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Factors Influencing Diagnostic Radiology as a Specialty choice among Women

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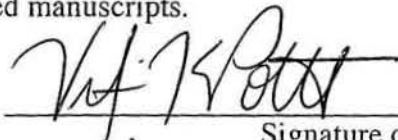
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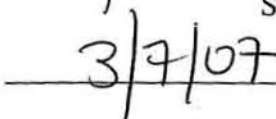
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**FACTORS INFLUENCING DIAGNOSTIC RADIOLOGY
AS A SPECIALTY CHOICE AMONG WOMEN**

A Thesis Submitted to the
Yale University School of Medicine
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Medicine

Victoria Kathryn Potterton

2007

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Abstract

While the number of women entering medical schools is approaching 50% nationally, women continue to be underrepresented in a number of specialties including diagnostic radiology. Although diagnostic radiology has many lifestyle characteristics that might be desirable to women, (e.g., reasonable call hours, flexible scheduling, and high salaries) women still do not choose radiology at the same rate at which they choose other specialties. Here, we use literature review, aggregated data analysis, and focus groups to investigate possible reasons why women enter diagnostic radiology at a lower rate than they enter medicine as a profession.

The current literature suggests a constellation of factors may be responsible for the gender differences in diagnostic radiology. Evaluation of factors affecting specialty choice include a review of available data on physician satisfaction and lifestyle data and analysis of focus groups and interviews conducted with female diagnostic radiology residents and female medical students from the Yale University School of Medicine.

We conclude that women who do not choose radiology are unable to overcome the lack of patient care inherent in its practice. Women who do choose radiology enjoy its technical aspects and often seek to offset the lack of patient contact by seeking careers in breast imaging and interventional radiology. Elective experiences and positive role models were important for women who went into radiology but were less important for women who chose other specialties. Finally, women who did not choose radiology as a career cited lifestyle as radiology's most attractive attribute, but women who *had* chosen a career in radiology placed significant emphasis on other aspects of radiology as the most important factors in their specialty choice, mentioning lifestyle as an afterthought.

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Dedication

I dedicate this work and my degree to my parents, Bill and Kathy Potterton, for their generous support, unconditional love and unending encouragement from the very beginning. They have made everything I have accomplished possible and continue to inspire me to follow my dreams.

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Introductionⁱ

Although the number of women entering medical schools in the United States approaches 50%, women remain underrepresented in some specialties, including Diagnostic Radiology. In 1992, 11% of active radiologists and 24% of residents in radiology were women (personal communication, Dr. Kimberly Applegate, January 30, 2004). In 1995, 13% of active radiologists and 24% of residents and fellows were women.¹ In 2000, women made up 16% of post-training radiologists and 22% of residents and fellows.² When we compare these numbers with female medical school acceptance rates of 43% in 1995 and 46% in 2000^{3,4}, it is clear that women enter careers in Diagnostic Radiology at a much lower rate than they enter the medical profession as a whole. Although the percentage of residents who were women held constant at 25% from 1988 to 1999, the percentage of all female residents who were in Diagnostic Radiology fell from 4% to 3% over the same period.⁵ In the 2003 National Residency Match, Diagnostic Radiology was the only specialty to have fewer women match than in the previous year.^{3,4} In light of these gender differences, one wonders if women are less informed about careers Diagnostic Radiology than men, or if women are not encouraged toward or selected for this specialty.

Which specialties medical students choose and how socialization during medical school affects that choice are important issues for educators to address. Research demonstrates that women are less likely to consider lifestyle, work hours, call hours, or salary when choosing a specialty.⁵ Moreover, specialty choices among women have

ⁱ The content in this section has previously been published in the *Journal of the American College of Radiology*⁴⁷.

subspecialties.⁵ A woman may ignore her skills or talents and choose a field with a more favorable professional environment, often one that already includes large numbers of women. The moral and ethical justifications for gender equality are obvious. In addition, a reasonable and representative distribution of medical abilities is important for the sake of patient access to health services. Medical students' gender and ethnicity should be distributed across specialties by criteria that address quality of care and equal and efficient access to medical services. These topics have important implications as Diagnostic Radiology becomes increasingly important for clinical care and therapy.

Women in medicine: an overview

In spite of relatively equal rates of matriculation into medical school, women are still not evenly distributed across medical specialties. A 1986 Public Health Report cited a 36% gender difference in annual income and a 24% difference in adjusted hourly income in 1986.⁶ Progress has been slow, with persistent inequalities, beginning at the medical school level. In her 2001 status report, "Gender Equity in Undergraduate Medical Education," Janet Bickel⁵ noted that while access to medical education for men and women has equalized, female medical students still describe inadequate teaching in women's health, report gender discrimination three times more often, and claim a lack of role models in procedure-based specialties. Bickel⁵ further noted that medical students rated artwork, articles, and *curriculum vitae* lower when they believed they were evaluating a woman's work. Finally, Bickel⁵ noted that female academic physicians must be 2.5 times more productive in order to receive competency scores similar to those of male counterparts.

Surveys of women throughout medicine indicate a greater perception of unfairness and inequity in medical practice between women and men.⁷ In 1999, a survey of women in medicine found that close friends and a pleasant work environment were more important aspects of a job for women, while opportunities for promotion and increased pay were the most important work-related issues for men.⁸ The same survey noted that men attribute their success in medicine to ability, while women often view luck as the major factor contributing to their success. Other commentaries have addressed the issue of ‘microinequities,’ which include a constellation of comments, jokes, or attitudes that are too subtle to isolate but which create an unpleasant work environment for women.⁹ In one survey, female faculty reported that they felt they were “poorly prepared” to address gender discrimination at work and noted the adverse effects of gender bias on their professional confidence, collegiality, and career satisfaction.¹⁰ Of the women who answered the survey, 40% ranked gender discrimination as the number one hindrance to their academic careers. An additional 35% ranked gender discrimination second to either “limited time for professional work” or “lack of mentoring.”

Women in academic medicine

Gender disparity in academic medicine is well documented. Women are more likely to enter academic medicine than private practice, and yet women face greater obstacles to promotion and have difficulty accessing institutional resources.¹¹ Women represent 30% of the faculty of U.S. medical schools today, yet they represent only 17% of all tenured faculty according to the Association of American Medical Colleges

(AAMC).¹² At higher levels of administration, such as department chair or dean, there are even fewer women: for example, only ten of 126 medical school deans in the U.S. are women.

While the number of women at every academic level is increasing, the rates of promotion for men and women still show marked discrepancies¹³; women are less likely to be promoted beyond the level of assistant professor.¹⁴ Indeed, according to the AAMC¹², the proportion of women who achieve the rank of full professor has not changed in over 20 years; nationally only 12% of women in academic medicine are professors compared with 31% of men. Women in academic medicine are less likely to have dedicated office or laboratory space, to start careers with grant support, or to have dedicated research time. Some authors have attributed these disparities to differences in negotiation skills.^{14,15} One author¹⁵ notes that a woman's cooperative style may put her in a vulnerable position relative to a man's more competitive style, allowing men to dominate interactions in academic (and other) settings. For example, Lewis¹⁴ describes female professors who claim that ideas contributed initially by women are later "attributed to men who make similar but derivative comments."

Another study found disparities in promotions between men and women who had joined faculties at the same time¹⁵. The authors implied that the slower promotion rate was likely related to an "informal adjustment" of the timetable to account for time spent outside of the academic environment on personal issues, such as childrearing. In spite of this proposed explanation, the authors also found that fewer women in academic medicine were married than men, and more than three times as many women as men had never been married (4% vs. 15%), implying that women who devote themselves to their

careers in academic medicine may make greater sacrifices in their personal lives. According to several academic leaders surveyed, barriers faced by women in academic careers include: traditional gender expectations (specifically child-related responsibilities), “sexism in the medical environment,” and a lack of mentoring in their chosen field.^{14, 16}

Women surveyed at all levels of medical education and academic practice reported a greater need for leaders, mentors, and role models.^{7, 10} A study of one surgery department found that 25% of women medical students reported no contact with female surgeons, even though 40% of the surgical faculty was female.¹⁷ This report questions both the presence of active role models and access to potential mentors. Another article reports that women in medicine lack adequate advice about academic advancement; women may place patient care and teaching ahead of national service and visibility,¹⁸ omitting a requirement for tenure at many institutions.¹¹ Indeed academic productivity correlates with less time spent teaching, and productivity translates into higher salaries and higher rank. Because more women spend their time teaching, they may be damaging their careers simply by making a contribution that is not given the same weight by many systems of academic evaluation.¹⁹ Surveys have established that women work part-time more often than men, often attributing this preference to increased family responsibilities¹¹, which may interfere with tenure opportunities in spite of equivalent training, ability and productivity, because the vast majority of institutions do not allow tenure-track faculty to work part time. Buckley *et al.*¹¹ suggest that promotion criteria be modified to reflect the different values and the intellectual, teaching, mentoring, collaborative, research and administrative contributions made by women.

Sexual harassment is also an important issue in academic medicine. Many articles have reported that women medical students, residents, and faculty self-report more episodes and increased severity of sexual harassment and gender discrimination than their male counterparts.^{5,20,21} A Stanford University study examined interventions to decrease sexual harassment among medical school faculty.²² The one-year program included education sessions, workshops, and implementation of a diversity council. Men on the faculty perceived the gender climate to be more positive than women both before and after the program, although the number of women with a positive perception increased after intervention. The authors concluded that “critical mass” was not sufficient to prevent sexual harassment or bias against women; instead, a broader and deeper approach across the institution was necessary.

Studies at institutions such as Columbia, MIT, and the Mayo Clinic suggest that efforts by department chairs, deans, and university administrations can improve the work environment for women in medicine relatively quickly and at a low cost.²³⁻²⁶ A 1996 Johns Hopkins University study described interventions by the Department of Medicine to identify and remove gender-based obstacles to advancement.²⁴ The authors surveyed male and female faculty and found significant differences in career development experiences. Women described obstacles to promotion such as rigid limits for time-at-rank and evening and weekend meetings that they could not attend because of their increased family responsibilities relative to men in similar positions. While equal proportions of men and women had mentors, women reported that their mentors were less likely to facilitate career development. Interventions included moving medical grand rounds from Saturdays to Friday mornings, adding at least two women to departmental

search committees, and implementing *curriculum vitae* reviews to identify junior faculty whose careers were progressing slowly. The department increased women's salaries to match those of men at a comparable level. After the three-year intervention, the percentage of women who felt the departmental climate was less supportive declined from 53% to 22%, while the percentage of women who felt 'welcome at the institution' climbed from 38% to 53%. The percentage of women with mentors increased from 31% to 65%, and 90% of the women who had mentors said their mentors actively fostered their careers.

The data collected at various institutions demonstrate that gender bias can be addressed with fairly simple, if multifaceted, remedies. These studies also indicate that women enjoy improved career satisfaction and performance in academic medicine when given support and opportunities and effort on the part of deans and chairs to adequately research salary disparities. Some institutions have remedied these inequities, many have not; some medical schools require annual professional reviews to promote junior faculty, some provide day care on site and still others have dual career offices, such as the University of California at Davis (personal communication, Dr. Kimberly Applegate, January 29, 2004). The benefit to institutions and to our society is not well studied. That being said, we know that a diverse work force with diverse perspectives and experiences brings with it more creative solutions to the problems facing health care delivery and medical research. Unequal representation of women in certain medical specialties persists in spite of equal numbers of men and women entering medicine highlights the importance of understanding gender-related issues in specialty choice.

Gender, sexual harassment, and specialty choice

The AAMC¹² tracks data annually from each of the 126 medical schools' deans on the composition of the medical students, house staff, and faculty. In 2003, they reported that internal medicine has the highest number of women (28% of all female residents). The next highest concentrations of women are in pediatrics (16%), family practice (13%), obstetrics and gynecology (9%), and psychiatry (7%), and these proportions have remained stable in recent years, accounting for 73% of female residents in total. With the exception of obstetrics and gynecology, three of the top four specialty choices for women remain the lowest paid in medicine. When choosing Diagnostic Radiology as a specialty, women cite "intellectual challenge" and "talent for skills characteristic of the specialty" as the most important factors in their choice, which is also true for women entering surgery, internal medicine, psychiatry, and anesthesiology.²⁷ In contrast, women entering family practice and pediatrics, two specialties women have historically chosen in large numbers, emphasize their desire to work with these patient populations and the emotional challenge associated with these specialties.

Women report different amounts of harassment and gender bias depending on their specialty. In general, the higher the proportion of women in the specialty, the fewer the reports of perceived or actual gender bias. For example, female surgeons perceive the most gender bias and harassment.²⁸ One study found that a woman's choice of surgery as a specialty correlated with a higher proportion of women on the surgical faculty at the student's particular medical school.¹⁷ Exposure to role models also affects specialty choice.²⁹ Findings such as these may suggest women can be recruited to Diagnostic Radiology by improving access to positive exposures during medical school, such as

small group sessions led by radiologists, research projects, mentoring programs, and elective rotations. Departments should ensure that medical students have access to mentors and are acquainted with the field by the time they apply for the National Residency Match.

Gender and diagnostic radiology

Recently, diagnostic radiology has seen a fall in the number of women entering the specialty through the National Residency Match. Figures 1a and 1b detail two important trends between 1991 and 2005 seen in the yearly educational data released in the educational issues of *Journal of the American Medical Association*³⁰. Figure 1a shows the percentage of diagnostic radiology residents who are women, which declined significantly during the 1990s. Figure 1b shows an increasing divergence between the percentage of women in radiology and the overall percentage of female residents. Both figures show that the numbers have begun to 'recover' recently, although radiology still lags in the proportion of female residents. Also, when the ratio of the percentage of women in radiology residency is compared to the percentage of women in all residencies (Figure 1c), this value has been relatively flat even as the percentage of women in radiology has slowly recovered. This observation implies that the gap between women in medicine overall and women in radiology is not closing.

Studies during the 1980s found that attitudes and barriers confronting women in Diagnostic Radiology are similar to those in other competitive specialties.^{31,32} In 1987, barriers encountered by women in academic Diagnostic Radiology departments resembled those described by women in other fields of academic medicine: female

radiologists published fewer articles, were less likely to be lead authors, and were less likely to become associate or full professors.³¹ In the same study, women identified the lack of a mentor for the “professional socialization process” as a major reason for the disparities in academic advancement. In 1983, researchers estimated that if women continued to enter radiology at the same rate, by the 1990s, one third of radiologists would be women,³³ and that the number of women entering Diagnostic Radiology residencies would follow this proportion, but this has not occurred.

In a 1986 survey of male radiologists’ attitudes towards women radiologists, older male radiologists were more likely than younger male radiologists to view women as equals.³² The study noted that while female diagnostic radiologists felt they could function in any practice, their male counterparts stated women were better for general radiology. The authors concluded that in general, “women are viewed as valuable colleagues in radiology but often not as true equals.” They further hypothesized that men who perceived a threat from women might respond differently if they had greater contact with women in the field.

More recently, Vydareny et al.³⁴ reported in 2000 that there were no overall differences in the amount of time women and men spent at the rank of assistant professor. Rates of publication also appeared to have equalized at the assistant professor rank. However, women overall had been associate professors longer than men. Differences between men and women did persist in tenured positions and in upper levels of administration, analogous to academic medicine in general.⁵

By 1995 13% of active radiologists were women, and these radiologists were more likely to work in an academic practice with a teaching component and less likely to

work in a private practice.¹ Women clustered in certain subspecialties of radiology, such as mammography, pediatrics, and sonography and avoided others, such as interventional and vascular radiology. In 2000, the year of the most recent American College of Radiology data, women constituted 16% of radiologists, with more women still in academics than in private practice, except for women under the age of 35, who are less likely to be in an academic practice, perhaps because there is greater flexibility in the opportunity to work part-time outside of an academic setting, a topic worthy of further investigation.² In 2000, 20% of women and 8% of men in radiology worked part-time, and the men who worked part time were almost exclusively older than age 60.² In 2001, Chertoff *et al.*³⁵ reported that the percentage of women working part time had jumped to 30%, while only 7% of men were working part time. These survey data suggest that either women in radiology as a whole are shifting to part time work, or that younger women who are just entering the specialty are choosing to work part-time to spend more of their energy on obligations outside of their careers.

In a 1987 survey, female radiologists cited the “diagnostic challenge” as the main reason they chose Diagnostic Radiology as a specialty.³⁶ The large majority of women surveyed said they found their career “gratifying” or “very gratifying,” yet 80% of the women also reported experiencing discrimination during their career. Women suggested ways to improve their work environment, specifically including greater roles in patient management, more interaction with clinical staff, greater respect for women, and more opportunities for career advancement,³⁶ and cultivating increased support in managing family responsibilities from their spouses and other sources.³¹

Another study published in 1995 found that both men and women were equally satisfied with Diagnostic Radiology, an improvement from the 1980s.³⁷ While an initial review of the data suggested that women were more satisfied with Diagnostic Radiology than they were five years earlier, multivariate analysis revealed that age and salary status, rather than gender, were affecting satisfaction. Younger, salaried radiologists were more satisfied than five years before, and because female radiologists are younger and are more likely to work in salaried jobs, the results may not reflect a true increase in satisfaction among women. While the study found no difference in work hours or vacation time between men and women, radiologists who work part-time report lower career satisfaction, and women work part-time more often than men (17% vs. 6% in 1995), another difference that may mask disparities in satisfaction by gender.

In 1999 female radiologists reported more than twice the average earnings of women in other fields but lower career satisfaction, more stress, and less control over work hours.³⁸ They worked more than other female physicians, reported more incidences of gender-based harassment in medical school and postgraduate training, and experienced more sexual harassment in their work environment. The authors noted that self-reported episodes of discrimination often depended on “subjective interpretation of a probably unpleasant episode.” Women detailed subtle hostility, such as off-color comments, jokes, and other incidents “small in nature but not trivial in effect.”

These comments and attitudes, or “microinequities,” including subtle put-downs, inappropriate contact, use of demeaning terms, and the inability of institutions to deal with inappropriate behavior, are defined as “non-actionable” conditions or events that involve gender-related behavior that is offensive or inappropriate and can create an

environment of significant hostility.⁹ Microinequities are described as a barrier to career advancement in medicine, particularly when perpetrators are in positions of power or control money for research or clinical work. Another example is the lack of recognition and appointment of women to serve on local or national committees, to speak at national meetings, and to be promoted to leadership positions.²¹ As suggested earlier, this may be due to the fact that, in their professional careers, women tend to prioritize local and institutional goals rather than national ones.¹¹ In her analysis of women in the sciences at MIT, Nancy Hopkins²⁵ suggests that there is an inherent bias against women in academia. Experiences with sexual harassment correlated directly with decreased professional satisfaction,³⁹ and female faculty are 2.5 times as likely as male faculty to report perceived discrimination in an academic environment.²¹

A 1999 career satisfaction study of female physicians found that specialties with a “controllable lifestyle” correlate with higher satisfaction than primary care specialties, *except* in the case of Diagnostic Radiology.³⁸ General internal medicine, general practice, and Diagnostic Radiology had the highest levels of dissatisfaction among women, with 22% of women in each group reporting dissatisfaction. Work stress, lack of control, and encounters with gender bias or sexual harassment were cited as factors in dissatisfaction. While 47% of female radiologists said they would probably not choose medicine as a career again, 68% of female radiologists said they would not change their specialty. These data suggest that female diagnostic radiologists like their specialty but are not satisfied with medicine in general, an observation that encourages further investigation⁴⁰. As controllable lifestyle becomes an increasingly important factor in specialty choice Diagnostic Radiology has the potential to attract an increasing number of

talented women. An article in the *New York Times* publicized this issue in the lay press, suggesting that medical school graduates in all specialties are increasingly choosing specialties with less time on-call and reasonable, defined work hours.⁴¹

Statement of Hypothesis

This research project will use focus groups to examine why women do not choose radiology as a medical specialty at the same rate as they choose other specialties. The current literature and descriptive statistics analyzed below provide a wide variety of possible reasons for why women choose certain specialties, but do not look specifically at radiology to determine why women choose it or why they neglect it.

Our hypothesis is that the following factors will prove to be the most common reasons why women do not choose radiology:

- Lack of patient contact inherent in the practice of radiology
- Lack of exposure to radiology during medical school clinical rotations
- Lack of available mentoring relationships and role models available for women in radiology

Furthermore, we believe lifestyle factorsⁱⁱ will *not* play a significant role in women's consideration of diagnostic radiology as a career.

ⁱⁱ For the purposes of this study, 'lifestyle factors' are defined as work hours and income, with more specific definitions noted where appropriate.

Analysis of Supplementary and Background Dataⁱⁱⁱ

Overview

The majority of the research related to specialty choice described in the current literature, including the focus group research conducted for this thesis, relies on subjective data or data gathered regarding a single specialty. As a complement to the focus groups we conducted and to enhance future investigations of factors affecting women's choices of a medical specialty, we examined the effect of a number of quantitative measures of residency characteristics, in-practice lifestyle characteristics and in-practice income on the number of medical students matching into a variety of specialties. To maintain objectivity, we specifically included lifestyle factors that could be defined using quantitative variables (e.g., in-practice work hours, income, etc.). The result of this analysis is summarized below.

Description of quantitative analysis

We included data from twenty-four different specialties over twelve years of physician practice characteristics and National Residency Matching Program data in multivariate regression analysis. The dependent variable was defined as the percentage of female entering residents in that specialty in a given year. Data regarding numbers of U.S. allopathic medical school graduates in any year were obtained from publicly

ⁱⁱⁱ As mentioned in the Introduction, the data and analysis summarized here is based on a project during which I served as a senior investigator and advisor to the principal investigator, Shuolun Ruan. At the time we completed the bulk of the analysis, Ms. Ruan was a senior at Yale College; she is now a student in the M.D./Ph.D program at the University of Rochester School of Medicine & Dentistry. The analysis has been submitted for publication in several forms, most recently with the following authors and title: Shuolun Ruan, Mythreyi Bhargavan Ph.D., Victoria K. Potterton, Kimberly E. Applegate M.D., M.S., Jonathan H. Sunshine Ph. D., Howard P. Forman, M.D., M.B.A, "A Look at the Numbers: Quantifiable Lifestyle and Income Factors Influencing Women Medical Students' Specialty Choice."

available data published by the American Medical Association (AMA) and Association of American Medical Colleges (AAMC).

We used the following explanatory variables to represent residency and in-practice features of various specialties:

Category	Explanatory Variables	Comments
Residency Lifestyle Characteristics	<ul style="list-style-type: none"> • Minimum number of required years of post-MD training. • Average weekly hours on duty during the first residency year. ^{42, 43} • Interaction variable between the post-MD years and average weekly duty hours. 	<ul style="list-style-type: none"> • Includes any additional required years of general training (e.g., preliminary year prior to beginning a PGY-2 position). • Reported by program directors, obtained from the Fellowship and Residency Electronic Interactive Database (FRIEDA Online®), the National GME Census Survey, and the AMA • Included because the negative effect of one may be offset by a positive effect from the other (i.e., a longer residency may be offset by shorter day-to-day work hours).
In-practice Lifestyle Characteristics	<ul style="list-style-type: none"> • Mean hours in professional activities per week ⁴⁴. • Hourly income* (annual median income⁴⁵ divided by the product of mean weekly work hours and mean annual weeks of practice). 	<ul style="list-style-type: none"> • Reported in the <i>Physician Socioeconomic Statistics</i>, published by the AMA. Data was not available for 2000, 2002, and 2003; values were extrapolated or interpolated where appropriate and imputed to provide smooth data and provide sufficient data points for a statistically significant study. • Used instead of annual income because annual income is partially determined by weekly hours, which were already included in the analysis. Median income data was obtained from the <i>Physician Compensation and Production Survey</i> (PCPS), produced by the Medical Group Management Association (MGMA). We used median rather than mean income data here because, according to the PCPS, a number of the sample sizes that produced the data were small. If median income for a specialty was not specifically reported by the AMA, we used the aggregated category "other" as a substitute variable in our analysis.

*All income values for this portion of the analysis were adjusted to 2003 dollars using the consumer price index ⁴⁶.

We also considered the following items regarding data selection:

- A linear time variable was included to account for the annual increases in women entering residency over the period being studied.
- We focused on eight specialties in particular that had the highest and lowest percentage of women. Those with a particularly high percentage of women were dermatology, obstetrics and gynecology, pediatrics, and pathology while those with a particularly low percentage were general surgery, orthopedic surgery, neurosurgery, and urology.
- Because the years missing data varied between the explanatory variables we chose, we did not exclude years with missing data; doing so would have diminished the statistical power of the study. Instead, all years are included in the analysis with imputed values used to replace missing data.

Data were analyzed using Stata 8.2 for multivariate linear regression with a standard test of statistical significance, $p \leq 0.05$.

Summary of results

The results of our analysis are presented in Tables 1a and 1b. General trends we observed included an increase in women among first-year residents in all 24 specialties from 37 percent to just under 43 percent between 1993 and 2004. Of the specialties we highlighted that have a high percentage of women residents, dermatology and pediatrics had growth that mirrored the overall trend while the other two specialties, OB/GYN and pathology, had growth of approximately 15 percentage points over the same time period. Of the specialties highlighted with a lower percentage of women, general and orthopedic

surgery followed the general growth trend while urology had a larger increase in the number of women and neurosurgery showed no increase.

The average minimum training period across all 24 specialties was 4.5 years with a range of 3 to 7 years. Average weekly work hours were 59.4 hours during residency and 56.2 hours in practice. In-practice hourly income averaged \$97 (all incomes reported in 2003 dollars using the consumer price index⁴⁶).

While all four focus specialties with lower percentages of women require at least five years of training, the four specialties with large numbers of women require either three years (pediatrics) or four years (dermatology, OB/GYN, and pathology). General surgery residents have the longest work hours during their first year (79.2) while dermatology and pathology residents have the shortest (43 and 48, respectively). OB/GYN and pediatrics, both popular among women, had relatively long work hours (74.6 and 70.7) while two specialties with relatively few women, orthopedic surgery and urology, had slightly shorter hours in the first year (68.2 and 66.8).

Practicing physicians had work hour trends similar to those observed during residency. Dermatologists and pathologists have the shortest work hours, averaging approximately 48 hours per week while general surgeons and OB/GYNs have the longest hours (62.9 and 62.5). Orthopedic surgeons and neurosurgeons reported the highest hourly incomes (\$130 and \$169). Pediatricians had the lowest hourly income by over \$25, earning only \$58 per hour on average.

To determine the extent to which the lifestyle variables influenced the percentage of female residents found in a given specialty, we conducted multivariate regression analysis. The residency lifestyle variables, first-year hours and minimum length of

training, explain 52% of the variance in the percentage of female residents in the 24 specialties we studied. In-practice lifestyle variables explain 40% of the variance in the percentage of female residents and the combined variables explain 61% of the variance with a correlation coefficient of 0.79. For completeness, summary of the coefficients for the lifestyle variables as well marginal effect of each variable on the percentage of women entering each specialty can be found in Table 2.

Data analysis conclusions and implications for focus groups

The multivariate regression analysis performed on already available AAMC and ACGME data reveal several important factors that affect specialty choice for women. In-practice work hours had the most significant effect; an additional 10 hours per week caused a sixteen percentage-point decrease in the proportion of women entering a specialty. Of the eight spotlight specialties we examined, our model significantly under-predicted women entering dermatology and OB/GYN and also under-predicted the number of women entering pathology and pediatrics, but to a lesser extent (Figures 2a-d). The model over-predicted the amount of women entering orthopedic surgery and urology (Figures 3a and 3b). There was no significant difference between the actual and predicted percentages for general surgery or neurosurgery (Figures 3c and 3d). Diagnostic radiology was not included in one of the 'spotlight specialties' for our general analysis, because the model generally predicted the percentage of women in radiology well. Figure 4 shows the predicted and actual percentages of residents in diagnostic radiology.

The interesting conclusions to be drawn from the relationship between actual values and those predicted by the model are that other, non-lifestyle factors must be entering into women's specialty choices. Because our model only examined *quantifiable* factors, the other factors must be looked at from a more subjective perspective, thus corroborating the efforts of many researchers to examine this issue through focus groups and surveys that take a more qualitative approach.

In particular, the under-prediction around OB/GYN is interesting because this specialty is essentially a surgical subspecialty. That said, significant numbers of women are found in OB/GYN in spite of long work hours without the relatively high hourly compensation of other surgical specialties. Women must be choosing this specialty for reasons other than simply lifestyle, and the main distinction between OB/GYN and other surgical specialties is, of course, the all-female patient population. Similarly, pediatrics has an extremely high proportion of women and even though the model does not under-predict the proportion of women in this specialty to the same extent as it does OB/GYN, we see that women are making an economically irrational choice by selecting a specialty that has less income and longer work hours^{iv}. Similarly, the unique aspect of pediatrics is the patient population.

In this sense, then, our model suggests evidence that women do not make choices based on lifestyle factors alone, and we might even extend that interpretation to predict that women *ignore* some lifestyle factors when choosing a specialty in favor of selecting an area of medicine that other favorable attributes that are of particular interest to women.

^{iv} It is worth noting here that this comment refers *only* to the economic aspects of a specialty, specifically the pay earned for the amount of time worked. In all areas of medicine, significant personal value and satisfaction are gained from working to improve the lives of others, and it is understandable and even expected that medical students will incorporate this into their specialty choice decisions. In fact, it is these subjective aspects of choosing a career within medicine that this study seeks to evaluate.

With this thought in mind, we proceeded with a series of focus groups and one-on-one interviews to examine specific reasons why women are not going into radiology as readily as one models might predict based on lifestyle factors alone.

Focus Groups

Methods

We conducted focus group sessions and individual interviews that included diagnostic radiology residents and fourth-year medical students. These two groups were chosen to provide a comparison in two dimensions. First, medical students who are graduating are closest to the specialty choice decision while residents can provide a backwards-looking perspective on their specialty choice. Second, many of the medical students interviewed were *not* going into radiology and thus offered a contrast to the residents, who had already chosen radiology and could specify a variety of reasons why they had pursued that field. We hoped to elucidate some of the reasons for actively choosing or not choosing radiology by examining the contrasting perspectives provided by these two groups.

Participants were solicited through the Department of Diagnostic Radiology at Yale-New Haven Hospital and via an email sent to all fourth- and fifth-year female medical students. At the Yale School of Medicine, a significant portion of students takes a year off to do additional research or pursue joint degrees other than a PhD before matching into residency. Thus, fifth-year students are, from a specialty choice perspective, addressing their decision in an identical way as their more traditional counterparts who are graduating in four years. Potential subjects who could not attend the focus groups were invited to schedule one-on-one interviews and their responses were analyzed in the same manner as focus group attendees.

Prior to beginning the focus groups, participants were asked to read and sign a consent form and confidentiality agreement. The purpose of this agreement was to

prevent any risk to participants, who might fear disclosure of their participation or comments could have negative consequences during the match process. A total of fourteen participants responded to the initial inquiry, while twelve proceeded with consent and participated in the focus groups or individual interviews. The two candidates who responded to our inquiry but did not participate in a focus group or interview were eliminated due to scheduling conflicts.

During focus group sessions, participants were presented with the following set of questions:

- What factors did you consider when choosing a specialty?
- Which of these were most important to you and why?
- What are the most attractive aspects of a career in Diagnostic Radiology?
- What hesitations did you have about Diagnostic Radiology? Why did you feel that way?
- What other specialties did you consider? If you are a medical student and chose a different specialty, why did you eliminate Radiology?
- Did your medical school do anything in particular that helped you make this decision? What did you find most/least helpful?
- Why do you think women are not going into Radiology at the same rate as they are entering medical school?
- What other comments do you have on this topic?

Each group was recorded, and following each session, the recordings were transcribed and then all identifying information (e.g., names, previous institutions, etc) was deleted from the transcript. After transcripts were checked for accuracy, the

recordings were destroyed. Again, these steps were taken to preserve the spirit and intent of participants' comments while minimizing any risk of disclosure that could have negative effects.

Comments were coded by question type and then analyzed for specific trends. Comments were not double-coded, that is, if a participant mentioned the amount of patient care as a factor in her specialty decision multiple times throughout the discussion, that thought was only recorded once. Therefore, all quantitative data reported below are the absolute number or percentage *of participants* who mentioned a particular factor affecting specialty choice rather than the number of times that factor was mentioned. Where appropriate, data were segmented by level of training, i.e., medical students vs. residents or by specialty choice interest, i.e., those who were applying in or who were residents in radiology vs. those who were not. For simplicity, some comments were 'collapsed' under a single category for purposes of coding, e.g., comments related to length of the workday, hours worked during residency, and flexibility were grouped under "Control over lifestyle." A more detailed description of the factors included in each category are shown in Table 3.

Results

Quantitative Data

Of the twelve participants, there were four radiology residents, one student applying in radiology, one student applying in radiology and dermatology concurrently, two students applying in internal medicine, and one student applying in each of general surgery, pediatrics, family medicine, and OB/GYN. Table 4 lists the specialties that all participants had considered other than radiology regardless of specialty choice. Of the medical students who were not applying in radiology, none had seriously considered radiology as a career. For the purposes of the descriptive results below, the six participants who were either residents or medical students applying in radiology are referred to as the ‘radiology group’ and the remaining six medical students are the ‘non-radiology group.’

Factors affecting specialty choice tended to cluster when grouped in some areas but not in others. Table 5 shows the number and percentage of participants who cited each factor broken down by question type, with factors cited by greater than 50% of the radiology group shown in bold and factors cited by greater than 50% of the non-radiology group in italics.

When identifying factors that women had considered when deciding on a specialty, four of the same five factors were mentioned regardless of whether the participants considered radiology seriously or not. These factors were patient care, technical and intellectual aspects of the specialty, elective and rotation experiences, and work atmosphere. Those who had considered radiology included the presence of a strong

role model or mentor in their top five factors while participants who had not chosen radiology instead included control over lifestyle in this list.

Table 5 also shows attractive aspects of radiology by number and percentage of participants who cited each factor. Over half of the radiology group mentioned the following factors:

- Presence of a role model or mentor (83%)
- Technical or intellectual aspects of practice (67%)
- Limited patient contact^v (67%)
- Positive elective or rotation experience (67%)
- Work atmosphere (50%)
- Long-term potential for career opportunities (50%)

The only factors mentioned by greater than half of the non-radiology group were 'Control over lifestyle' (100%) and 'Work atmosphere' (50%), which was also the only overlapping factor mentioned by both groups.

In contrast, both groups identified the same top three unattractive aspects of radiology, which in the case of the radiology group were discussed as hesitations they had about radiology:

- Limited patient contact (50% radiology, 100% non-radiology)
- Unique role of the radiologist in patient care (50%, 33%)
- Fear of being 'stuck in a dark room, bored, or lonely' (33%, 50%)

^v N.B., In this context 'Limited patient contact' is considered a positive attribute of radiology.

When asked to speculate about why women are not choosing radiology at the same rate as other specialties, the radiology group cited the following factors, in decreasing order by the percentage of women who cited each factor:

- Insufficient positive exposure during medical school (67%)
- Existence of a perceived gender bias among female medical students (50%)
- Daunting technical and intellectual aspects of radiology (50%)
- Limited patient contact (33%)

The non-radiology group cited a similar set of factors, but with different frequencies:

- Limited patient contact (83%)
- Perceived gender bias (33%)
- Daunting technical and intellectual aspects of radiology (17%)
- Too much competition in the National Residency Match (17%)

Qualitative Observations

While the data described above and in the accompanying tables attempts to quantify the discussions with the twelve participants in this study, there are a number of qualitative aspects of the comments made by participants that should be included to make the data reported here complete.

Most notably, when asked about *their own* hesitations regarding radiology or their reasons for choosing a specialty other than radiology, every participant except for one mentioned patient care as the most important aspect of this decision. The only participant who did not mention patient care as an important factor in her initial consideration of

specialties or as a hesitation about radiology was one of the radiology residents who realized very early in medical school that she did not enjoy working with patients directly. In contrast, when asked to speculate about why *other* women might not be interested in radiology, all of the participants mentioned patient contact *last*, if at all, instead citing the other factors outlined above, most often the perceived gender bias in radiology.

Also of note, all of the medical students in the non-radiology group said that they felt radiology was an essential tool for patient care but knew it would not be right for them because of the limited patient contact and thus avoided considering it almost from the beginning of medical school. Several of these students had done radiology electives as a way to broaden their understanding of the field and described “wanting” to like radiology because of the attractive lifestyle but found that they missed patient care too much, regardless of how short the hours or friendly the radiologists.

In the radiology group, women who felt that patient care was important to them noted that they were likely to pursue interventional radiology and breast imaging fellowships after residency as a way to incorporate more patient contact within their radiology practices. These particular participants also mentioned that what they loved most about radiology was the technology and that they pursued radiology only after reassuring themselves that they could have both technology and patient contact by practicing certain subspecialties within radiology.

The topic of lifestyle became an important theme across all of the women who participated in the study. All six members of the non-radiology group cited ‘Control over lifestyle’ as one of the most attractive aspects of radiology, but only one of the six

members of the radiology group brought up lifestyle as an important factor in her decision to pursue a career in radiology (she had previously considered orthopedic surgery and was also the one applicant applying concurrently in radiology and dermatology). The other members of the radiology group cited access to technology, influence of a mentor or role model, and a preference for less patient contact as the main reasons they chose a career in radiology.

Of the women in the non-radiology group who discussed lifestyle in greater detail, two of them mentioned that, while the specialties they had chosen, family medicine and pediatrics, were not traditional 'lifestyle specialties' as defined by fewer nights on call, shorter work days, and so forth, they did feel they had chosen specialties where their colleagues would be more agreeable to creating a flexible and family-friendly atmosphere that would allow for a good family lifestyle. Another participant in the non-radiology group described a desire to pursue OB/GYN with a focus in gynecologic surgery because she wanted a surgical career and perceived the lifestyle to be better than her second choice, which was cardiothoracic surgery.

Experiential factors related to how women perceived radiology were important. The radiology group mentioned role models, mentors, and positive elective experiences most often as reasons for choosing radiology as a career. This group also speculated most frequently that 'Insufficient positive exposure' to radiology could be a reason why fewer women choose to go into radiology. Both groups cited the *perceived* gender bias due to a lack of visible women in radiology as important factors in why women may not choose radiology, although the women in the radiology group emphasized that they had not experienced any direct evidence of this bias. This group did agree that women are

more rare among radiologists, which can suggest a bias to an outside observer when one does not, in fact, exist.

One final issue that took on more subjective importance to the discussion than revealed in the quantitative data was the issue of 'lonely' radiologists 'sitting in a dark room all day' and the role of radiologists as an adjunct, if essential, participant in a patients' care. These two aspects of radiology were cited by a number of the participants to summarize their impressions of radiology as a subdued specialty isolated not only from patients but from other physicians as well. The radiology residents who mentioned these two aspects of the specialty noted that their hesitation on these grounds proved unfounded, but for the members of the non-radiology group who mentioned these topics, they proved to be important factors that discouraged them from pursuing a career in radiology.

Discussion

Study limitations

This study attempts to examine a subjective process and set of impressions for which obtaining quantitative data is difficult, and as a result several important limitations exist. The selection process for participants injects both identifiable and unknown bias into the results. Radiology residents have chosen their career and thus display an obvious bias towards radiology. Although their participation provides an important insight into why women *do* choose radiology, and their admitted hesitations about choosing radiology are important (in particular because they overcame these limitations to move forward with their careers), the study group is missing a 'negative control' for this group. We have attempted to mitigate this among the medical students participating in the focus groups by inviting medical students who are applying for the match in a wide variety of specialties to participate, but because they are at different levels of training and likely view the pressures related to specialty choice somewhat differently, the medical students do not provide a perfect comparison.

The second major limitation is the voluntary nature of participation, which introduces a significant selection bias into the groups. Because we could not require all female residents from all specialties to participate or all female medical students to participate, only those who have an interest in this topic or who are willing to share their personal experiences and insights were included in the focus groups. Consequently, a large number of women at this institution who rejected radiology did not have their opinions recorded in this study, and these opinions may be very different from those of the group we assembled. Furthermore, the voluntary nature of participation limits the

number of participants overall, magnifying the irregularities and sources of error that exist in any data set.

Finally, and perhaps most notably, this study omits the most obvious control group: men. Men were not included in the study for several reasons. First, limitations of time and access prevented incorporation of men. Additionally, at the outset of the project and through the phases of study design, the focus of our analysis was on women who do and do not choose radiology. Men may or may not make specialty choice decisions using the same criteria as women, and while the literature reveals some data on men's specialty choice decision-making, we do not make any comparison in this study between men and women, nor do we attempt to make concrete comments on why men make the specialty choices they do.

Conclusions

We hypothesized that women do not choose a career in radiology for three main reasons:

- Lack of patient contact inherent in the practice of radiology
- Lack of exposure to radiology during medical school clinical rotations
- Lack of available mentoring relationships and role models available for women in radiology.

We further hypothesized that lifestyle factors would *not* play a significant role in women's consideration of diagnostic radiology as a career.

The aspects of radiology and the factors guiding specialty choice among this group of women suggest several important conclusions. First, patient care is a strong

consideration for women when examining specialties as potential careers. Given the motivations inherent in pursuing a career in medicine, particularly altruism and the desire to make a difference in the lives of others, this does not come as a surprise. Women are also more traditionally conditioned by society to seek out nurturing and caring roles, a characteristic pointed out by many of the participants in this study, and may therefore be more likely to choose specialties that emphasize that characteristic.

In addition to patient care, previous experience with a specialty through rotations and electives during medical school is very important regardless of which specialty students choose. In the case of medical schools where very few elective opportunities are available to third-year medical students, there is a likely bias *away* from specialties such as radiology, dermatology, and so forth that are not part of a traditional clerkship curriculum. The implication of this observation is that it is to the advantage of departments trying to capture the interest of students to make as many elective slots available as possible, either through expanding the size of electives or lobbying the administration to increase the flexibility in students' schedules so that they may schedule electives earlier in their clinical years. Ironically, this effort might not accrue as many benefits to radiology as a specialty because, based on the responses of women in this study, a significant number of women have already decided against radiology because of the lack of patient care inherent in its practice.

The issue of lifestyle is also an important one in specialty choice even though it did not emerge in our study as a factor that encourages women to choose radiology. The non-radiology group considered radiology's *reputation* as a 'lifestyle specialty' to be its most important benefit, while the women who were actually in radiology claimed to have

chosen it for completely different reasons. Furthermore, the non-radiology group stated that lifestyle was a significant consideration in their specialty choice and yet they did not choose radiology, a specialty that they had just identified as having an attractive lifestyle. In fact, many of the women chose specialties that have reputations for difficult lifestyles such as surgery, OB/GYN, pediatrics, and internal medicine.

The reasons for this discrepancy are not clear from the data collected here, but one might speculate that many women make the choice not to go into radiology because as a specialty it does not offer the one thing they value most, patient care, and this issue outweighs whatever lifestyle benefits radiology might offer. It is also possible that most individual women see lifestyle as *an* important factor but not the most important factor in choosing a medical specialty. This interpretation is consistent with the data presented here, where lifestyle was mentioned most frequently among the non-radiology group even though the majority of women who participated in our focus groups are not pursuing specialties traditionally thought of as 'lifestyle specialties.' This conclusion is corroborated by the comments of the women who chose to enter family medicine and pediatrics, admitting that the lifestyle was known to be challenging in an absolute sense but that the colleagues were also known to be more flexible, perhaps dampening the effect of otherwise difficult lifestyle factors.

As mentioned above, experiential factors were very important to the women who chose radiology as a career, in particular the encouragement and example set by role models and mentors throughout the participants' medical school experiences. Each of the five participants in the radiology group who described an important interaction with a role model or mentor emphasized that person (or people) as one of the main reasons why

she chose radiology as a career (the sixth woman in the radiology group had begun a residency in internal medicine before switching to radiology). Surprisingly, not a single woman in the non-radiology group mentioned a mentor or role model as her specific reason for choosing a specialty. Those women sought mentors in their chosen field only *after* they had already decided to pursue that specialty and described positive experiences with their mentors but no significant influence over the students' eventual decision to pursue a particular career.

The reasons for this discrepancy are similarly unclear, but a few possibilities exist. Given the fear of professional loneliness and the 'dark room' described above, women who are interested in radiology for reasons such as the technical and intellectual aspects may feel the need to actively seek out examples of practicing radiologists who defy this stereotype. Once a role model is identified, women can internally acknowledge that person as justification that the 'dark room' fear is unfounded and proceed with reassurance that they will likely enjoy a career in radiology on a professional and personal basis

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Appendix: Figures and Tables

Figure 1a: Women in Radiology as a Percentage of All Residents, 1991-2005

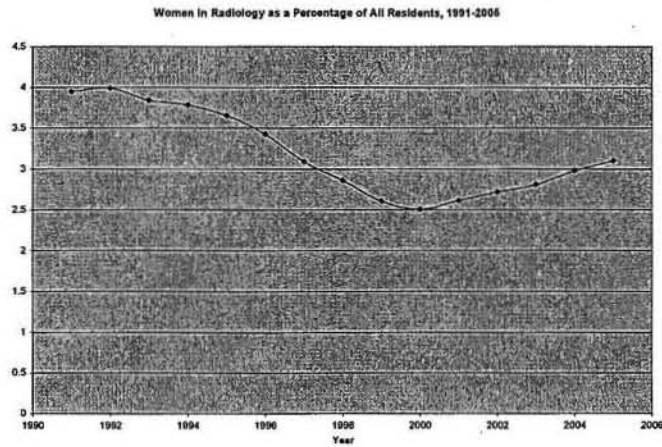


Figure 1b: Women in All Residencies and Women in Radiology Residencies

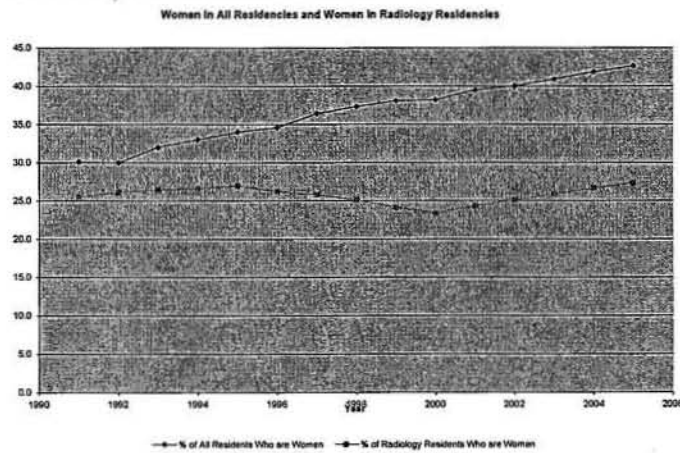


Figure 1c: Ratio of the Percentage of Women in Radiology Residences to the Percentage of Women in All Residencies

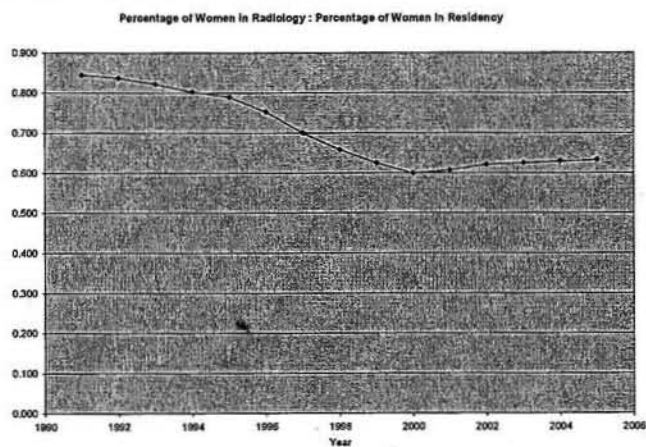


Table 1a: Percent of Entering Residents Who are Women for 24 Specialties, 2004

Specialty	% Women Among Entering Residents
Allergy & Immunology	48.3
Anesthesiology	33.0
Colon & Rectal Surgery	29.3
<i>Dermatology</i>	<i>64.3</i>
Diagnostic Radiology	27.2
Emergency Medicine	33.8
Family Practice	51.2
<i>General Surgery</i>	<i>26.5</i>
Internal Medicine (general)	42.0
Neurology	43.6
<i>Neurological Surgery</i>	<i>13.0</i>
Nuclear Medicine	28.8
<i>Obstetrics & Gynecology</i>	<i>76.1</i>
Ophthalmology	35.1
<i>Orthopaedic Surgery</i>	<i>11.4</i>
Otolaryngology	25.9
<i>Pathology</i>	<i>52.8</i>
<i>Pediatrics</i>	<i>69.5</i>
Physical Medicine & Rehab	39.1
Plastic Surgery	23.6
Psychiatry	50.4
Radiation Oncology	35.1
Thoracic Surgery	5.9
<i>Urology</i>	<i>21.2</i>

Focus specialties (italicized) include four specialties with typically high percentages of women entering residency and four specialties with typically low percentages of women.

Table 1b: Summary Statistics for Eight Focus Specialties

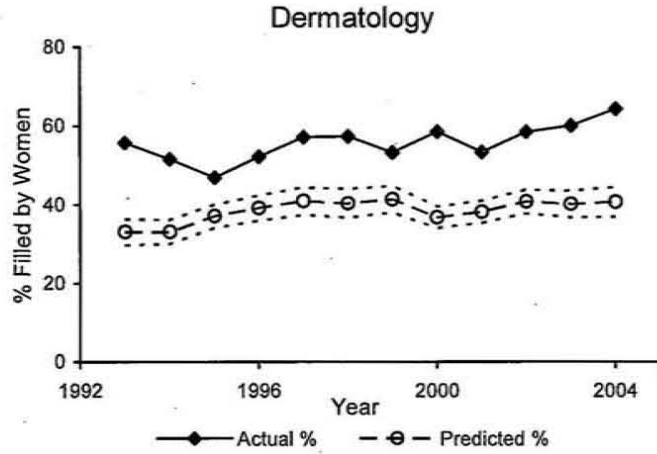
	Specialties with High Percentages of Women Entering Residency					Specialties with Low Percentages of Women Entering Residency			
	All 24 Specialties	Dermatology	Obstetrics and Gynecology	Pathology	Pediatrics	General Surgery	Neurological Surgery	Orthopaedic Surgery	Urology
Percent of entering residents who were women, 2004	42.6	64.3	76.1	52.8	69.5	26.5	13.0	11.4	21.2
Minimum years of required training [SE]	4.5 [0.06]	4	4	4	3	5	6	5	5
Average percent of entering residents who were women, 1993-2004 [SE]	32.8 [1.00]	55.7 [1.33]	68.7 [1.60]	46.6 [1.28]	65.8 [0.52]	22.6 [0.52]	10.3 [0.58]	9.04 [0.55]	13.6 [1.09]
Average hours on duty per week in the first year of residency, 1993-2004 [SE]	59.4 [0.63]	43.0 [0.16]	74.6 [0.10]	47.7 [0.17]	70.7 [0.27]	79.2 [0.32]	73.9 [0.13]	68.2 [0.25]	66.8 [0.48]
Average of median income, in 2003 dollars, 1993-2004 (in thousands) [SE]	256.8 [4.60]	223.1 [7.37]	248.7 [3.15]	264.5 [11.1]	155.0 [0.73]	257.8 [2.13]	469.90 [9.63]	360.62 [3.72]	283.0 [9.14]
Average hours in professional activities per week, 1993-2004 [SE]	56.2 [0.29]	47.7 [0.43]	62.5 [0.55]	47.8 [0.54]	56.3 [0.55]	62.9 [0.53]	58.8 [0.28]	59.8 [0.21]	62.2 [0.31]
Average income per hour, in 2003 dollars, 1993-2004 [SE]	97.4 [1.70]	100.4 [4.04]	84.2 [1.16]	118.8 [6.07]	58.0 [0.57]	86.4 [1.05]	169.2 [3.54]	129.1 [1.40]	96.9 [3.28]

Table 2: Results of Multivariate Regression Analysis of Training and In-Practice Lifestyle Characteristics on Percentage of Entering Residents Who are Women, 24 Specialties, 1993-2004

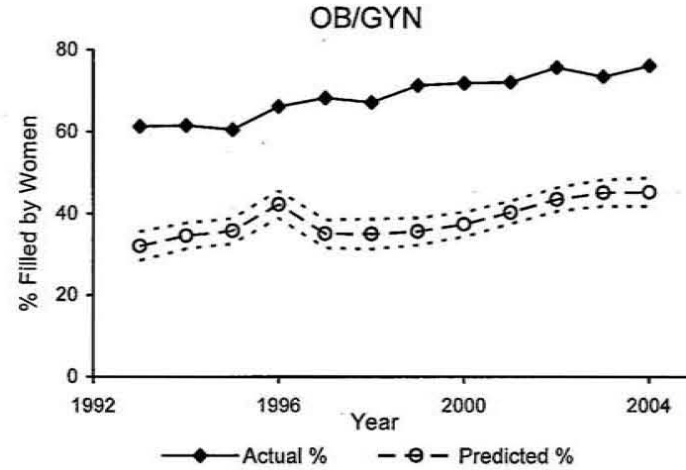
<i>Coefficients of lifestyle variables</i>	
<i>Years of Residency (SE)</i>	35.19 (4.47)
<i>P Value</i>	<0.001
<i>Average Hours on Duty per week in first year of residency (SE)</i>	3.39 (0.35)
<i>P Value</i>	<0.001
<i>Interaction between Residency Years and Hours (SE)</i>	-0.675 (0.070)
<i>P Value</i>	<0.001
<i>Average Hours Spent in Professional Activities per week (SE)</i>	-1.576 (0.205)
<i>P Value</i>	<0.001
<i>In-practice Income per Hour (SE)</i>	-0.0854 (0.030)
<i>P Value</i>	0.005
<i>Marginal effect on percentage of women among entering residents</i>	
<i>Effect of an additional year of residency given overall average hours in first year of residency (SE)</i>	-4.9 (0.05)
<i>P Value</i>	<0.001
<i>Effect of an additional 10 hours on duty per week in first year of residency given average residency length (SE)</i>	3.9 (0.1)
<i>P Value</i>	<0.001
<i>Effect of an additional 10 hours spent in professional activities per week (SE)</i>	-15.8 (2.1)
<i>P Value</i>	<0.001
<i>Effect of an additional \$10 per hour in income (SE)</i>	-0.9 (0.3)
<i>P Value</i>	<0.001
<i>Effect of change in data source, pre-1998 vs. post-1998 (SE)</i>	2.6 (2.5)
<i>P Value</i>	0.30
<i>Effect of time, time trend (SE)</i>	0.93 (0.36)
<i>P Value</i>	0.009
<i>R-squared</i>	0.62
<i>Multiple correlation coefficient</i>	0.79
<i>Adjusted R-squared</i>	0.61
<i>N</i>	288

Figure 2: Actual Percentages of Women Among Those Entering Residency in Dermatology (a), OB/GYN (b), Pathology (c), and Pediatrics (d) and the Predicted Percentages with 95% Confidence Intervals from Regression

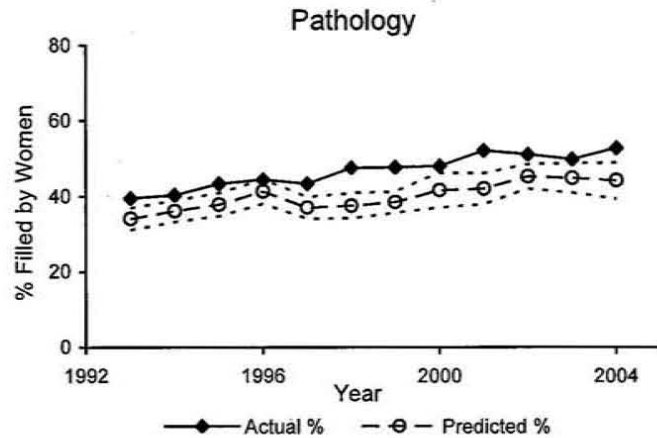
a)



b)



c)



d)

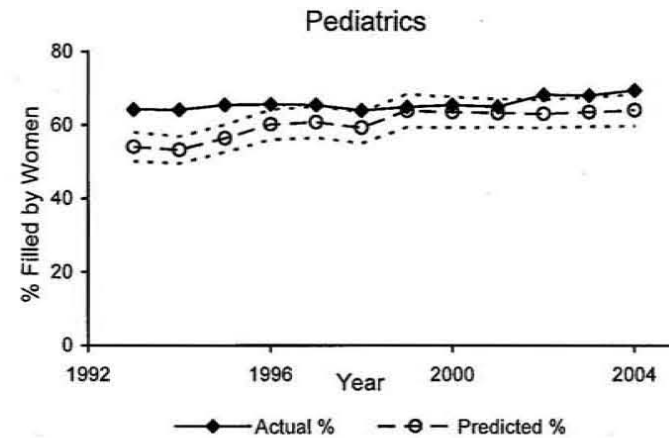


Figure 3: Actual Percentages of Women Among Those Entering Residency in General Surgery (a), Neurological Surgery (b), Orthopaedic Surgery (c), and Urology (d) and the Predicted Percentages with 95% Confidence Intervals from Regression

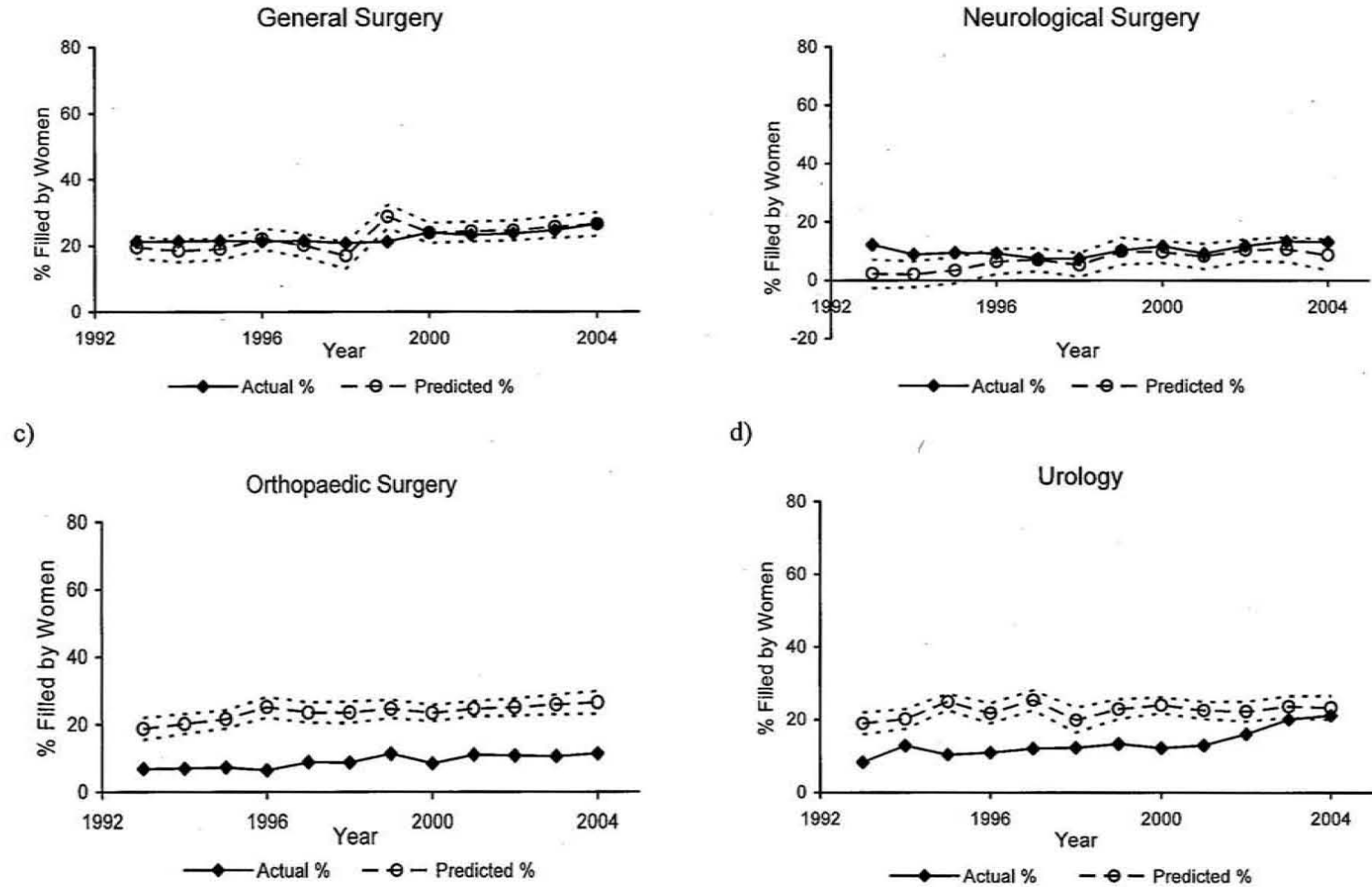


Figure 4: Actual Percentages of Women Among Those Entering Residency in Radiology and Percentages Predicted by Multivariate Regression (95% Confidence Interval included).

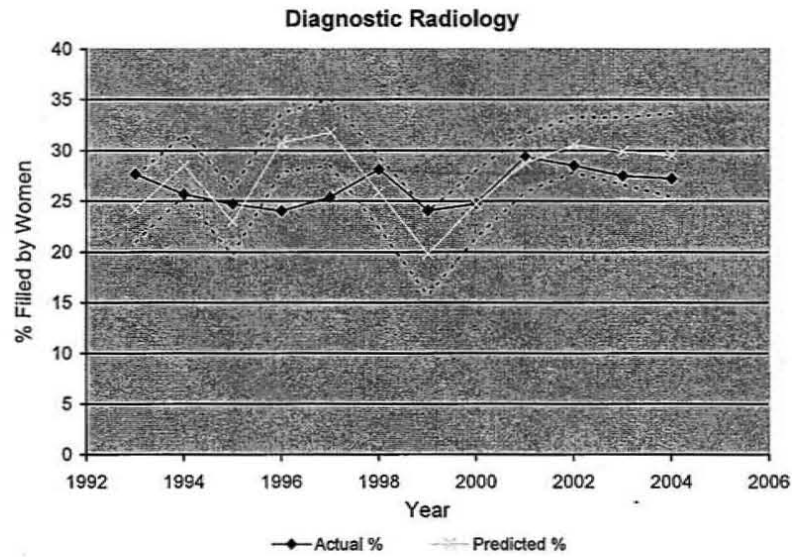


Table 3: Glossary of Selected Coding Groups and Included Concepts*

Coding Group	Included Concepts
Patient care	<ul style="list-style-type: none"> • Direct patient care considered an important aspect of specialty practice • Unique patient population (e.g., women for OB/GYN and children for pediatrics)
Insufficient Positive Exposure	<ul style="list-style-type: none"> • Challenging rotation schedules during medical school • Limited available rotation slots • Lack of available female mentors/role models
Gender bias	<ul style="list-style-type: none"> • Perceived gender bias due to small number of women observed on duty • Directly observed or experienced discrimination or derogatory behavior toward women
Role model/mentor	<ul style="list-style-type: none"> • Role models available and visible among attendings and housestaff • Mentors involved directly with students by overseeing research, providing career advice, etc.
Technical/Intellectual Aspects	<ul style="list-style-type: none"> • Skills required to become proficient in a specialty (e.g., surgical skills, specific procedures, etc.) • Access to and mastery of technology required to become proficient in a specialty • Breadth of knowledge required for competence (e.g., radiologists' mastery of pathology across a variety of disciplines)
Work atmosphere	<ul style="list-style-type: none"> • Pleasant relationships with colleagues (experienced on rotations or perceived through observation of interactions between other housestaff or attendings) • Cool, quiet, and calm reading rooms seen as a relief from the bustle of the hospital wards
Daily schedule	<ul style="list-style-type: none"> • Presence or absence of rounds, clinics, operating room time, didactic sessions, etc. during the workday
Role on care team	<ul style="list-style-type: none"> • Radiologists' role as an important advisor to the care team with limited (or absent) involvement with individual patients
Long-term Potential	<ul style="list-style-type: none"> • Specialty is portable (i.e., does not require a hospital, exam room, specific equipment, etc.) • Specialty poised for significant expansion in volume or importance within the medical field
Dark room	<ul style="list-style-type: none"> • Repeated sentiments from those interested in radiology and not interested alike <ul style="list-style-type: none"> • Fear of sitting in a dark room • Fear of being bored without frequent interaction with colleagues, patients, students, etc. • Fear of being lonely or losing touch with the remainder of the hospital

*Coding groups that do not appear on this list are considered self-explanatory based on their title.

Table 4: Final Specialty Choices as Reported by Focus Group Participants

<u>SPECIALTIES CONSIDERED BY PARTICIPANTS</u>	<u>No.</u>
Applying in/matched in radiology	6
General Surgery	4
Internal Medicine (incl PC)	4
OB/GYN	4
Pediatrics	2
Psychiatry	2
Dermatology	1
Neurosurgery	1
Orthopedic Surgery	1
Radiation Oncology	1
Family Medicine	1
Emergency Medicine	1

Table 5: Focus Group Coded Response Data, Segmented by Question

Items cited by >50% of participants are shown in **bold** for the **radiology group** and *italics* for the *non-radiology group*.

	Total		Radiology		Non-Radiology	
	No.	%	No.	%	No.	%
FACTORS CONSIDERED WHEN CHOOSING A SPECIALTY						
<i>Control over lifestyle</i>	6	50.0	1	16.7	5	83.3
Daily schedule	4	33.3	2	33.3	2	33.3
<i>Elective/rotation experience</i>	8	66.7	5	83.3	3	50.0
Income	2	16.7	1	16.7	1	16.7
Length of training	3	25.0	1	16.7	2	33.3
Less gender bias than another choice	1	8.3	1	16.7	0	0.0
Long-term career prospects	2	16.7	2	33.3	0	0.0
Malpractice costs	1	8.3	0	0.0	1	16.7
Opportunity to do Procedures	3	25.0	2	33.3	1	16.7
<i>Patient Care</i>	11	91.7	5	83.3	6	100.0
Personality Fit	1	8.3	0	0.0	1	16.7
Role model/mentor	4	33.3	4	66.7	0	0.0
Role on the care team	1	8.3	1	16.7	0	0.0
<i>Technical or intellectual aspects of practice</i>	9	75.0	5	83.3	4	66.7
<i>Work atmosphere</i>	6	50.0	3	50.0	3	50.0
ATTRACTIVE ASPECTS OF RADIOLOGY						
<i>Control over lifestyle</i>	7	58.3	1	16.7	6	100.0
<i>Elective/rotation experience</i>	4	33.3	4	66.7	0	0.0
Income	3	25.0	1	16.7	2	33.3
Limited patient contact	4	33.3	4	66.7	0	0.0
Long-term potential	3	25.0	3	50.0	0	0.0
Procedures	2	16.7	2	33.3	0	0.0
Role model/mentor	5	41.7	5	83.3	0	0.0
Role of radiologist in care team	2	16.7	1	16.7	1	16.7
Technical/intellectual aspects of practice	6	50.0	4	66.7	2	33.3
<i>Work atmosphere</i>	6	50.0	3	50.0	3	50.0
UNATTRACTIVE ASPECTS OF RADIOLOGY/HESITATIONS ABOUT RADIOLOGY						
<i>Dark room/lonely/bored</i>	5	41.7	2	33.3	3	50.0
<i>Limited patient contact</i>	9	75.0	3	50.0	6	100.0
Perceived gender bias	1	8.3	1	16.7	0	0.0
Role of radiologist in care team	5	41.7	3	50.0	2	33.3
Technical/intellectual aspects	2	16.7	1	16.7	1	16.7
SPECULATED REASONS FOR WHY WOMEN ARE NOT CHOOSING RADIOLOGY						
Insufficient Positive Exposure	4	33.3	4	66.7	0	0.0
<i>Limited Patient Contact</i>	7	58.3	2	33.3	5	83.3
No answer	1	8.3	0	0.0	1	16.7
Perceived gender bias	5	41.7	3	50.0	2	33.3
Technical/intellectual aspects	4	33.3	3	50.0	1	16.7
Too competitive	1	8.3	0	0.0	1	16.7