

## Research Letter

# Why an Increasing Number of Unmatched Residency Positions in Radiation Oncology? A Survey of Fourth-Year Medical Students



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Received March 18, 2021; revised May 5, 2021; accepted June 9, 2021

## Abstract

**Purpose:** The number of US fourth-year medical students applying to radiation oncology has decreased during the past few years. We conducted a survey of fourth-year medical students to examine factors that may be influencing the decision to pursue radiation oncology.

**Methods and Materials:** An anonymous online survey was sent to medical students at 9 participating US medical schools.

**Results:** A total of 232 medical students completed the survey. Of the 153 students who stated they were never interested in radiation oncology, 77 (50%) reported never having been exposed to the specialty as their reason for not pursuing radiation oncology. The job market was the most commonly cited factor among students who said they were once interested in but ultimately chose not to pursue radiation oncology. Conversely, the recent low pass rates for board examinations and a perception of a lack of diversity within radiation oncology had the least influence.

**Conclusions:** Despite discussion of potential measures to address this disquieting trend, there have been minimal formal attempts to characterize and address potential causes of a decreasing interest in radiation oncology. This study's data are consistent with previous research regarding the trend of decreased medical student interest in radiation oncology and may be used as part of ongoing introspective assessment to inform future change within radiation oncology.

Sources of support: This work had no specific funding.  
Disclosures: none.

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<https://doi.org/10.1016/j.adro.2021.100743>

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## Introduction

There has been a recent increase in unmatched positions among radiation oncology residency programs within the United States. In 2020, the proportion of unmatched residency positions rose to 19%, compared with 14% in 2019 and approximately 4% from 2010 to 2018.<sup>1-3</sup> In addition, the number of US senior medical students applying to radiation oncology has continued to decline; 0.4% of all US senior medical students applied to radiation oncology in 2020, compared with 0.52% (163 students) in 2019 and an average of 0.66% between 2010 and 2018.<sup>1-4</sup>

A number of factors may be contributing to the increase in unmatched programs, including decreased interest among medical students.<sup>4,5</sup> Wu et al recently published a survey of senior medical students, finding that students who were once interested in radiation oncology but ultimately opted against it were most influenced by the job market.<sup>6</sup> In this study, we sought to further characterize the perceptions of senior medical students toward radiation oncology within the United States.

## Methods

An anonymous online survey was sent to fourth-year US medical students postmatch in the spring of 2020 using Qualtrics software (SAP, Provo, UT). The survey was distributed at Mayo Clinic Alix School of Medicine, Oregon Health and Sciences University, Tufts University School of Medicine, University of Alabama at Birmingham School of Medicine, University of Florida College of Medicine, University of Iowa Carver College of Medicine, University of Michigan School of Medicine, University of Wisconsin School of Medicine and Public Health, and Virginia Commonwealth University School of Medicine. There was minimal overlap between this survey and Wu et al's survey, with only 1 institution included in both.<sup>6</sup> The total number of students receiving the survey was approximated at 1000, with an estimated response rate of 23%; however, owing to the COVID-19 pandemic, many students graduated early, and e-mail correspondence was lost at the time of graduation. The survey remained open for 5 weeks, and ten \$25 Amazon gift cards were distributed randomly as incentives. The study was deemed exempt by the University of Wisconsin institutional review board, each participant read an informative statement about the survey prior to taking it, continuing to take the survey was considered consent. Descriptive statistics and the Spearman correlation coefficient were used for data interpretation. Attempts at face validity testing were made

based on gender; 52% of the survey respondents were female and 46% were male in this study, similar to 2019 data on US medical school enrollees, of whom 51% were female and 49% were male.

## Results

A total of 232 fourth-year medical students participated in the survey (215 with complete data); demographic characteristics are summarized in Table 1. Most students (93%) did not pursue radiation oncology in the 2020 match.

The majority of respondents (70%) reported never being interested in radiation oncology. Of those not ever interested in radiation oncology, the most commonly reported reason for such was never having been exposed to the specialty (50%), followed by interest in a more traditional specialty (19.6%) and not wanting to pursue a specialty heavy in physics or math (19%) (Table 2).

**Table 1** Characteristics of respondents

Characteristics	Respondents, No. (%) (N = 232)
Gender	
Male	106 (45.7)
Female	120 (51.7)
Nonbinary	1 (0.4)
Unknown	5 (2.2)
Academic degree*	
MD	213 (91.8)
PhD	13 (5.6)
MS	9 (3.9)
MBA	3 (1.3)
JD	1 (0.4)
MPH	9 (3.9)
Other	14 (6.0)
Geographic region of medical school	
Northeast	12 (5.2)
Southeast	70 (30.2)
Midwest	103 (44.4)
West	30 (12.9)
Southwest	2 (0.9)
Unknown	15 (6.5)
Radiation oncology department in school	
Yes	214 (92.2)
No	3 (1.3)
Unknown	15 (6.5)

Abbreviations: JD = juris doctor; MBA = master of business administration; MPH = master of public health.

\* Percentages do not sum to 100% owing to some respondents' holding multiple degrees.

**Table 2** Summary of reasons for not being interested in radiation oncology

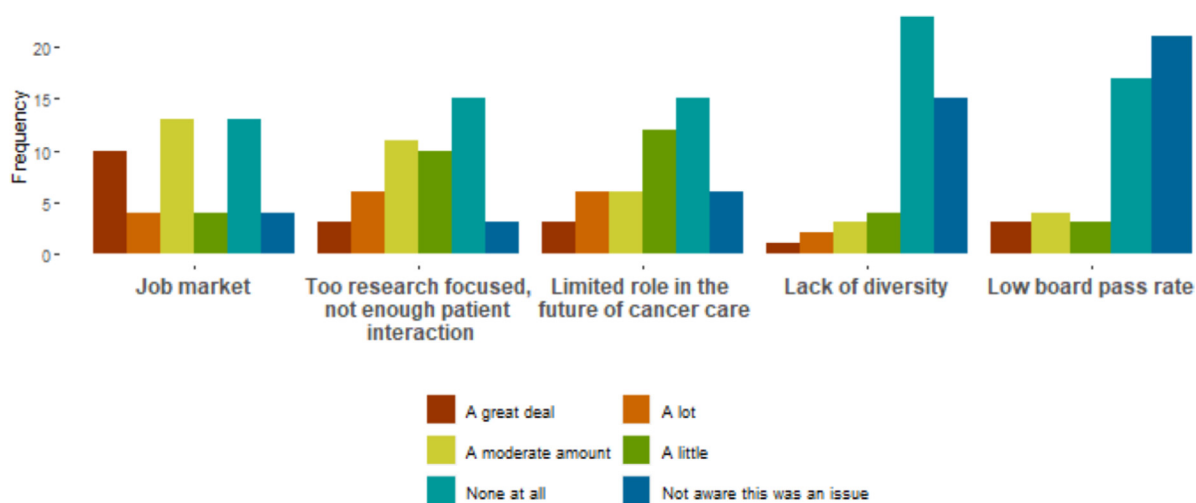
Reason	Respondents, No. (%) (N = 153)
Exposed to the specialty but not interested in cancer care	11 (7.2)
Exposed to the specialty but did not want to be in a specialty heavy in physics or math	29 (19.0)
Exposed to the specialty but did not want to interact daily with patients	3 (2.0)
Exposed to the specialty but interested in a more traditional medical specialty	30 (19.6)
Never exposed to the specialty	77 (50.3)
Other	3 (2.0)

A total of 50 respondents (23%) reported once being interested in radiation oncology but ultimately not choosing to pursue radiation oncology in the match. When queried regarding the importance of specific variables influencing the decision not to pursue radiation oncology, the job market was the factor cited as having the most influence, with 30% of respondents reporting it influenced them either a “great deal” or “a lot” (Fig 1). Conversely, board examination pass rates and a perceived lack of diversity within radiation oncology had the least influence. A total of 79% of respondents reported that board examinations and a lack of diversity had no influence at all or that they were unaware these were even an issue within radiation oncology (Fig 1).

### Discussion

This analysis of interest in radiation oncology among medical students from the most recently matched medical school class within the United States had 3 key findings:

- 1 Altogether, 70% of respondents reported never being interested in radiation oncology. Importantly, of those never interested in radiation oncology, 50% reported never having been exposed to the specialty as their reason for not pursuing radiation oncology. This is consistent with a perceived underemphasis of oncology curriculum within US medical schools and imbalanced involvement of different clinical subspecialists as educators.<sup>7</sup> Furthermore, there is limited exposure of medical students to radiation oncology, with gaps in knowledge critical to understanding the role of radiation oncologists in the multidisciplinary management of cancer.<sup>8,9</sup>
- 2 The factor most influencing those who reported once being interested in radiation oncology but who decided not to pursue the specialty (30% of respondents) was the job market. In this study, 65% of this subset reported that the job market had some influence on their decision not to pursue radiation oncology. These findings are consistent with a generally reported increasing concern surrounding the job market within radiation oncology as well as maldistribution of



**Fig. 1** Summary of factors affecting the decision not to pursue radiation oncology among those who were once interested in radiation oncology but did not apply (48 responses). The job market was the factor most frequently reported as having “a great deal” of influence on the decision not to pursue radiation oncology among those who were once interested in radiation oncology but did not ultimately apply. Lack of diversity within radiation oncology and a low pass rate on board examinations had the least influence, with a high proportion of respondents reporting being unaware that these factors were an issue.

jobs.<sup>5,10</sup> A total of 53% of American Society for Radiation Oncology members surveyed and 91% of radiation oncology residents surveyed expressed concern over a perceived unfavorable job market.<sup>11,12</sup>

- 3 A perceived lack of diversity within radiation oncology and pass rates for board examinations were not concerns among those initially interested in but who did not ultimately pursue radiation oncology. Notably, 79% of this subset reported that a lack of diversity and board examinations had no influence on their decision not to pursue radiation oncology. This finding is particularly salient given a recent American Society for Radiation Oncology news bulletin suggesting that a lack of diversity may be the primary factor in the decreasing number of applicants in radiation oncology.<sup>12</sup>

Similar to Wu et al, we found that of those medical students who were never interested in radiation oncology, the great majority were never exposed to the specialty.<sup>6</sup> We also confirmed that of those who were interested but chose not to pursue radiation oncology, the job market was the most influential factor. We recommend further investigation into the job market and career satisfaction within our field to help inform changes within radiation oncology training as well as to provide ongoing data to medical students considering radiation oncology. Furthermore, board examinations and pass rates and a concern about lack of diversity did not influence respondents who were once interested in radiation oncology but decided not to pursue the specialty, and in fact, these were not recognized as issues of concern by most respondents. We advocate that this study's data be considered by stakeholders when deciding how to structure changes within radiation oncology training.

## Acknowledgments

We thank the DHO Clinical Trials staff who work tirelessly to support our research.

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