, but over 70% felt constrained by their loans.¹² Additionally, the high costs associated with applying to and attending orthodontic programs might act as a barrier, favoring those from wealthier socioeconomic backgrounds and advantaged racial and cultural identities, potentially contributing to the underrepresentation of certain minority groups.^{13–19}

Historically, finances were secondary in applicants' ranking of residency programs. Keith and Proffit (1992) explored the relative influence of factors on applicants' residency ranking and found that less than half (43.4%) of residents considered cost the most important.²⁰ In 2003, cost was ranked most important by a quarter (25.6%) of residents.²¹ In 2006, Lindauer et al. reported that residents ranked financial considerations as being neutral.²² The authors hypothesized that finances might become more critical in the future as program funding decreases and cost increases, but a study conducted in 2010 found only 6% of respondents considered tuition/stipend to be most important in program selection — a considerable decrease compared to 25.6% in 2003.^{21,23}

With the rapidly changing landscape in orthodontics, including the rise in corporate dentistry, new technology, and educational debt increasing in recent decades, there is a gap in knowledge regarding the influence of debt and program cost on residency program selection. This study aims to test the hypothesis that applicants who carry higher debt loads will correspondingly weigh the cost of residency training as a more significant factor in their program selection criteria compared to applicants with lower or no debt. Understanding how program features and cost influence the match process is relevant not only to residency applicants and programs but also to our implicit goal to serve the U.S. population through training a diverse workforce.

Materials and Methods

Study design

A mixed-methods approach consisted of semi-structured interviews followed by a cross-sectional survey to test the generalizability of qualitative results with a larger sample. All subjects consented to participate. The University of North Carolina (UNC) Institutional Review Board granted ethics approval (IRB # 16–2743).

Phase I: participant recruitment and interview methodology

Potential interviewees were approached in person, by email, or by phone through professional and alumni networks (of Triny Gutierrez and Laura Anne Jacox) and were screened for enrollment criteria from 2017 to 2019 (Table S1). Purposeful sampling was used to recruit different perspectives from various regions, private and public schools, and student debt burdens ($n = 4$ High \$300,001–\$400,000, $n = 5$ Moderate \$300,000–\$150,001, and $n = 6$ Low \$0–\$150,000). One-on-one interviews of 12 first-year orthodontic residents and 3 final-year dental students applying to orthodontic residency were recorded remotely via Zoom (9 of 15, Zoom Video Communications Inc.) or in person (6 of 15) (Appendix 1). Demographic information was collected with a pre-interview survey (Table S2). The semi-structured interviews followed a topic guide to cultivate an open, conversational environment. The topic guide was developed as described.²⁴

Recorded interviews were de-identified and transcribed through [Rev.com](https://www.rev.com). Transcripts were analyzed with MAXQDA2022 software (Verbi Software GmbH). A foundational codebook was revised based on five transcripts and coding meetings with a qualitative research collaborator (Paul Mihás).^{24–26} The codebook was developed and revised iteratively with

researcher triangulation, as described, and finalized by senior authors and a qualitative expert for use with all transcripts (Appendix 2).¹¹ Illustrative quotations were identified, reviewed by all authors, and selected for inclusion (Table 1). Code frequencies were calculated and represented in Figure 1. Statistics were not included due to the small number of participants and the qualitative nature of Phase I.

Phase II: survey sample recruitment, distribution, and analysis

Survey questions were developed from a combination of previous study questions on program ranking and educational debt, including identical questions used by Lindauer et al. in 2006.^{11,22} The final survey consisted of 33 questions and 22 demographic questions after revision using pre-tests (Appendix 3). The survey was distributed via email to all PASS applicants of the UNC Orthodontics residency program (limited to UNC per PASS stipulations), an affordable program with stipends and scholarships. A recruitment email was sent in November of 2020–22, only after rank lists were irrevocably finalized, to prevent pressure to participate nor suggest an influence on the ranking process. Three emails (one initial and two reminders) were sent to applicants over a span of 14 days to maximize response rates. Applicants consented, screened, and completed the survey through a secure Qualtrics Link. Debt stratifications for the survey cohort were adjusted to account for a greater mean debt compared to Phase I participants: none (\$0, $n = 66$), low (\$1–\$225,000; $n = 58$), moderate (\$225,001–\$425,000; $n = 74$), and high debt (\$425,001–\$850,000; $n = 38$) (Table S2). For Figures 2 and 3B,C, participants were asked about residency factor desirability; a list of factors appeared with the option to indicate whether a factor was: Very Desirable (1 point), Desirable (2 points), Neutral (3 points), Undesirable (4 points) or Very Undesirable (5 points). Each response was converted to its numerical value on a scale of 1–5 and then averaged across participants to calculate mean values with a standard deviation.

Statistical analysis

Survey results were analyzed using descriptive and bivariate statistics. Significance was accepted at a p -value less than 0.05. Bivariate analyses were performed using t -tests, Pearson's chi-square test of no association, and analysis of variance tests, when appropriate.²² A Bonferroni method was used when adjusting p -values for multiple tests. Questions where participants selected more than one response were reported as frequencies, with chi-square pairwise comparisons. SAS 9 software (SAS Institute) was used for analyses. Adobe Photoshop (Adobe Inc., San Jose, CA, USA) was used to create figures.

Results

Demographics of respondents

Demographics for Phase I and II participants are reported in Table S2. Interviewees ranged in age from 25 to 32 with educational debt after dental school from \$0 to \$400,000. Survey respondents ranged in age from 22 to 49 years with educational debt after dental school from \$0 to \$850,000. The survey response rate was 27.28% (876 applicants emailed with 239 responses).

Qualitative study: residency applications

The theme that continuously emerged in the qualitative interviews was cost or factors involving finance. Interviewees with higher debt burdens indicated cost played a greater role than lower debt interviewees (Figure 1). The majority of interviewees did not borrow loans during undergrad due to family support, but half began accruing debt during dental school (Table 1). Even if not a concern initially, cost and resulting debt became more important to interviewees over time, particularly during dental school and subsequent repayment periods (Table 1).

Location was also a primary factor, with interviewees prioritizing being close to family or accommodating partners' careers and educations (Table 1). Across debt groups, the anticipated clinical experience was a key factor influencing where interviewees applied (Table 1). Interviewees sought broad clinical training, particularly those who felt dental school provided limited experience; they desired programs where they treated numerous patients and learned multiple techniques, gaining experience for independence.

Qualitative study: residency rankings

As prospective residents ranked programs, their perspectives on the importance of certain factors evolved. Interviewees frequently noted cost was a major determinant in where they applied and was less important when ranking programs (Table 1).

When considering where to apply, location was a key factor across all debt groups (Table 1). The interview experience was understandably an important factor when ranking programs (Table 1). The ranking stage emphasized "compatibility" with residents and faculty; compatibility was mentioned ten times more frequently relative to program ranking than when considering where to apply (Table S3).

Program length, perceived compatibility, and clinical experience were all prioritized, though interviewees in different debt groups valued program length differently (Table 1). Interviewees in higher debt groups expressed their desire for shorter programs and a more rapid entry into the workforce, while those in lower debt categories were more likely to seek a lengthier program with additional clinical experience (Table 1).

Quantitative study: survey results

Like Lindauer et al., respondents scored factors on a scale of 1–5, where 1 is "very desirable" and 5 is "very undesirable" with results reported as the average or mean factor desirability for applying and ranking, respectively (Figure 2).²² Interviewee and survey respondents considered cost significantly more when applying to programs than for ranking ($p = 0.0049^*$), suggesting cost is an upfront filter for programs (Table 1, Table S4, and Figure 3B). Respondents with high debt favored low-cost (tuition and expenses) somewhat more than low and no-debt participants (Figure 3A, $p = 0.1562$ for 2020-22; $p = 0.0380^*$ for 2020-21).

Consistent with qualitative data, surveys conveyed the importance of the interview experience on ranking. For example, survey respondents prioritized satisfied current residents (mean factor desirability: 1.28 for program applications, 1.27 for program

ranking), followed by a good impression of current residents (1.43, 1.43) and a good impression of faculty (1.47, 1.44) (Table S4 and Figure 3B).

Beyond the residency interview experience, the quality and breadth of clinical education were key criteria highlighted in both phases of the study (Tables S3 and S4). Survey data indicated that multiple techniques taught, good quality of clinical faculty, high number of cases treated, use of new technology in the clinic, and emphasis on clinical time were highly desirable factors, averaging mean scores under 1.53 (Table S4). A positive interview experience and clinical education were considered more important than the program and faculty reputations, in both qualitative and quantitative phases (Tables S3 and S4).

The most undesirable factors were after-hours work (3.74, 3.73), certificate-only programs (3.38, 3.32), heavy emphasis on research time (3.36, 3.31), GRE required or emphasized (3.28, 3.18), and hospital-based program (3.25, 3.20) (Table S4 and Figure 3C). Aside from the low cost, there were few differences in factor desirability between applying and ranking, which differs from interview data (Table S4). Comparison of data from virtual interviews in 2020 and 2021 to in-person interviews in 2022, revealed no significant differences (data not shown).

Discussion

Satisfied residents, a positive interview experience, and quality clinical education emerged as the most desirable factors in the study (Table S4 and Figure 3B). Keith and Proffit and Lindauer et al. found many of these same factors, however, the order of some factors has changed over time.^{20,22} For instance, the most important factor for ranking programs in 1992 was reputation, while reputation was tied as the sixth most desirable factor in our study (Table S5).²⁰ Using the same desirability scale in our survey as Lindauer et al., we found the top important factors, satisfied current residents (#1) and multiple techniques taught (#2), have not changed positions in almost two decades (Table S5 and Figure 2).²²

Both qualitative and quantitative data suggest cost has become a significant factor guiding program selection and rank (Table S4 and Figures 1 and 3B). Low-cost programs have become more desirable (lower values being more desirable), moving from a mean desirability of 1.63 in Lindauer's 2006 study to 1.53 presently (Table S5, Figure 2).²² In this study, interview and survey participants valued cost differently during applications and ranking; data suggest applicants use cost as an initial filter (#4 factor) for where they apply, and cost is less important during later ranking (tied #10 factor) (Table 1 and Table S4). Interview results support the hypothesis that applicants who carry higher debt weigh the cost of residency more in program selection and rank than applicants with low or no debt; a similar but statistically insignificant trend was observed in survey results (Table 1 and Figures 1 and 3A).

The significant addition of debt during orthodontic residency prolongs the financial burden of loan repayment and likely delays other milestones in the professional careers of recent graduates.^{9,11} The increasing weight of debt can hinder graduates' long-term career aspirations, such as practice ownership, and potentially impede their contributions to the

profession.⁹ Findings are likely to translate to other dental specialties, given the increasing costs of dental pre-doctoral and specialty training.²⁷

Interestingly, while location was emphasized in interviews, it was tied as eleventh in desirability in the survey (Table 1 and Table S4). The difference may stem from interview sample bias, as the interview cohort had a higher representation of UNC graduates who may heavily value family proximity and low in-state tuition. The small interview sample may have skewed certain viewpoints, leading to under- and over-representation of certain viewpoints, while the survey pool was larger and more diverse, reducing the potential for bias. This demonstrates the strength of mixed-methods studies, in that qualitative findings can be tested for generalizability through a survey. Furthermore, differences between qualitative and quantitative phases may also result from changes in question wording and formats; interviews had open-ended questions asking about “importance” while the surveys asked participants to evaluate “desirability” on a 31-item list from Lindauer et al. While such a list may reduce recall bias and enable direct comparison to Lindauer’s results, it may also influence the weight of factors as participants compare items to one another.

The survey collected responses during the fall of 2020, 2021, and 2022 encompassing different phases of the coronavirus disease 2019 (COVID-19) pandemic. There was an 8.09% increase in applications per program from 2019 to 2021, indicating a broadening of program selection by applicants during this period.²⁸ Interviews were predominantly virtual in 2020, partially virtual in 2021, and mostly in person in 2022. Apart from these differences, survey data were consistent across these years, indicating similar values regardless of remote or in-person interview format.

This study was limited by its sample size, sampling bias, and recall bias in both phases. Phase I had a small cohort with limited geographic representation. Participants were predominantly females, attended a public university for dental school and residency, and had less debt than the national average (average debt in qualitative sample \$175,333, National average \$301,583).²⁹ Some of these biases were mitigated in the quantitative phase with a more even sex ratio and reported debt incurred through dental school (\$201,480) closer to the national average. Still, the Phase II sample was modest in size and made up of applicants to the UNC Orthodontics residency program (a low-cost, in-state, 33-month master’s program), limiting the generalizability. The study team requested to distribute the survey widely to the full PASS orthodontic applicant pool to offer a more representative dataset but were limited to those that applied to UNC. The response rate (27.28%) was lower, though the sample size was slightly higher ($N = 239$), compared to historical studies, like Lindauer et al. (46.9%) and ($N = 222$).²²

Future studies utilizing these survey scales could be distributed to track changes in orthodontic applicants over time, particularly to determine if preferences shift due to the COVID-19 pandemic and rising debt. Conducting the study on residency applicants applying to fully funded dental specialty programs, like pediatrics and oral surgery, would also provide a valuable counterpoint with regard to financial factors.

Data indicate orthodontic programs to attract top applicants should prioritize providing a welcoming interview experience with satisfied residents, and a low-cost, high-quality education including a wide breadth of clinical techniques, patients, and technology. These factors are expected to gain greater significance in the future as the orthodontic specialty navigates an inflection point in its history. Namely, the intersection of rapidly evolving clinical technologies, increasing educational debt, direct-to-consumer marketing, and a rise in orthodontic services from corporate dentistry and general practitioners, are driving change that may impact the quantity and diversity of orthodontic residency applicants in the future. It is crucial for orthodontic programs to collectively address the cost factor as a logical step toward improving career options and satisfaction for all. Clinical education and interview experiences are key for residency selection, consistent with prior studies, but program cost has grown in importance. Findings can help guide orthodontic programs in recruiting applicants and suggest a need to limit educational costs.

Conclusions

- The most desirable factors for selecting and ranking orthodontic programs include satisfied residents, multiple techniques taught, quality of clinical faculty and training, low cost, good impression of faculty and current residents at interview, high patient numbers, and good clinical facilities with new technology.
- Consistent with prior studies, clinical training and interviews are key for residency selection, with program costs growing in importance over the past three decades.
- Less desirable factors included programs that are hospital-based, certificate-only, place a heavy emphasis on research time, and require considerable work after hours.
- Interview results are consistent with the hypothesis that applicants who carry higher debt weigh the cost of residency more in program selection and rank than applicants with low or no debt; a similar but not statistically significant trend was seen in survey results.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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APPENDIX

APPENDIX 1: Phase I Interview Topic Guide

Phase I: Interview Topic Guide

Career in Dentistry Questions

- How did you decide to become a dentist?
- What attracted you to the profession?
 - Prompts:
 - ◆ Quality of life
 - ◆ Lifestyle
 - ◆ Flexibility
 - ◆ Income
 - ◆ Autonomy/Sole Ownership
 - ◆ Job Security
 - ◆ Intellectually stimulating
 - ◆ Manual dexterity, Working with your hands
 - ◆ Impact factor/Changing lives

Dental School Selection Questions

- Can you walk me through how you decided on your dental school?
- What was going through your mind when making the decision on where to attend?
 - Prompts:
 - ◆ Geography
 - ◆ Spouse or family considerations
 - ◆ Cost of attendance- tuition, cost of living in area
 - ◆ Reputation of program- Clinical training, Research, or Name recognition of program or university
 - ◆ Specialty placement success
 - ◆ Research opportunities
 - ◆ Dental student community and happiness
 - ◆ Mentorship opportunities / Faculty relationships
 - ◆ Medical school partnership

- What kinds of conversations did you have with your family or friends? What about faculty?
- How, if at all, did getting married influence your choice of dental school?
- Whose career, if either, was prioritized? Can you tell me more about this?
 - Prompts:
 - ◆ Gender
 - ◆ Age
 - ◆ Education
 - ◆ Parenting
 - ◆ % of household income
- How, if at all, did your student loan debt influence your decision in selecting dental schools?
- When you first entered dental school, what did you envision yourself doing after graduation?
 - How important was cost of attendance to you at this point?
 - Did that change during dental school? Can you tell me more about that?

Career in Orthodontics Questions

- Can you talk about why you decided to become an orthodontist?
- What attracted you to the specialty?
 - Prompts:
 - ◆ Quality of life
 - ◆ Lifestyle
 - ◆ Flexibility
 - ◆ Income
 - ◆ Autonomy/Sole Ownership
 - ◆ Job Security
 - ◆ Intellectually stimulating
 - ◆ Manual dexterity
 - ◆ Impact factor/Changing lives

Orthodontic Program Selection Questions

- Can you walk me through how you decided on where to apply for residency?
 - Prompts:

- ◆ Desire to explore a school / new part of the country / program
- ◆ Geography
- ◆ Spouse or family considerations
- ◆ Cost of attendance- tuition, cost of living in area
- ◆ Reputation of program- Clinical training, Research, or Name recognition of program or university
- ◆ Research opportunities
- ◆ Length of program (2 year vs. 3 year)
- ◆ Resident community and happiness
- ◆ Mentorship opportunities / Faculty relationships
- What kinds of conversations did you have with classmates? What about faculty? What about with your family/spouse or friends?
- How, if at all, did getting married influence your choice of residency program?
- How did having children influence your choice of residency programs?
 - Prompts:
 - ◆ Number
 - ◆ Timing (before, during, after residency?)
 - ◆ Age factors
 - ◆ Children with special needs/medical illness
 - ◆ Financial responsibilities
- How did your family member's aging, if any, influence your choice of residency programs?
- How did your family member's illness, if any, influence your choice of residency programs?
- How did your family member's special needs, if any, influence your choice of residency programs?
 - Prompts:
 - ◆ Your parents
 - ◆ In-laws
 - ◆ Financial burden
- When you first entered residency, what did you envision yourself doing after graduation?
 - How important was cost of attendance to you at this point?

- Did that change during residency? *Can you tell me more about that?*

Orthodontic Program Ranking Questions

- Can you walk me through how you decided how to rank residency programs in the match process? What was going through your mind when making the rank list decision?

Was _____ going through your mind?

- Prompts:

- ◆ Geography
- ◆ Spouse or family considerations
- ◆ Cost of attendance- tuition, cost of living in area
- ◆ Experience during the in-person interview and interactions with residents on site?
- ◆ Reputation of program- Clinical training, Research, or Name recognition of program or university?
- ◆ Research opportunities
- ◆ Length of program (2 year vs. 3 year)
- ◆ Resident community and happiness
- ◆ Mentorship opportunities / Faculty relationships
- What kinds of conversations did you have with classmates? What about faculty? What about with your family/spouse or friends?
- How, if at all, did having children influence your decision making?
- How, if at all, did your student loan debt influence your decision in selecting orthodontic programs?

Debt Questions

- Thank you for answering the survey questions related to your current and former debt. How has debt influenced your educational choices?

- Prompts:

- ◆ College debt
- ◆ Dental school debt
- ◆ Residency debt
- ◆ Personal / credit card debt
- ◆ Family financial situation
- Can you tell me about any additional debt you may have since graduating?

- Prompts:
 - ◆ Credit card
 - ◆ Additional tuition
 - ◆ Buying a practice
 - ◆ Family member support
 - ◆ Cost of living
 - ◆ Buying a car
 - ◆ Buying a house

I am going to switch gears a bit and ask you about larger lifestyle issues

- In what other ways has debt had an impact on you (and your family)?
- How, if at all, has debt influenced your lifestyle decisions?

- Prompts:
 - ◆ Buying a house
 - ◆ Buying a car
 - ◆ Getting married
 - ◆ Buying a practice
 - ◆ Sending children to school
 - ◆ Supporting family members

- Do you mind sharing how much debt you have now?

Is there something you'd like discuss that I haven't asked you?

APPENDIX 2: Phase I Code List

Phase I: Code List

- Profession Attributes
 - Interdisciplinary
 - Working with hands
 - Compatible Personality
 - Perception of Happiness
 - Work-life Balance
 - Esthetics
 - Age of Population
 - Autonomy

- More Desirable than Physician
- Program Attributes
 - Clinic Facilities
 - Resident Feedback
 - Research Potential
 - Balance of Clinical and Academics
 - Compatibility with Resident or Faculty
 - Clinical Experience
 - Specialty Placement
 - Location
 - Length of Program
 - Reputation
 - Faculty to Resident Ratio
- Intellectual
- Social
 - Helping People
 - Social Interaction
- Advice
 - Peer Feedback
 - Working Orthodontist/Dentist Advice
 - Family Member Advice
 - Partner Advice
 - Faculty Advice
- Finances and Debt
 - COVID Influence
 - Debt
 - Cost
 - Income Potential
- Wishes After Residency
 - Academics
 - Practice Owner
 - Associate

- Reason for Dentistry
- Influencing Dental School Decision
- Reason for Orthodontics
- Influencing Residency Applications
- Influencing Match Ranking

APPENDIX 3: Phase II Qualtrics Survey

Start of Block: Screening

Q1 Thank you for participating in our survey on decision making in orthodontics residency selection. **Your participation is voluntary, anonymous, and will not influence your ranking as an applicant.** Your feedback will help us understand how orthodontists and trainees are influenced by changes in the dental marketplace and educational debt. This survey takes **10–12 minutes**. If your browser times out, you can click on the link again and you will be directed to the question where you left off. You may skip any question you choose not to answer. All results are presented only in aggregate. The first 100 responders will receive a **\$5 Amazon gift card** for completion of the survey.

Q2 Have you completed this survey in the past?

- Yes
- No

End of Block: Screening

Start of Block: Influencing Factors

Q3 How many Orthodontic Residency programs did you ***apply to*** this year?

Q4 How many Orthodontic Residency programs did you ***rank*** this year?

Q5 Did you Match at an Orthodontic Residency program this year?

- Yes
- No

Q6 The next questions will ask you to consider factors that influenced you when selecting programs to apply to as well as when developing your rank list for orthodontic residency.

Q7 How **desirable** are the following in deciding which orthodontic programs to **apply to**:

	Very Desirable	Desirable	Neutral	Undesirable	Very Undesirable
Good program reputation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good reputation of Full-Time faculty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of new technology in the clinic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lab fabricates appliances (vs. resident)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
GRE required or emphasized	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positive spouse, family or peer input	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extensive interdisciplinary care training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High stipend or salary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good location (i.e. hometown, inexpensive, fun)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High # of cases treated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High number of assistants/auxiliary staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good quality of clinical facility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfied current residents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lots of work required after regular hours	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heavy emphasis on clinic time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heavy emphasis on research time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heavy emphasis on class time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Program length < 30 months	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Program length 30 months	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low cost (tuition and expenses)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Certificate only offered (no degree)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Masters offered/required	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High number of Full-Time faculty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dental school based program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-dental school based (i.e. hospital based)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good impression of faculty at interview	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good impression of current residents at interview	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Class size 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Class size > 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High participation of part-time faculty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multiple technique(s) taught (straightwire, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8 How **desirable** are the following in developing your rank order list:

	Very Desirable	Desirable	Neutral	Undesirable	Very Undesirable
Good program reputation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good reputation of Full-Time faculty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of new technology in the clinic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lab fabricates appliances (vs. resident)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
GRE required or emphasized	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Positive spouse, family or peer input	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extensive interdisciplinary care training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High stipend or salary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good location (i.e. hometown, inexpensive, fun)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High # of cases treated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High number of assistants/auxiliary staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good quality of clinical facility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfied current residents	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lots of work required after regular hours	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heavy emphasis on clinic time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heavy emphasis on research time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heavy emphasis on class time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Program length < 30 months	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Program length 30 months	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low cost (tuition and expenses)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Certificate only offered (no degree)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Masters offered/required	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High number of Full-Time faculty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dental school based program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-dental school based (i.e. hospital based)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good impression of faculty at interview	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good impression of current residents at interview	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Class size 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Class size > 4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High participation of part-time faculty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multiple technique(s) taught (straightwire, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Influencing Factors

Start of Block: Demographics

Q9 What is your age?

Q10 With which gender do you identify?

- Male
 - Female
 - Other. Please specify:
-

Q11 Which of the following describe you? Please select **all** that apply.

- African American
- Asian/Pacific Islander
- Caucasian
- Hispanic/Latino
- Native American
- Other. Please specify: _____

Q12 What is your **current** marital status?

- Married
- Never married
- Widowed
- Divorced
- Separated

Display This Question:

If Q12 Married

Q14 Which of the following best describes you?

- Single - not in a committed romantic relationship
 - Engaged to be married
 - In a civil partnership
 - In a committed relationship
 - Other. Please specify:
-

Q15 How many dependents under the age of 18 are living in your home?

Display This Question:

If Q15 Text Response Is Greater Than or Equal to 1

Q16 What is the age, in years, of the **youngest** child living in your home?

Display This Question:

If Q15 Text Response Is Greater Than or Equal to 1

Q17 Who is the **primary caregiver** for the children in your household?

- You
- Your spouse/partner
- Family and/or friends
- Paid childcare
- Other. Please specify: _____

Q18 Are you currently enrolled in a dental school program (DDS, DMD or foreign equivalent)?

- Yes
- No
- No, but I am a recent 2020 dental school graduate

Q19 What is (or was) the total length of your dental school program (DDS, DMD or foreign equivalent) in years?

- 3 years long
- 4 years long
- 5 years long

Display This Question:

If Q18 = Yes

Q20 In what year are you currently enrolled in your dental school program?

- 3rd year
- 4th year
- 5th year

Display This Question:

If Q18 = Yes

Q21 In what year do you anticipate graduating from your dental school program?

Display This Question:

If Q18 = No

Q22 In what year did you graduate from your dental school program?

End of Block: Demographics

Start of Block: Debt Demographics

Q23 Did you complete (or are currently completing) a **PhD** combined DDS, DMD, or foreign equivalent program?

- Yes
- No

Q24 Have you participated in any debt forgiveness programs (i.e. Health Professions Scholarship Program, National Health Service Corp Loan Repayment Program, State Loan Repayment Program, etc..)?

- Yes
- No

Display This Question:

If Q24 = Yes

Q25 How much potential debt forgiveness have you received?

- \$0
- \$1 to \$49,999
- \$50,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 to \$249,999
- \$250,000 to \$299,999
- \$300,000 to \$349,999
- \$350,000 to \$399,999
- \$400,000 to \$449,999
- \$500,000 to \$549,999
- \$550,000 to \$599,999
- \$600,000 to \$649,999

- \$700,000 to \$749,999
- \$750,000 to \$799,999
- \$800,000 to \$849,999
- \$850,000 to \$899,999
- \$900,000 to \$949,999
- \$950,000 to \$999,999
- \$1,000,000 or greater

Q26 How much **total** debt do you have right now?

- \$0
- \$1 to \$49,999
- \$50,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 to \$249,999
- \$250,000 to \$299,999
- \$300,000 to \$349,999
- \$350,000 to \$399,999
- \$400,000 to \$449,999
- \$500,000 to \$549,999
- \$550,000 to \$599,999
- \$600,000 to \$649,999
- \$700,000 to \$749,999
- \$750,000 to \$799,999
- \$800,000 to \$849,999
- \$850,000 to \$899,999
- \$900,000 to \$949,999
- \$950,000 to \$999,999
- \$1,000,000 or greater

Q27 How much **educational debt** do you **currently** have? Educational debt includes funds borrowed for tuition, fees and housing.

- \$0
- \$1 to \$49,999

- \$50,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 to \$249,999
- \$250,000 to \$299,999
- \$300,000 to \$349,999
- \$350,000 to \$399,999
- \$400,000 to \$449,999
- \$500,000 to \$549,999
- \$550,000 to \$599,999
- \$600,000 to \$649,999
- \$700,000 to \$749,999
- \$750,000 to \$799,999
- \$800,000 to \$849,999
- \$850,000 to \$899,999
- \$900,000 to \$949,999
- \$950,000 to \$999,999
- \$1,000,000 or greater

Display This Question:

If Q25 \$0

Q28 Why did you take out loans?

1. Tuition for dental school and/or college
2. Cost of living during dental school, residency and/or college
3. Purchase of a home
4. Purchase of a car
5. Credit card debt
6. Medical expenses for a personal or family illness
7. Care of a child, spouse or family member
8. Other. Please Specify:

9. I did not take out loans

Q29 How much total educational debt did you have when graduating from undergraduate college?

- \$0
- \$1 to \$49,999
- \$50,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 to \$249,999
- \$250,000 to \$299,999
- \$300,000 to \$349,999
- \$350,000 to \$399,999
- \$400,000 to \$449,999
- \$500,000 to \$549,999
- \$550,000 to \$599,999
- \$600,000 to \$649,999
- \$700,000 to \$749,999
- \$750,000 to \$799,999
- \$800,000 to \$849,999
- \$850,000 to \$899,999
- \$900,000 to \$949,999
- \$950,000 to \$999,999
- \$1,000,000 or greater

Q30 Did you complete an additional educational program prior to dental school (i.e. Master’s Degree)?

- Yes
- No

Display This Question:

If Q30 = Yes

Q31 You indicated that you completed an additional educational program after college but before dental school, like a Master’s degree. How much total educational debt did you have when graduating from this educational program, before entering dental school?

Q32 How much total educational debt will you have (or did you have) when graduating from dental school (DDS, DMD or foreign equivalent)?

- \$0
- \$1 to \$49,999
- \$50,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 to \$249,999
- \$250,000 to \$299,999
- \$300,000 to \$349,999
- \$350,000 to \$399,999
- \$400,000 to \$449,999
- \$500,000 to \$549,999
- \$550,000 to \$599,999
- \$600,000 to \$649,999
- \$700,000 to \$749,999
- \$750,000 to \$799,999
- \$800,000 to \$849,999
- \$850,000 to \$899,999
- \$900,000 to \$949,999
- \$950,000 to \$999,999
- \$1,000,000 or greater

Display This Question:

If Q32 \$0

Q33 How often do you think about your educational debt?

- Not at all
- Not Often
- Often
- Very Often
- All of the time

Display This Question:

If Q32 \$0

Q34 How stressful is your educational debt?

- Not at all stressful
- Slightly stressful
- Stressful
- Very stressful
- Extremely stressful

Q35 Please use the slider to indicate your percent contribution to **current** household income.

Your % contribution to household income: 0 10 20 30 40 50 60 70 80 90 100

End of Block: Debt Demographics

Start of Block: Professional Expectations

Q36 How would you describe your expected **initial** employment immediately following residency? Please select **all** possibilities that apply.

- Sole private practice owner
 - Partnership private practice owner
 - Corporate and/or dental support organization (DSO) associate
 - Private practice associate
 - Independent contractor
 - Military orthodontist
 - Public health orthodontist
 - Academic orthodontist
 - Hospital orthodontist
 - Other. Please specify:
-

Q37 What is most important to you when choosing your **initial** employment opportunity? Please select the two most important.

- Quality of patient care
- Ownership
- Work-life balance and/or flexibility
- Income
- Length of commute
- Mentorship

Q38 How much do you expect to earn **annually** (before tax) in your **initial employment** following residency?

- \$0
- \$1 to \$49,999
- \$50,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 to \$249,999
- \$250,000 to \$299,999
- \$300,000 to \$349,999
- \$350,000 to \$399,999
- \$400,000 to \$449,999
- \$500,000 to \$549,999
- \$550,000 to \$599,999
- \$600,000 to \$649,999
- \$700,000 to \$749,999
- \$750,000 to \$799,999
- \$800,000 to \$849,999
- \$850,000 to \$899,999
- \$900,000 to \$949,999
- \$950,000 to \$999,999
- \$1,000,000 or greater

Q39 How many **days per week**, on average, do you plan to work with patients (clinic days)?

Q40 Are you planning to pursue practice ownership (buy-in/buy-out/start-up) in the next **5 years**?

- Yes
- No

Display This Question:

If Q40 = Yes

Q41 Why are you planning to pursue ownership? Please select the two most important.

- Greater income potential
- Schedule flexibility

- Desire for self-employment (autonomy)
 - Other. Please specify:
-

Display This Question:

If Are you planning to pursue practice ownership (buy-in/buy-out/start-up) in the next 5 years? = No

Q42 Are you planning to pursue practice ownership (buy-in/buy-out/start-up) in the next **10 years?**

- Yes
- No

Display This Question:

If Q42 = Yes

Q43 Why are you planning to pursue ownership? Please select the two most important.

- Greater income potential
 - Schedule flexibility
 - Desire for self-employment (autonomy)
 - Other. Please specify:
-

Display This Question:

If Q42 = No

Q44 Why are you **not** planning to pursue ownership? Please select the **two** most important.

- Educational debt burden
 - No desire for self-employment
 - Avoid stress of business management
 - Better work-life balance and/or flexibility
 - Other. Please specify:
-

Q45 In **5 years** from now, what do you expect will be **most important** to you?

- Achieving financial independence
- Paying off my student loans
- Flexibility to pursue time with family and/or friends

- Flexibility to pursue other interests and/or professional avenues outside of dentistry
- Growing a practice
- Becoming an owner of a practice
- Retiring from practice

Q46 In **15 years** from now, what do you expect will be **most important** to you?

- Achieving financial independence
- Paying off my student loans
- Flexibility to pursue time with family and/or friends
- Flexibility to pursue other interests and/or professional avenues outside of dentistry
- Growing a practice
- Becoming an owner of a practice
- Retiring from practice

Display This Question:

If Q36 Corporate and/or dental support organization (DSO) associate

Q47 Are you willing to work for a corporation and/or dental support organization (DSO) at any point in your career?

- Yes
- No
- Maybe

Display This Question:

If Q47 No

Or Q36 = Corporate and/or dental support organization (DSO) associate

Q48 What is **most important** to you when considering employment with a corporation and/or dental support organization (DSO)? Please select the **two** most important.

- Equity in the corporation or DSO
- A lucrative salary and/or selling price
- Autonomy in treatment decision making
- Excellent patient care
- Business management support
- Sound practice ethics

- Other. Please specify:

Q49 What is your greatest **reservation**, if any, when considering employment with a corporation and/or dental support organization (DSO)? Please select the **two** most important if applicable.

- Compromised practice ethics
- Compromised patient care
- Loss of ownership/autonomy
- Lack of job security
- Compromised future of orthodontic profession
- Other. Please specify:

- I have no reservations

Q50 Why did you choose to enter the field of orthodontics? Please select the **two** most important.

- Intellectually stimulating
- Ownership potential
- Patient care and patient relationships
- Business management
- Passion for orthodontics
- Work-life balance and/or flexibility
- Job security
- Income potential
- Other. Please specify:

Q51 What concerns, if any, do you have regarding the field of orthodontics? Please select the **two** most important.

- Growth of corporate and/or dental support organizations (DSO)
- Decrease in desire for ownership among women orthodontists
- Decline in income potential
- Decrease in desire for ownership among millennial orthodontists
- Saturated orthodontic market
- Growth of direct-to-consumer products
- Length and/or cost of education

- Other. Please specify:

- I have no concerns regarding the future of the field

Q52 What do you anticipate will contribute most to **stress** in your job? Please select the **two** most important.

- Financial stress (income, debt)
- Lack of work-life balance and/or flexibility
- Patient care and treatment results
- Patient and family relationships
- Professional partner and/or employer relationship
- Staff relationships
- Self-employment
- Treatment decision autonomy
- Business management
- Job security
- Intellectually challenging work

Q53 How important is work-life balance to you?

- Not at all important
- Slightly important
- Important
- Very important
- Extremely important

Q54 How would you rate your current work-life balance?

- Poor work-life balance - Excellent work-life balance (10)
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7

- 8
- 9
- 10

Q55 What do you anticipate will contribute most to your **job satisfaction**? Please select the **two** most important.

- Financial success (income)
- Work-life balance and/or flexibility
- Patient care and treatment results
- Patient and family relationships
- Professional partner and/or employer relationship
- Staff relationships
- Self-employment
- Treatment decision autonomy
- Business management
- Job security
- Intellectually challenging work

Q56 What is most important to you with regard to your career goals **at this point in time**? Please select the **two** most important.

- Becoming an owner of a practice
 - Becoming a partner of a practice
 - Paying off my student loans
 - Treatment outcomes
 - Growing a practice
 - Flexibility to pursue time spent with family and/or friends
 - Achieving financial stability
 - Flexibility to pursue other interests and/or professional avenues outside of dentistry
 - Retiring from practice
 - Other. Please specify:
-

Q57 What best describes your **ultimate employment goal(s)** in the field of orthodontics? Please select **all** that apply.

- Sole private practice owner

- Partnership private practice owner
 - Corporate or dental support organization (DSO) associate
 - Private practice associate
 - Independent contractor
 - Military orthodontist
 - Public health orthodontist
 - Academic orthodontist
 - Hospital orthodontist
 - Other. Please specify:
-

End of Block: Professional Expectations

Start of Block: Incentives

Q58 Are you interested in receiving an Amazon gift card? The first 100 respondents are eligible.

- Yes
- No

Display This Question:

If Q58 = Yes

Q59 Please enter the email address where you would like us to send your Amazon gift card. Your email address will be disassociated from your survey data for confidentiality.

Display This Question:

If Q58 = Yes

Q60 Please re-enter your email address for verification.

End of Block: Incentives

References

1. National Matching Services Inc. Results of Phase I of the Match for 2023–2024 Positions; 2023.
2. Keim RG. The Burden of Student Debt. *J Clin Orthod* 2016;50:9–10. [PubMed: 26919640]
3. American Association of Orthodontists. Accredited orthodontic programs: American Association of Orthodontists 2023.
4. Jacksonville University. Admissions: Jacksonville University 2022.

5. Boyington BK, Kerr E, Wood S. 20 years of tuition growth at national universities. U.S. News & World Report 2021.
6. Healey PB. We Should All Be Concerned about the Student Debt Crisis Consumer News and Business Channel; 2019.
7. Board of Governors of the Federal Reserve System (US). Student Loans Owned and Securitized [SLOAS] Federal Reserve Bank of St. Louis; 2022.
8. Bentson C, Associates LLC. 2018 Annual orthodontic resident survey. 2018.
9. Pruzansky DP, Ellis B, Park JH. Influence of Student-Loan Debt on Orthodontic Residents and Recent Graduates. *J Clin Orthod* 2016;50:24–32. [PubMed: 26919635]
10. American Dental Education Association. ADEA Survey of dental school seniors. 2017 Graduating Class Tables Report. 2018. pp. 1–53.
11. Worthington CC, Mihas P, Bocklage C, et al. Educational debt and the gender gap: Understanding factors influencing orthodontists' career decisions. *Am J Orthod Dentofacial Orthop* 2022;161:e20–e61. [PubMed: 34503861]
12. American Association of Orthodontists. Student loan survey. 2018.
13. Wright J, Vujicic M, Frazier-Bowers S. Elevating dentistry through diversity. *J Am Dent Assoc* 2021;152(4):253–255. [PubMed: 33775280]
14. Gabard DL. Increasing minority representation in the healthcare professions. *J Allied Health* 2007;36(3):165–175. [PubMed: 17941411]
15. United States Census Bureau. Census. 2023.
16. American Dental Association. Survey of advanced dental education. 2023.
17. Burk T, Orellana M. Assessment of graduate orthodontic programs in North America. *J Dent Educ* 2013;77(4):463–475. [PubMed: 23576592]
18. Mertz E, Calvo J, Wides C, Gates P. The black dentist workforce in the United States. *J Public Health Dentistry* 2017;77(2):136–147.
19. Mertz E, Calvo J, Wides C, Gates P. The Hispanic and Latino dentist workforce in the United States. *J Public Health Dentistry* 2017;77(2):163–173.
20. Keith O, Proffit WR. Orthodontic training: the residents' perspective. *Am J Orthod Dentofacial Orthop* 1994;106:649–653. [PubMed: 7977212]
21. Bruner MK, Hilgers KK, Silveira AM, Butters JM. Graduate orthodontic education: the residents' perspective. *Am J Orthod Dentofacial Orthop* 2005;128:277–282. [PubMed: 16168322]
22. Lindauer S, Payne MD, Shroff B, Eser Fekçi T. Factors influencing applicant ranking of orthodontic programs. *Angle Orthodontist* 2006;84–84. [PubMed: 16448274]
23. Burk T, Orellana M. From the students' corner assessment of graduate orthodontic programs in North America. *J Dent Educ* 2013:463–475. [PubMed: 23576592]
24. Jacox LA, Mihas P, Cho C, Lin FC, Ko CC. Understanding technology adoption by orthodontists: a qualitative study. *Am J Orthod Dentofacial Orthop* 2019;155:432–442. [PubMed: 30826046]
25. Saldaña J. *The Coding Manual for Qualitative Researchers* SAGE; 2021.
26. Carter N, Bryant-Lukosius D, DiCenso A, Blythe J, Neville AJ. The use of triangulation in qualitative research. *Oncol Nurs Forum* 2014;41:545–547. [PubMed: 25158659]
27. American Dental Association. Survey of advanced dental education.
28. American Dental Association. 2020-21 Survey of advanced dental education report surveys of advanced dental education. Health Policy Institute. 2021.
29. Istrate EC, Mallarapu M, Stewart DCL, West KP. Dentists of tomorrow 2021: An analysis of the results of the 2021 ADEA Survey of U.S. Dental School Seniors Summary Report. ADEA Education Research Series 2022.

Most Frequently Discussed Factors in Phase I Interviews by Debt Group (N=15)

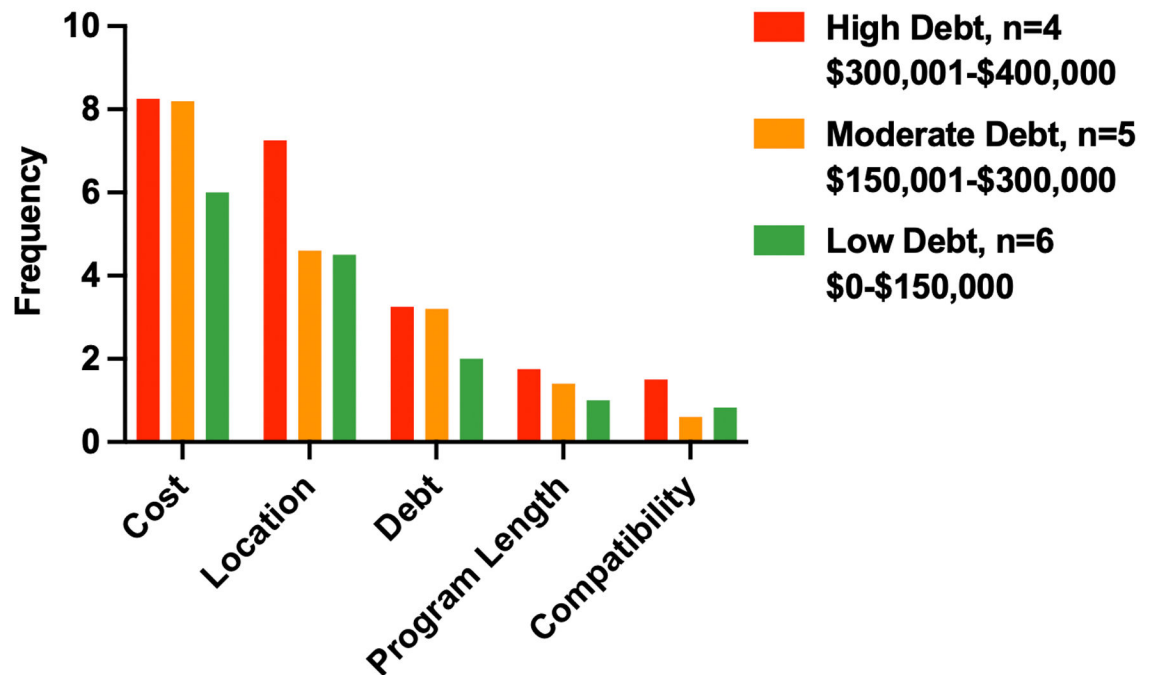


Figure 1.

Most frequently discussed factors in Phase I interviews by Debt Group. The numbers displayed are calculated by dividing the total frequency of a code within a debt group by the number of interviewees in that category. Interview debt groups: Red: high debt; Orange: moderate debt; Green: low debt. Because frequencies are based on the total number of codes gathered from interviews, in which not all interviewees were asked the same prompts, this figure must be interpreted carefully. Traditional statistics cannot be applied.

Factors	Current Study Ranking		Lindauer et al. (2006) Ranking	
	N=239		N=215	
	Mean	SD	Mean	SD
Satisfied current residents	1.27	0.51	1.39	0.57
Multiple technique(s) taught (straightwire, etc.)	1.37	0.61	1.52	0.64
Good impression of current residents at interview	1.43	0.64	1.55	0.65
Good impression of faculty at interview	1.44	0.67	1.62	0.62
High # of cases treated	1.45	0.65	1.72	0.69
Good quality of clinical faculty	1.47	0.62	1.52	0.56
Good program reputation	1.47	0.59	1.54	0.62
Use of new technology in the clinic	1.50	0.63	1.65	0.62
Heavy emphasis on clinic time	1.52	0.67	1.62	0.58
Good location (i.e. hometown, inexpensive, fun)	1.53	0.69	1.65	0.71
Low cost (tuition and expenses)	1.53	0.78	1.63	0.74
Good reputation of full-time faculty	1.59	0.65	1.73	0.64
High participation of part-time faculty	1.76	0.79	1.94	0.70
High number of full-time faculty	1.76	0.72	2.09	0.68
High stipend or salary	1.86	0.92	1.80	0.75
Positive spouse, family or peer input	1.87	0.85	2.18	0.88
Extensive interdisciplinary care training	1.89	0.77	2.05	0.71
High number of assistants/auxiliary staff	1.92	0.74	2.07	0.67
Lab fabricates appliances (vs. resident)	2.05	0.81	2.17	0.86
Masters offered/required	2.11	0.84	2.40	0.84
Program length < 30 months	2.14	1.03	1.95	1.01
Dental school based program	2.23	0.82	2.30	0.80
Class size > 4	2.54	0.87	2.84	0.76
Class size ≤ 4	2.80	0.87	2.82	0.71
Heavy emphasis on class time	2.80	0.87	2.89	0.85
Program length > 30 months	3.07	0.90	3.39	1.04
GRE required or emphasized	3.18	0.86	3.82	1.01
Hospital-based program	3.20	0.89	3.26	0.77
Heavy emphasis on research time	3.31	1.10	3.31	1.00
Certificate-only offered	3.32	0.96	3.21	0.91
After hours work	3.73	1.01	3.81	0.90

Figure 2.

Mean desirability ranking in the current study compared to Lindauer et al. Participants were asked: “How desirable are the following in developing your rank order list?” In the heat maps, factors were ordered from most desirable (lowest mean, green in color) to least desirable (highest mean, red in color) based on the current study. Lindauer et al. asked the same survey questions, allowing direct comparison.

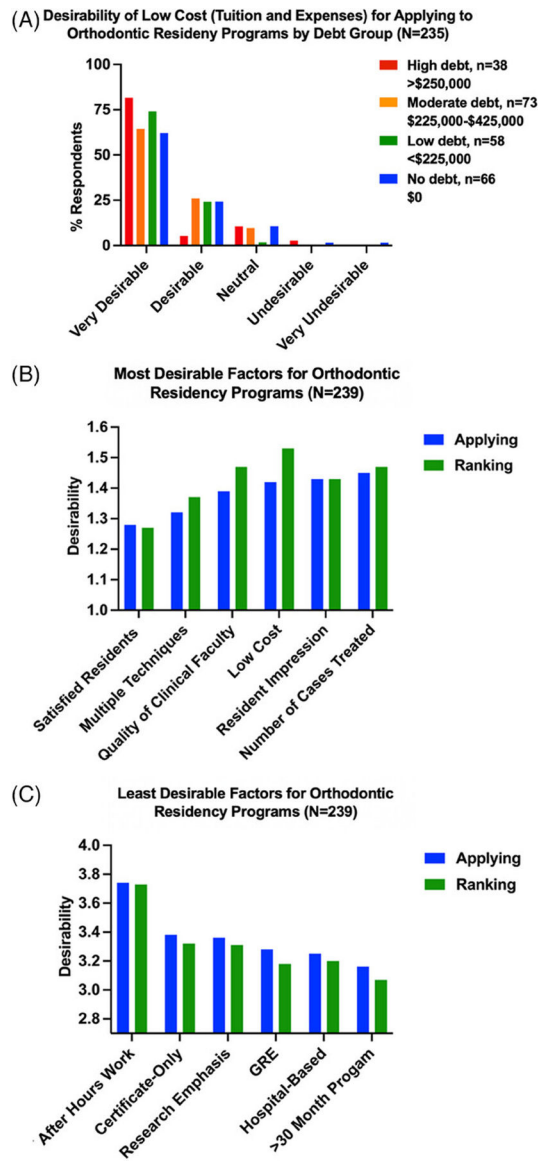


Figure 3. Factor desirability from Phase II survey data. Participants were asked: “How desirable are the following in deciding which orthodontic programs to apply to?” and “How desirable are the following in developing your rank order list?” (A) Percentage of respondents scoring desirability of “low cost (tuition and expenses)” for applying to orthodontic residency programs. Red: high debt; Orange: moderate debt; Green: low debt; Blue: no debt. (B) Most desirable factors for residency programs (lowest mean scores). (C) Least desirable factors for residency programs (highest mean scores). Blue: applying; Green: ranking.

Table 1.

Representative Quotes

Topic	Group	Representative quotations
Dental School Considerations		
Reputation and Clinical Experience	LD*	The student body, the reputation of the school, from what I had heard from people actually attending and saying good or bad things about their school... ended up being more important because the cost of attendance was going to be the same.
	MD*	I was attracted to the reputation and the clinical experience that was promised, and that we were taught something one semester and then were able to implement it in the clinic in the next. I thought that was appealing. They also offered rotations, which everybody raved about. The class size seemed good. I guess this is all the stuff that I was considering pre-interviews, and then it was very much affordable for being out-of-state.
	HD*	They're really going to prepare me for my goal, which is to ultimately go out into the private practice world. At that time, I wanted to be a dentist, not an orthodontist, and really most of the conversations just centered around, "Is it a good quality school?" It was about the quality of the program and if it's worth going and spending hundreds of thousands of dollars and then not having the best education, or having a really good education and just kind of weighing and comparing schools.
Debt in Dental School	LD	It was important in the beginning, but considering I wasn't in debt and...you're not seeing a number. Once you start looking at your debt, you look at your loan servicer, and it becomes more important. You look and you say, well the negative number to my name is growing and I'm just getting farther along in my education, getting older, and I have to pay all this off and the interest is accruing. So, debt became more important.
	MD	It [debt] became more important because as you see those student loans racking up every year. You realize this is real money... And as you see that number get bigger and bigger and bigger each semester, you start to realize, "Oh, someday I am going to have to pay this off." So, I think I did become more appreciative that I selected a more cost-effective school as dental school went on.
	HD	I felt like because I was going to a school where I was taking out loans, and it was a decent amount of loans, I think I felt more motivated to do really, really well. I don't want to, I guess I can't compare it, but I feel like if I went to a school that I wasn't taking out that many loans for, I don't know if I would have felt so motivated. I'm not sure if that's strange to say, but I think when you're 22, it's just a number...I don't think it felt real until I graduated and we took the financial aid federal loan checkout thing, and I said, "Wow, that's a lot of money."
Considerations for Applying to Residency		
Cost	LD	I didn't want it [residency] to be overly expensive, obviously, but when I looked at the cost, I thought that it would be well worthwhile in regard to becoming a specialist and I did rule out some residencies based on their extremely high costs. So, that helped me rule out some programs, but if they were in the general ballpark, I didn't use that as an eliminating factor.
	MD	Cost of course was a huge determining factor. Not wanting to go into additional debt, because I was already in debt from dental school. I didn't want to go into more (debt) and have that interest accrue.
	HD	The debt was something that was glaring in front of my face now. So I mainly applied to programs that were either hospital-based where they paid you, or they were academic-based, but they had relatively low tuition. Quote from a separate interview: I looked at the location. The cost was huge and again, the quality of the program. So I basically stayed in the Southeast. I told myself, "nothing more than \$40,000 a year." The length of the program was also huge to me. I didn't want to stay in school for that much longer if I didn't have to. So if I can do a 2-year program, which I'm doing now versus 3 years, that was definitely a plus, but definitely cost, location, and quality.
Location	LD	I wanted to be close to family. So, that was a huge consideration.
	MD	A lot of my decision for residency for where I was going to apply was based on geography. I got married during dental school and my wife is a student at Duke. And so, I knew she was going to be locked in here in North Carolina for the next 3 years, for my full term of residency. That doesn't mean I only applied to North Carolina, but it does mean that I was very selective in where I was applying for residency, because if I'm going to have to move away, I want to be at a place that I'm absolutely going to love and that makes sense for me to move to.
	HD	I mainly had all my applications in the East Coast and Northeast because I was thinking about the area I would want to live in, in the future in practice. So the Northeast was my main focus. I definitely wanted it to be Pennsylvania and above. I was thinking about location a lot so a lot of the dental schools I applied to were Northern schools, but I also believe that you can't be picky when it's residency because it's a match and you never know. I definitely had a few schools in the south, but location was very important, and the reputation of the program.
Clinical Training	LD	I would've been fine doing a 2-year program and it would have been nice getting out a year sooner, but I kind of leaned toward the 3-year program because I felt it was especially important for orthodontics because it requires longer treatment to see, and I wanted to see as many cases from start to finish as I could. And it didn't feel like 2-year programs were going to give me the best opportunity to do that. So, I leaned toward 3-year programs.

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Topic	Group	Representative quotations
	MD	Do you have to make all your own devices? Do you have to do a lot of lab work? How many cases do you get to see or do?... At the time, I had a list of things that were important that I wanted to ask. Flexibility to do different techniques and work with different people?
	HD	But then after compiling a long list, I went through and in addition to location, I wanted something that was a little bit more clinical, not entirely research, or at least had a good balance. So I started talking to residents about that, seeing which ones had a good balance of clinical and didactic, and then tuition was a huge factor.
Considerations for Ranking Residencies		
Cost	LD	The cost of the school was more of a factor when I applied to schools. I didn't apply to schools if I wasn't willing to pay the tuition. So, once I got to the match process, I did not use that as much of a factor.
	MD	By the time I had created my application for the schools I was applying to, I had already filtered out schools that were too expensive for me. And so, when it came time to rank schools, the cost of attendance was not as important. Quote from a separate interview: I didn't even apply to the schools that in my head were too expensive to make sense...I suppose in a way it was a consideration, but I had taken care of that heavy lifting by the time I went to generate my rank list.
	HD	I looked at the cost of attendance. It was important at the point of choosing which schools, for sure, that was very important, but when I actually ranked, that [cost] was not important.
Interview Experience	LD	I went to one [interview] and they moved up in my rank list because I felt like I connected with the faculty in the residency. It had started at the bottom of my list because I wasn't excited about the city, but the interview itself made it move higher in the rankings. Quote from a separate interview: It definitely changed for me after the interviews. To be honest, I did consider if they were going to rank me or not. And I know you're not supposed to. You're just supposed to pick what you want, but if you get a vibe from a program that they might put you lower, you don't really want to risk it. But I think, my number one factor was the interview process. How polite they were to me. How responsive they were to me.
	MD	At the top of my mind was geography because of my family and situation. Additionally, the culture of the residents was extremely, extremely important to me. If the residents were happy and motivated, and professional and excited about the future of their residency program, I wanted to be at that school.
	HD	I know you're not supposed to think like this for the match, but I felt like if I felt the most comfortable with them [the residents and faculty], then they probably also felt the most comfortable with me.
Debt Perception	LD	I don't think educationally it has affected me because we were always told to kind of gun for what we wanted and then everything else will follow: money, fame, all that. You eventually find your niche and whatnot. So yeah, I don't think it [debt] affected my educational curiosity or whatever.
	MD	I guess I would say I didn't let it limit my educational experience. Fear of going into debt didn't prevent me from applying to dental school and then applying to ortho residency. But if given the option between two or more different programs, I would prefer to go to a program that was less expensive, if it gave a comparable result.
	HD	I couldn't keep going to a school that was super expensive because I do think that at some point, even if you make very good money as an orthodontist, there's a point where you dig a hole so deep that you can't come out of it. So I didn't want to do that to my financial future.

* Low Debt (LD), Moderate Debt (MD), High Debt (HD).