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Original Article

Child Neurology Applicants Place Increasing Emphasis on Quality of Life Factors

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ABSTRACT

Background: Medical education, residency training, and the structure of child neurology residency training programs are evolving. We sought to evaluate how training program selection priorities of child neurology residency applicants have changed over time.

Methods: An electronic survey was sent to child neurology residents and practicing child neurologists via the Professors of Child Neurology distribution list in the summer of 2018. It was requested that the survey be disseminated to current trainees and alumni of the programs. The survey consisted of seven questions assessing basic demographics and a list of factors applicants consider when choosing a residency.

Results: There were 284 responses with a higher representation of individuals matriculating into residency in the last decade. More recent medical school graduates had a lower probability of considering curriculum as an important factor for residency selection (odds ratio [OR], 0.746; 95% confidence interval [95% CI], 0.568 to 0.98; $P = 0.035$) and higher priority placed on interaction with current residents over the course of the interview day (OR, 2.207; 95% CI, 1.486 to 3.278; $P < 0.0001$), sense of resident happiness and well-being (OR, 2.176; 95% CI, 1.494 to 3.169; $P < 0.0001$), and perception of city or geography of the residency program (OR, 1.710; 95% CI, 1.272 to 2.298; $P < 0.001$).

Conclusions: Over time, child neurology residency applicants are putting more emphasis on quality of life factors over curriculum. To accommodate these changes, child neurology residency programs should prioritize interactions with residents during the interview process and resident wellness initiatives throughout residency training.

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Introduction

The first child neurology training programs were established in the second half of the twentieth century. Resident characteristics,

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curricula, and program oversight have evolved over time. These include increased representation of women and minorities in medical school classes,¹ duty hour restrictions, and a growing appreciation for physician burnout^{2,3} with specific focus on the well-being of resident physicians.⁴ In parallel, there have been changes in the child neurology residency application and matching process. Initially, there was no formal process, but in 2005 applicants were matched to programs by the San Francisco Residency and Fellowship Match Service with a subsequent transition to the current National Resident Matching Program (NRMP) in 2012. This most recent transition allowed for more cooperation between child neurology and pediatrics residency programs that eventually led to the categorical five-year child neurology residency position. Over this time there has been an increase in number of child neurology

residency positions offered and filled.⁵ The gap between number of positions offered and those that are filled has narrowed over the years; however there are child neurology programs that remain unfilled in the match.

There is a growing variation between training programs in size and structure, including how time is divided between pediatric and adult neurology training.^{6,7} Some programs condense adult neurology into one year, whereas others spread it out over three years. The Accreditation Council for Graduate Medical Education has set a minimum amount of clinical training (e.g., inpatient time and specific electives), but further inpatient clinical time, electroencephalography training, research, and other electives vary between programs. With increasing adaptations to curriculum among child neurology residency programs, it is not clear how important these differences are to residency applicants, relative to other priorities.

The NRMP residency match data from 2020 show child neurology residency applicants demonstrated match rate of 90% for US allopathic seniors and 80% for US osteopathic seniors.⁸ A relatively higher proportion of US allopathic seniors applying to child neurology also hold PhD degrees compared with other specialties and United States Medical Licensing Examination Step 1 scores that are on par with those matching into competitive fields such as anesthesiology, emergency medicine, and general surgery.⁹ Medical school class composition continues to grow in diversity with increasing number of women and minorities represented in medicine. As of 2017, over half of all US medical school matriculants are women.¹ Electronic Residency Application Service data for child neurology residency applicants reveal a trend over the past five years of gradually increasing representation of female applicants, with the 2020 NRMP match consisting of 58% female applicants.¹⁰ Child neurology workforce data from 2002 evaluating practicing physicians performing at least 20 hours of patient care per week showed overall male predominance (69.4% male of 604 respondents), particularly those who had been practicing 15 years or longer (74% male).¹¹ The 2015 American Academy of Pediatrics/Child Neurology Society Joint Taskforce survey reporting child neurology workforce data yielded responses from 523 practicing physicians and 97 trainees, which showed sex distribution of 37.5% female practicing physicians and 64% female trainees. There was a higher predominance of physicians with MD/PhD degrees (5.9%) in the practicing physicians than trainees and trend for increasing representation of trainees with DO degrees (1.7% practicing physicians and 12.6% trainees).¹² Given the changes in applicant demographics and educational backgrounds, we questioned whether this has created a shift in training priorities.

Several specialty-specific and multispecialty studies have evaluated various applicant priorities in selecting a residency, including resident morale,^{13–17} interpersonal fit,¹⁴ faculty involvement and teaching,^{13,14} depth and breadth of faculty,¹³ academic reputation,¹⁷ career preparation,¹³ interview day experience,^{16,17} geographic location,^{13,14,18} and proximity to family.¹⁸ A better understanding of child neurology residency applicant priorities would help to improve the match system and ensure programs are able to attract excellent candidates. In these shifting times, we sought to achieve better understanding of who our child neurology applicants are, where their priorities lie in crafting their rank lists, and how this has changed over time.

Methods

Study design and population

A survey titled “Child Neurology Applicant Priorities” (see [Supplementary Material](#) for full survey) was distributed in August

2018 by e-mail from SurveyMonkey (SVMK Inc, San Mateo, CA, USA) by the Professors of Child Neurology. This survey was distributed to all members of the organization, including current and past division heads, program directors, associate program directors, and program coordinators. Recipients were asked to distribute the survey to current and past residents from their programs. There was no ability to confirm whether these e-mails were distributed and how many individuals received it. Participation in the survey was voluntary and all responses were anonymous. This study was reviewed and deemed exempt by the Washington University School of Medicine Institutional Review Board.

Survey content

The survey contained seven questions and took approximately 1.5 minutes to complete. Participants were asked to identify their year of graduation from medical school, age at the time of residency application, degree obtained (MD, DO, MD/PhD), international medical graduate status, sex, and whether they participated in the couple's match. They were then asked to select the five most important factors in choosing a residency among the following options: residency size, number of faculty, clinical curriculum and training, subspecialization of faculty, interactions with faculty, research opportunities, resident workload, resident happiness and wellness, interactions with residents, interactions with program director(s), perception of adult neurology training, postgraduate opportunities and fellowships, postgraduate resident jobs and placement, perception of city or geography, spouse or family reason, pediatrics training, and other (with free-text for specification). Because of the nature of the survey software, respondents could choose more or less than five items, if desired.

Institutional data

For the past several years, our institution (Washington University School of Medicine/St. Louis Children's Hospital) has sent a postmatch interview survey to all interviewed applicants. Survey data were available for years 2011, 2013 to 2015, and 2017 to 2020. In this survey, in addition to institution specific questions, we asked applicants to select what was most appealing to him or her about the program they ranked number one. Responses were given in the format of comments until 2018 when survey format transitioned to multiple choice selection that only allowed one response. These options included curriculum structure, clinical autonomy of residents, resident workload, call responsibilities, perception of resident wellness and happiness, fit and interactions with residents, fit and interactions with faculty, general pediatrics interview experience, perception of adult neurology training, research orientation, perception of city, and spouse or family reasons. The 2017 survey did not include this question of interest, so that year was excluded.

Statistics

We used a binary logistic regression model to examine the effect of medical school graduation year per decade and sex on the selection of clinical curriculum and training, faculty subspecialization, interaction with faculty, interaction with residents, interaction with program director, resident happiness and wellness, and location. For the combined categories of work-life balance, academic factors, and interpersonal factors, a general linear model was used to model the data. Because of the variable amount of responses, a hypergeometric distribution was used to calculate deviation from an assumed response rate within each category to an actual response rate. On the basis of this method, each participant's preferential

selection of the combined categories can be determined. Our institutional data were reviewed with descriptive statistics.

Results

A total of 284 responses were received for the “Child Neurology Applicant Priorities” survey. Respondent demographics are outlined in Table 1. There were an increased number of responses for individuals matriculating into residency in the past decade. Sixty-three percent of respondents were female with increased proportion of female respondents over time. Eighteen percent of all respondents had MD/PhD degree with an overall decrease in number of respondents with MD/PhD over time. Average age at graduation from medical school was 28 years and remained relatively stable over time. Approximately one fifth of participants chose greater than five factors influencing their residency training program selection as the survey software did not set a hard limit. Respondent median and interquartile range for the number of factors selected was 5.0 [4.0, 5.0].

In evaluating broad categories of academic, interpersonal, and work-life balance factors over time the respondents had an increased probability of selecting work-life balance factors ($P = 0.0007$) together with a decreased probability of selecting academic factors ($P < 0.0001$) as an influence in selecting a training program. In multivariate models, no other covariate became significant.

As an applicant’s year of medical school graduation increased (per decade), there was a decrease in probability of considering curriculum as an important factor for residency selection (odds ratio [OR], 0.746; 95% confidence interval [95% CI], 0.568 to 0.98; $P = 0.035$; Table 2). The importance of interaction with faculty overall was unchanged over time, but a difference existed among female applicants who were more likely to select this as an important factor (OR, 1.952; 95% CI, 1.177 to 3.255; $P = 0.009$). There was no significant difference between sexes regarding priority placed on faculty subspecialization or interaction with program director(s). Interaction with residents had increasing priority over time (OR, 2.207; 95% CI, 1.486 to 3.278; $P < 0.001$), as did sense of resident happiness and well-being (OR, 2.176; 95% CI, 1.494 to 3.169; $P < 0.001$), and perception of city or geography of residency program (OR, 1.702; 95% CI, 1.264 to 2.293; $P < 0.001$; Fig).

A total of 150 responses were received for our institutional postmatch surveys. Response rate varied across years but was generally 40% to 60%. The most common factor for ranking a program number one was spouse or family reason (26.7%), followed by fit and interaction with residents (16.0%), fit and interaction with faculty (14.7%), research orientation (14.0%), and location or perception of city (13.3%). In descriptive comments, many

applicants relayed the importance of a general sense of “fit” with their number one program.

Discussion

Our survey identified an increase in child neurology applicants prioritizing quality of life factors over time. This finding paralleled our institutional data that identified an increasing emphasis on interpersonal relationships and applicants perceived “personality fit” with residents based on their interview day experience. Our survey respondents were generally representative of the child neurology workforce with an increasing representation of females¹⁰⁻¹² and number of DO degrees over time.¹² Our respondents had a higher representation of MD/PhD degrees than recent workforce numbers, which have demonstrated an overall decrease in MD/PhD degrees over time.¹²

Many factors contribute to resident well-being and happiness in any given training program, but strong social relatedness has been identified as a protective factor for resident burnout.⁴ This sense of social relatedness may be crafted by multiple components including overall culture of a training program, relationships with faculty, coresidents, geography, and proximity to family and loved ones. Residency program directors will not be surprised to find that interaction with current residents is prioritized given this is highly emphasized on interview days. Residents get ample face time with applicants during scheduled social events and are encouraged to participate in casual conversations during applicant lunches and hospital tours. The increased emphasis on resident interaction may be a by-product of how the interview day structure itself has evolved as opposed to a true change in applicant priorities. Regardless, this poses a particularly difficult challenge for residency recruitment in times of social distancing because of the coronavirus disease 2019 pandemic present at the time of writing this article. With the likelihood that residency interviews will rely heavily on video conferencing, applicants will lack exposure to many of the interpersonal facets that come with in-person interview days. Programs will need to be more creative about attracting applicants to their program and applicants may need to invest more time remotely getting acquainted with programs and locations.

Prioritizing quality of life features also speaks to the increasing attention of the medical community on physician burnout, which is becoming more frequently recognized, discussed, and addressed in residency programs with implementation of tools to identify residents in distress.¹⁹ Physician burnout issues have entered the public eye through the lay press, as well.²⁰ Burnout prevalence and work-life imbalance are higher among neurologists than physicians in most other specialties.² It is perhaps not surprising that child neurology applicants would seek to protect themselves from burnout by looking for wellness initiatives being supported and

TABLE 1.
Survey Respondent Demographics

Year of Graduation From Medical School	Number of Respondents	% Female	Average Age at Graduation From Medical School	%MD, PhD	%DO	%IMG	% Couples Match
<1980	6	0	27	33	0	0	0
1980s	11	27	28	18	0	18	0
1990s	16	44	30	25	0	44	6
2000s	37	65	28	14	11	30	5
2011-2015	139	65	28	22	9	9	6
2016	21	81	28	14	10	0	5
2017	25	68	27	4	12	12	16
2018	21	71	27	14	5	5	0
TOTAL	284	63	28	18	8	13	6

Abbreviations:
DO = Doctor of osteopathic medicine
IMG = International medical graduate

TABLE 2.
Effect of Medical School Graduation Year and Sex on Residency Applicant Priorities

Logistic Model	Variable	P Value	OR (95% CI)
Curriculum	Year of graduation	0.0354	0.746 (0.568-0.98)
	Sex	0.3155	1.296 (0.781-2.148)
Faculty specialization	Year of graduation	0.5677	1.088 (0.815-1.452)
	Sex	0.7848	0.927 (0.538-1.597)
Faculty interaction	Year of graduation	0.9386	1.01 (0.778-1.312)
	Sex	0.0097	1.957 (1.177-3.255)
Resident interaction	Year of graduation	<0.0001	2.207 (1.486-3.278)
	Sex	0.2568	1.352 (0.803-2.279)
Program Director interaction	Year of graduation	0.1645	1.224 (0.92-1.628)
	Sex	0.7689	0.925 (0.552-1.552)
Resident happiness	Year of graduation	<0.0001	2.176 (1.494-3.169)
	Sex	0.96	0.987 (0.588-1.658)
Location	Year of graduation	0.0005	1.702 (1.264-2.293)
	Sex	0.692	1.11 (0.663-1.858)

Abbreviations:
CI = Confidence interval
OR = Odds ratio

showcased during interviews and prioritizing these qualities when crafting their final rank list.

The increased priority placed on quality of life measures may be occurring at the expense of decreased interest in institution-specific curricula. This decreasing emphasis may be related to overall increasing homogeneity of child neurology residency training. Programs are adapting to the Accreditation Council for Graduate Medical Education–mandated changes in structure including decreased adult neurology time and increased duty hour restrictions that results in fewer differences between programs in outpatient and inpatient clinical demands. The decrease is unlikely to be related to an applicant’s desire to be “less academic,” as child neurology training programs are predominantly at moderate and large academic hospitals and the specialty remains a common destination for MD/PhD applicants.⁹ Similarly, our institutional

survey data support a continued priority placed on research opportunities.

Over time there has been an increased number of female applicants for residency training programs in child neurology. This follows the same trend as demonstrated by national data for pediatrics and pediatric subspecialties.¹ The only difference between sexes in priorities we identified was a higher emphasis placed on interaction with faculty by females. At present, with growing appreciation for wage gaps and gender bias in academic medicine,²¹ mentorship is a proposed method to address the barriers to advancement of female physicians.²² Thus female applicants may be looking for representative role models, particularly women in positions of leadership, who would serve as mentors.

With survey respondents skewing toward more recent graduates, there were some factors such as increasing weight placed on

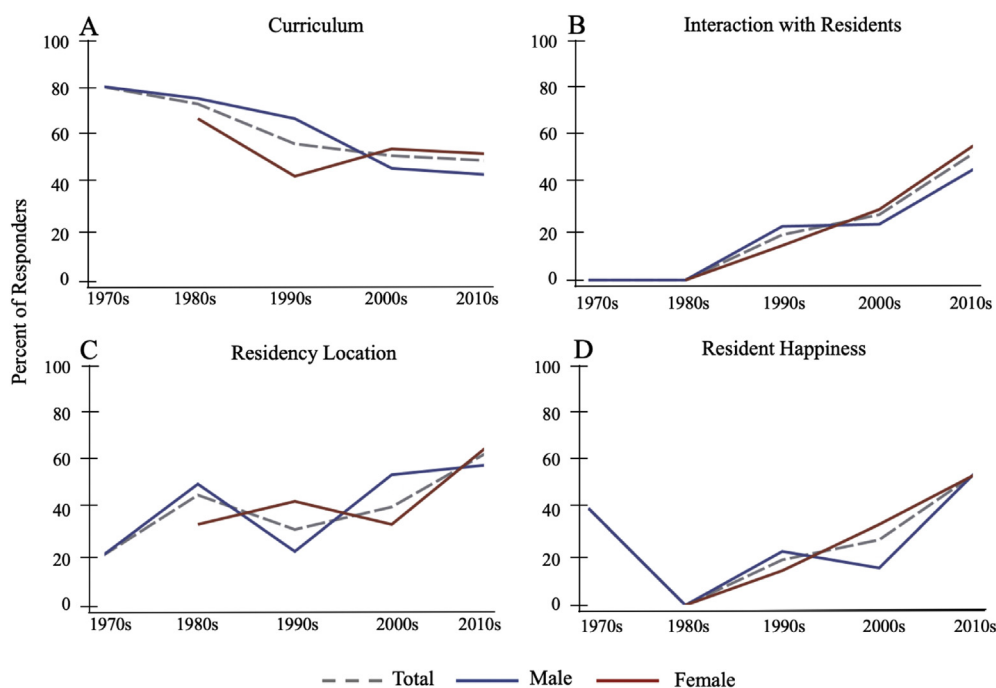


FIGURE. Survey responses ranking important priorities for child neurology applicants over time. Trends are displayed for all respondents (dashed lines) and by sex (males blue and females red). There was a decrease over time in the odds of applicants ranking curriculum (A) and significant increases over time in ranking interaction with residents, residency location and resident happiness (B, C, D). The color version of this figure is available in the online edition.

residency program size and the impression of the preliminary training in general pediatrics that were more likely to be reflections of graduation date, as these features were not a variable in residency program selection until recent years. In addition, institutions with larger residency program size may have had a disproportionately high response rate leading to sampling bias. Increasing weight placed on impression of the characteristics of general pediatric training is likely related to changes over time in the relationship between allied child neurology and pediatric training programs and the match process. The transition from the San Francisco Residency and Fellowship Match Service to the NRMP, which facilitated matching applicants to categorical programs (linking preliminary general pediatric training and neurology training at single or partner institutions), motivates applicants to think more critically about combined training in pediatrics and neurology over a five-year period, as opposed to pediatric residency being a two-year aside, sometimes at a separate institution. Data from the 2020 NRMP match show 151 of 159 categorical positions were filled and 12 of 25 advanced positions (applied to after preliminary pediatrics training) were filled.⁸ This lean toward more trainees doing combined training through the categorical match may contribute to the priority placed on pediatric training.

Finally, generational differences may impact applicant priorities as the millennial workforce may be fundamentally different than prior generations. Millennials (those born between 1981 and 1999) have been noted to show increased need for affiliation with teams, strong peer bonds, sociability, and work-life balance as compared with Generation X (those born between 1965 and 1980).^{23,24} In addition, a relatively high proportion of applicants with PhD degrees entering child neurology may contribute to a sense of delayed gratification regarding work-life balance, prompting more priority to be placed on these program qualities.

There are several limitations to this study. We were reliant on others to distribute the survey, which is reflected in the lack of a responder rate and the inability to confirm which programs sent out the survey. It is also likely that there are institutional differences in the accuracy of alumni distribution lists and many graduates may not have received the survey. This is reflected in the increased number of responses from more recent medical school graduates, as current trainees and recent residency graduates are easier to contact than graduates from past decades. Applicants from over a decade ago also may have more consistency or historical bias given the longer time between their residency application and data collection. Those who have been in practice for longer may report factors that reflect their current values more so than their values at the time of residency application. The inability to have respondents select only five responses made statistical analyses more challenging. Imposing limits to responses on future surveys would help to better standardize data. Future surveys should also include racial demographic information. Our internal postmatch surveys were primarily collected for our own recruitment development and predominantly contained qualitative data, which could impart unintended bias as answers were analyzed. Finally, there may have been program characteristics influencing applicants' choices that were not included in this survey.

Conclusions

Survey respondents demonstrated an increased emphasis on quality of life and work-life balance factors with decreasing weight on curriculum and academic factors. Resident happiness and well-being, interactions with residents, and geographic location all have increased over time as priorities when selecting a residency training program. This trend may be influenced by shifting demographics of residents, increasing awareness of physician and

resident burnout, and an emphasis on resident well-being. Ultimately, the information collected by this survey allows for all child neurology residency programs to optimize commonly desired aspects of residency training and highlight these features during the interview process.

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Supplementary Data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pediatrneurol.2020.09.012>.

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