Association of Clinical Specialty With Symptoms of Burnout and Career Choice Regret Among US Resident Physicians

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IMPORTANCE Burnout among physicians is common and has been associated with medical errors and lapses in professionalism. It is unknown whether rates for symptoms of burnout among resident physicians vary by clinical specialty and if individual factors measured during medical school relate to the risk of burnout and career choice regret during residency.

OBJECTIVE To explore factors associated with symptoms of burnout and career choice regret during residency.

DESIGN, SETTING, AND PARTICIPANTS Prospective cohort study of 4732 US resident physicians. First-year medical students were enrolled between October 2010 and January 2011 and completed the baseline questionnaire. Participants were invited to respond to 2 questionnaires; one during year 4 of medical school (January-March 2014) and the other during the second year of residency (spring of 2016). The last follow-up was on July 31, 2016.

EXPOSURES Clinical specialty, demographic characteristics, educational debt, US Medical Licensing Examination Step 1 score, and reported levels of anxiety, empathy, and social support during medical school.

MAIN OUTCOMES AND MEASURES Prevalence during second year of residency of reported symptoms of burnout measured by 2 single-item measures (adapted from the Maslach Burnout Inventory) and an additional item that evaluated career choice regret (defined as whether, if able to revisit career choice, the resident would choose to become a physician again).

RESULTS Among 4696 resident physicians, 3588 (76.4%) completed the questionnaire during the second year of residency (median age, 29 [interquartile range, 28.0-31.0] years in 2016; 1822 [50.9%] were women). Symptoms of burnout were reported by 1615 of 3574 resident physicians (45.2%; 95% CI, 43.6% to 46.8%). Career choice regret was reported by 502 of 3571 resident physicians (14.1%; 95% CI, 12.9% to 15.2%). In a multivariable analysis, training in urology, neurology, emergency medicine, ophthalmology, and general surgery were associated with higher relative risks (RRs) of reported symptoms of burnout (range of RRs, 1.23 to 1.48) relative to training in internal medicine. Characteristics associated with higher risk of reported symptoms of burnout included female sex (RR, 1.19 [95% CI, 1.09 to 1.29]; risk difference [RD], 7.6% [95% CI, 3.8% to 11.3%]) and higher reported levels of anxiety during medical school (RR, 1.08 per 1-point increase [95% CI, 1.06 to 1.10]; RD, 1.7% per 1-point increase [95% CI, 1.5% to 1.9%]). A higher reported level of empathy during medical school was associated with a lower risk of reported symptoms of burnout during residency (RR, 0.99 per 1-point increase [95% CI, 0.99 to 1.00]; RD, −0.5% per 1-point increase [95% CI, −0.5% to −0.2%]). Reported symptoms of burnout (RR, 3.46 [95% CI, 2.83 to 4.23]; RD, 15.2% [95% CI, 12.8% to 17.5%]) and clinical specialty (range of RRs, 1.60 to 2.96) were both significantly associated with career choice regret.

CONCLUSIONS AND RELEVANCE Among US resident physicians, symptoms of burnout and career choice regret were prevalent, but varied substantially by clinical specialty. Further research is needed to better understand these differences and to address these issues.

This article was retracted and replaced on March 26, 2019. See supplemental content for versions that show errors and corrections.

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B urnout, a syndrome that is driven by work-related stressors and characterized by emotional exhaustion, depersonalization, and low sense of personal accomplishment,[1] has been associated with a higher frequency of medical errors, lapses in professionalism, impeded learning, problematic alcohol use, and suicidal ideation.[2-6] Physicians who report symptoms of burnout are more likely to have career dissatisfaction[6,7] and to leave their current practice, retire early, or reduce their clinical hours.[8]

Studies of US physicians have found substantial differences in the prevalence of symptoms of burnout and career satisfaction by clinical specialty.[7,9] For example, in a 2014 study of 6880 US physicians, 46.3% of general pediatricians and 71.6% of emergency medicine physicians reported symptoms of burnout. In a 2008 study of 7905 US surgeons, ophthalmologists and orthopedic surgeons were twice as likely to be satisfied with their career choice as general surgeons.[9]

To our knowledge, no similar national study has been conducted for resident physicians. Most studies were cross-sectional, conducted in a single institution, and measured factors associated with graduate medical education.[2,10-14]

Personal factors known to buffer or exacerbate the effects of stress on mental health may also affect burnout and career satisfaction.[11,15] These factors include positive coping resources, such as social support, and factors such as anxiety that may compound the effects of stress. Attitudes such as empathy also may buffer the effects of stress.

This longitudinal study assessed symptoms of burnout in a US sample of second-year resident physicians who had been followed up since their first year of medical school. The aims were to (1) explore rates of reported symptoms of burnout and regret of career and specialty choice based on clinical specialty and (2) identify factors measured during medical school that may increase the risk of symptoms of burnout and regret of career and specialty choice by the second year of residency.

Methods

This analysis is derived from a prospective observational study (Cognitive Habits and Growth Evaluation Study) designed to examine changes in medical trainees' well-being, experiences, and attitudes from medical school through residency. Self-reported data from repeated questionnaires by the same respondents were used to assess the 2 study aims.

Study Sample

The methods used in this study have been reported.[16] Briefly, first-year medical students attending a stratified random sample of 49 allopathic US medical schools were invited to participate in the study between October 2010 and January 2011 (**Figure**). Four years later, during the spring of 2014 (January-March), those who had provided written informed consent and completed the baseline questionnaire (ie, baseline responders) were invited to complete the year 4 medical school questionnaire (MS4 questionnaire). During the spring of 2016, base-

Key Points

Question Do rates of burnout and career choice regret among resident physicians vary by clinical specialty?

Findings In this prospective cohort study of 3588 second-year resident physicians with follow-up since medical school, reported symptoms of burnout occurred in 45.2% of participants and career choice regret in 14.1%. However, there were wide ranges of prevalence by clinical specialty (29.6%-63.8% for burnout symptoms and 7.4%-32.7% for career choice regret).

Meaning Symptoms of burnout and career choice regret were prevalent among US resident physicians.

line responders were invited to complete the second-year resident questionnaire (postgraduate year 2 [PGY-2] questionnaire).

Participants received financial incentives for each questionnaire they completed. The institutional review boards at the University of Minnesota, Oregon Health & Science University, and the Mayo Clinic approved the study. Participants who gave consent and completed both the MS4 and the PGY-2 questionnaires were included in this study.
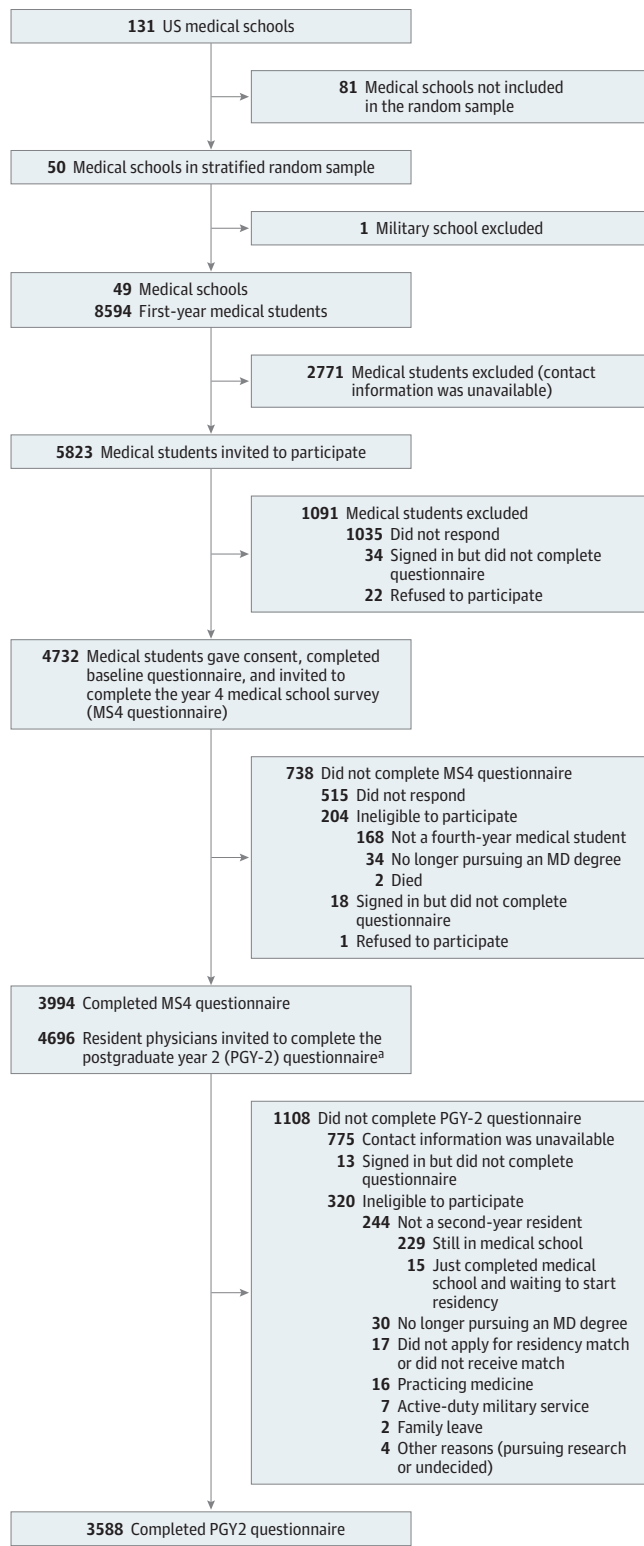
Exposure

The PGY-2 questionnaire asked participants to indicate the clinical specialty of their current residency training program. Similar training programs were combined as follows: diagnostic radiology, nuclear medicine, and radiology oncology were combined into *radiology* and child neurology, neurology, and neurodevelopmental disabilities were combined into *neurology*.

The baseline questionnaire included standard questions to measure demographic characteristics (year of birth, sex, race, ethnicity, country of birth). Race and ethnicity were included in the analysis because previous studies have suggested a relationship between race and ethnicity and the mental health of medical students and resident physicians.[17-19]

The MS4 questionnaire asked participants to report their US Medical Licensing Examination (USMLE) Step 1 score and educational debt. The PGY-2 questionnaire included questions to update demographic characteristics (relationship status, parental status, whether had children <5 years of age, and household income during residency). Fixed-response options to items were provided.

The MS4 questionnaire included the Patient-Reported Outcome Measurement Information System anxiety short form,[20,21] 8 items from the Jefferson Scale of Physician Empathy (JSPE),[22-24] and the Tangible Support and Emotional Support subscales from the Medical Outcomes Study Social Support Measure.[25] The Patient-Reported Outcome Measurement Information System anxiety short form was developed and validated by the National Institutes of Health.[20,21] For this instrument, respondents indicated the frequency of experiencing various emotions on a 5-point scale. Response options ranged from "never" to "very often" (score range, 4-20) and a higher score indicated greater anxiety.

Figure. Flow of Participants in the Cognitive Habits and Growth Evaluation Study

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┌─────────────────────────────────────┐
│ 131 US medical schools               │
└─────────────────────────────────────┘
              │          ┌─────────────────────────────────────┐
              │─────────▶│ 81 Medical schools not included      │
              │          │    in the random sample              │
              ▼          └─────────────────────────────────────┘
┌─────────────────────────────────────┐
│ 50 Medical schools in stratified     │
│    random sample                     │
└─────────────────────────────────────┘
              │          ┌─────────────────────────────────────┐
              │─────────▶│ 1 Military school excluded           │
              ▼          └─────────────────────────────────────┘
┌─────────────────────────────────────┐
│ 49 Medical schools                   │
│ 8594 First-year medical students     │
└─────────────────────────────────────┘
              │          ┌─────────────────────────────────────┐
              │─────────▶│ 2771 Medical students excluded       │
              │          │      (contact information was        │
              ▼          │      unavailable)                    │
┌─────────────────────────────────────┐ └───────────────────────┘
│ 5823 Medical students invited        │
│      to participate                  │
└─────────────────────────────────────┘
              │          ┌─────────────────────────────────────┐
              │─────────▶│ 1091 Medical students excluded       │
              │          │ 1035 Did not respond                 │
              │          │   34 Signed in but did not complete  │
              │          │      questionnaire                   │
              ▼          │   22 Refused to participate          │
┌─────────────────────────────────────┐ └───────────────────────┘
│ 4732 Medical students gave consent,  │
│      completed baseline question-    │
│      naire, and invited to complete  │
│      the year 4 medical school       │
│      survey (MS4 questionnaire)      │
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              │          ┌───────────────────────────────────────────┐
              │─────────▶│ 738 Did not complete MS4 questionnaire      │
              │          │ 515 Did not respond                         │
              │          │ 204 Ineligible to participate               │
              │          │     168 Not a fourth-year medical student   │
              │          │      34 No longer pursuing an MD degree     │
              │          │       2 Died                                │
              │          │  18 Signed in but did not complete          │
              │          │     questionnaire                           │
              ▼          │   1 Refused to participate                  │
┌───────────────────────────────────┐ └─────────────────────────────┘
│ 3994 Completed MS4 questionnaire   │
│                                    │
│ 4696 Resident physicians invited   │
│      to complete the postgraduate  │
│      year 2 (PGY-2) questionnaire[a]│
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              │          ┌───────────────────────────────────────────────┐
              │─────────▶│ 1108 Did not complete PGY-2 questionnaire       │
              │          │  775 Contact information was unavailable        │
              │          │   13 Signed in but did not complete             │
              │          │      questionnaire                              │
              │          │  320 Ineligible to participate                  │
              │          │      244 Not a second-year resident             │
              │          │          229 Still in medical school            │
              │          │           15 Just completed medical             │
              │          │              school and waiting to start        │
              │          │              residency                          │
              │          │       30 No longer pursuing an MD degree        │
              │          │       17 Did not apply for residency match      │
              │          │          or did not receive match               │
              │          │       16 Practicing medicine                    │
              │          │        7 Active-duty military service           │
              │          │        2 Family leave                           │
              │          │        4 Other reasons (pursuing research       │
              ▼          │          or undecided)                          │
┌───────────────────────────────────┐ └─────────────────────────────────┘
│ 3588 Completed PGY2 questionnaire  │
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[a] Of the 4732 medical students who responded to the baseline questionnaire, 34 quit pursuing a doctor of medicine (MD) degree and 2 died, leaving 4696 resident physicians invited to respond to the PGY-2 questionnaire.

The JSPE measures attitudes toward the value of physician empathy in clinical encounters and has well-established psychometric properties.[22-24] At baseline, 2 of the 3 JSPE subscales (Perspective Taking and Standing in the Patient's Shoes subscales) were administered.[23,24] Using data from the baseline responders, factor analysis indicated that 4 items did not

translate meaningfully, and those 4 items were subsequently excluded from the MS4 questionnaire. Respondents indicated their level of agreement on a 7-point scale for the JSPE. Response options ranged from "strongly disagree" to "strongly agree" (score range, 7-56) and a higher score indicated greater empathic orientation.

For the Tangible Support and Emotional Support subscales from the Medical Outcomes Study Social Support Measure, respondents rated how often various types of support were available to them on a 5-point scale. Response options ranged from "none of the time" to "all of the time" (score range, 1-5) and a higher score indicated better social support.[25] Although the minimal clinically important differences for these scale measures have not been established for this population, a magnitude of change between 0.25 and 0.50 SD from the mean for the studied population is likely to indicate that an important change has occurred.[26,27]

Main Outcomes and Measures
Symptoms of Burnout
Although the full Maslach Burnout Inventory (MBI) is the reference standard for measuring symptoms of burnout,[1] its length limits its utility in large questionnaires. Therefore, symptoms of burnout were measured at the PGY-2 time point using 2 single-item measures adapted from the full MBI and previously demonstrated in multiple samples including more than 10 000 physicians and medical students to stratify the risk of burnout.[28,29] Compared with the full MBI domain scores, the areas under the receiver operating characteristic curve in these studies[28,29] were 0.94 for the single item of emotional exhaustion and 0.93 for the single item of depersonalization and the positive likelihood ratios were 14.9 and 23.4, respectively.

In the same studies,[28,29] a 1-point increase in the score for the single item of emotional exhaustion was associated with an increase of 3% to 4% in suicidal ideation and an increase of 3% in perceived major medical error. Similarly, a 1-point increase in the score for the single item of depersonalization was associated with an increase of 5% to 6% in suicidal ideation and an increase of 5% in perceived major medical error.[20,21] Respondents in the current study indicated the frequency of experiencing burnout-related feelings or emotions ("I feel burned out from my work" and "I've become more callous toward people since I started this job") on a 7-point scale. Response options ranged from "never" to "every day." Those with a high score (frequency ≥once per week) on the emotional exhaustion or depersonalization items were considered to have symptoms of burnout.[28,29] This approach has been used previously in national studies of US physicians.[4,7]

Career and Specialty Choice Regret
Regret regarding career and specialty choice were assessed at the PGY-2 time point with questions based on similar items from prior physician questionnaires.[9,30] Resident physicians were asked, "If you could revisit your career choice, would you choose to become a physician again?" and "If you could revisit your specialty choice, would you choose the same specialty again?" Response options were "definitely not," "probably not," "maybe," "probably," and "definitely yes." Responses of "probably not" or "definitely not" indicated career and specialty choice regret.

Statistical Analyses
Standard summary statistics were used to characterize the sample. Respondents were initially sampled by medical school, therefore, an assumption was not made that the outcomes were independent of the school from which they graduated. Instead, we assessed the intraschool correlation for each outcome to assess for such autocorrelation within school. All intraclass correlation coefficients were less than 1% and model convergence proved problematic when including school as a random effect, therefore, fixed-effects logistic regression models were used for all analyses with robust standard errors adjusted for clustering by school. We report overall (Wald) P values for all variables because the outcome rate was not close to 0 or 1, making interpretation of odds ratios difficult, and all effects were transformed into risk differences (RDs) and risk ratios (RRs). This was done by first estimating marginal linear predictions and then using simulation to get the confidence intervals for the difference and ratio of the inverse logit-transformed point estimates. These confidence intervals improve interpretation but will not correspond exactly to those of the underlying coefficients.

In addition to specialty, each model included the following fixed set of covariates, which were identified as potential confounders or effect modifiers of the association between specialty and the dependent variables: demographics, educational debt, USMLE Step 1 score, and scores for anxiety, empathy, and social support measured during year 4 of medical school. An overall symptom of burnout variable was added to the models for career and specialty choice regret.

In all models, internal medicine was the reference specialty because it was the most common among the resident physicians studied. All bivariable and multivariable models used multiple imputation with 20 imputations to account for missing values.

All tests were 2-sided and significance was defined as P < .05. All comparisons were performed using SAS version 9 (SAS Institute Inc) and Stata version 15.1 (StataCorp).

Results

Between October 2010 and January 2011, 4732 (81.2%) of 5823 first-year medical students completed the baseline questionnaire (Figure). Of 4732 baseline responders, 3994 (84%) completed the MS4 questionnaire from January to March 2014. There were 204 baseline responders who were ineligible to participate for the MS4 questionnaire (the reasons for ineligibility appear in the Figure).

In 2016, we were unable to contact 775 of the 4732 baseline responders to invite them to complete the PGY-2 questionnaire. In addition to the 775, there were 34 baseline responders who were no longer pursuing medicine (and not invited to complete the PGY-2 questionnaire) and 2 who had died. Of the 3921 baseline responders we were able to contact, 244 were not eligible for the PGY-2 questionnaire due to

not being a second-year resident. Overall, 3588 (90% of 3994 MS4 responders, 76% of 4732 baseline completers, and 42% of all 8594 first-year students) responded to the PGY-2 questionnaire. The last day of follow-up was July 31, 2016.

The characteristics of the study participants appear in **Table 1**. The demographic characteristics were generally similar to all US resident physicians.[32,33] With respect to parental and marital status, the demographic characteristics of those who responded to both the baseline questionnaire and the PGY-2 questionnaire were similar to those who did not respond to the PGY-2 questionnaire (eTable in Supplement 1). Those who responded to both questionnaires were slightly more likely to be female (50.8% vs 47.1%), younger than 24 years of age (74.0% vs 70.6%), white (65.8% vs 59.2%), and be born in the United States (85.6% vs 80.3%) and less likely to be Hispanic (5.4% vs 8.2%) ($P < .05$ for all comparisons).

Symptoms of emotional exhaustion at least weekly were reported by 1272 of 3574 resident physicians (35.6% [99% CI, 34.0%-37.2%]) and 1246 of 3574 resident physicians (34.9% [99% CI, 33.3%-36.5%]) reported symptoms of depersonalization at least weekly. Both high emotional exhaustion and high depersonalization were reported by 903 of 3574 resident physicians (25.3% [95% CI, 23.9%-26.7%]). Overall, 1615 of 3574 resident physicians (45.2% [95% CI, 43.6%-46.8%]) reported at least 1 symptom of burnout at least weekly.

In terms of career and specialty choice regret, 502 of 3571 resident physicians (14.1% [95% CI, 12.9%-15.2%]) reported that they would "definitely not" or "probably not" choose to become a physician again and 253 of 3570 resident physicians (7.1% [95% CI, 6.3%-8.0%]) indicated they would "definitely not" or "probably not" choose the same specialty if given the chance to revisit their career and specialty choice.

Reported symptoms of burnout during the second year of residency appear in **Table 2** by demographic characteristics; specialty; reported levels of anxiety, social support, and empathy during year 4 of medical school; and USMLE Step 1 score. Substantial variation in reported symptoms of burnout among second-year resident physicians was observed by clinical specialty (Wald $P < .001$). In multivariable models, after controlling for demographics, educational debt, USMLE Step 1 score, and levels of anxiety, empathy, and social support during year 4 of medical school, training in urology, neurology, emergency medicine, ophthalmology, and general surgery were significantly associated with higher RRs of reported symptoms of burnout during the second year of residency (range of RRs, 1.23-1.48) relative to training in internal medicine. In contrast, training in dermatology (RR, 0.60 [95% CI, 0.39 to 0.88]; RD, −16.9% [95% CI, −26.6% to −5.0%]) was associated with lower RRs for reported symptoms of burnout during the second year of residency relative to training in internal medicine (Table 2).

Female sex was associated with a higher RR of reported symptoms of burnout (RR, 1.19 [95% CI, 1.09 to 1.29]; RD, 7.6% [95% CI, 3.8% to 11.3%]). A higher anxiety score during year 4 of medical school was associated with a higher RR for reported symptoms of burnout during the second year of residency (RR, 1.08 per 1-point increase [95% CI, 1.06 to 1.10]; RD, 1.7% [95% CI, 1.5% to 1.9%]). In contrast, a higher empathy score during year 4 of medical school (RR, 0.99 per 1-point increase

Table 1. Characteristics of US Resident Physicians

	US Resident Physicians (N = 3588)
Specialty, No. (%)[a]	
Internal medicine	815 (22.7)
Dermatology	71 (2.0)
Radiology[b]	198 (5.5)
Emergency medicine	301 (8.4)
Family medicine	306 (8.5)
Anesthesiology	255 (7.1)
Neurology[c]	87 (2.4)
Obstetrics and gynecology	234 (6.5)
Pathology	49 (1.4)
Pediatrics	412 (11.5)
Physical medicine and rehabilitation	30 (0.8)
Psychiatry	148 (4.1)
Surgery (general)	199 (5.5)
Other surgery[d]	56 (1.6)
Ophthalmology	95 (2.6)
Orthopedic surgery	153 (4.3)
Otolaryngology	67 (1.9)
Plastic surgery	27 (0.8)
Neurological surgery	26 (0.7)
Urology	59 (1.6)
Symptoms of burnout, No./total No. (%)[e]	1615/3574 (45.2)
Measured during year 4 of medical school, mean (SD)	
Anxiety[f]	10.7 (3.7)
Empathy[g]	50.2 (5.5)
Emotional social support[h]	4.3 (0.8)
Tangible social supporth	3.9 (1.1)
Age in 2016, median (interquartile range), y[i,j]	29.0 (28.0-31.0)
Sex, No. (%)[i]	(n = 3579)
Male	1750 (48.9)
Female	1822 (50.9)
Other	7 (0.2)
Race/ethnicity, No. (%)[i]	(n = 3550)
White	2354 (66.3)
Black	142 (4.0)
East Asian	444 (12.5)
South Asian	307 (8.6)
American Indian or Alaskan Native	1 (0.03)
Native Hawaiian or Pacific Islander	10 (0.3)
Multiracial	183 (5.2)
Unknown[k]	109 (3.1)
Not Hispanic or Latino, No./total No. (%)[i]	3347/3527 (94.9)
Single relationship status, No./total No. (%)[a]	1852/3532 (52.4)
Parental status, No. (%)	(n = 3540)
No childrena	3067 (86.6)
No children <5 y of age	3120 (88.1)
Born in United States, No./total No. (%)[i]	2760/3213 (85.9)
Household income during residency, No. (%)[a]	(n = 3528)
<$49 000	376 (10.7)
$50 000-$74 999	1802 (51.1)
$75 000-$99 999	497 (14.1)
$100 000-$249 999	806 (22.8)
≥$250 000	47 (1.3)

(continued)

Table 1. Characteristics of US Resident Physicians (continued)

	US Resident Physicians (N = 3588)
Educational debt quartile, No. (%)[a]	(n = 2970)
Highest (≥$210 000)	748 (25.2)
Second highest ($150 000-$209 999)	833 (28.0)
Second lowest ($60 000-$149 999)	650 (21.9)
Lowest ($<60 000)	739 (24.9)
US Medical Licensing Examination Step 1 score, No. (%)[l]	(n = 3214)
≤200	154 (4.8)
201-210	259 (8.1)
211-220	378 (11.8)
221-230	593 (18.5)
231-240	634 (19.7)
241-250	619 (19.3)
251-260	443 (13.8)
≥261	134 (4.2)

[a] Data derived from the questionnaire during the second year of residency.

[b] Includes diagnostic radiology, nuclear medicine, and radiology oncology.

[c] Includes child neurology, neurology, and neurodevelopmental disabilities.

[d] Includes integrated thoracic surgery and integrated vascular surgery, among others.

[e] Positive for symptoms of burnout if had a score of 5 (≥once per week) or higher (range, 1-7) on either of 2 questions. Taken from the Maslach Burnout Inventory, one question was on "emotional exhaustion" and the other was on "depersonalization."

[f] The score range is 4-20; higher scores indicate greater anxiety. The Patient-Reported Outcome Measurement Information System anxiety short form was used. A raw score of 10 converts to a t score of 59.5 (SE, 2.6), which is approximately 1 SD above the US general population mean.

[g] The score range is 7-56; higher scores indicate greater empathic orientation. Eight items from the Jefferson Scale of Physician Empathy were used.

[h] The score range is 1-5; higher scores indicate better social support. The Tangible Support and Emotional Support subscales from the Medical Outcomes Study Social Support Measure were used. An Emotional Support subscale score of 4.3 transforms on a 0-100 scale to 82.5, which is higher than the population norm of 69.9. A Tangible Support subscale score of 3.9 transforms on a 0-100 scale to 72.5, which is higher than the population norm of 69.8.[31]

[i] Data derived from baseline medical school questionnaire.

[j] Age calculated from year of birth to 2016.

[k] Respondent indicated unknown race. Response was considered missing if the respondent did not answer the question.

[l] Self-reported on the questionnaire during year 4 of medical school. The score range is 1-300; higher scores indicate better performance. Most examinees score in the range of 140-260.

[95% CI, 0.99 to 1.00]; RD, −0.5% [95% CI, −0.5% to −0.2%]) was associated with a lower RR for reported symptoms of burnout during the second year of residency. The C statistic for the model was 0.66 (pseudo R^2 = 0.06).

Career and Specialty Choice Regret

During the second year of residency, data on reported regret for career choice appear in **Table 3** and regret for specialty choice appear in **Table 4**; both tables contain demographic characteristics, specialty, reported symptoms of burnout during the second year of residency (on the PGY-2 questionnaire), levels of anxiety, social support, empathy during year 4 of medical school, and USMLE Step 1 score. After controlling for other fac-

tors, symptoms of burnout were associated with a higher RR for career choice regret (RR, 3.46 [95% CI, 2.83 to 4.23]; RD, 15.2% [95% CI, 12.8% to 17.5%]; Table 3).

Training in pathology (RR, 2.96 [95% CI, 1.72 to 4.66]; RD, 19.6% [95% CI, 7.6% to 34.6%]), radiology (RR, 1.60 [95% CI, 1.06 to 2.38]; RD, 6.0% [95% CI, 0.6% to 12.6%]), and anesthesiology (RR, 1.82 [95% CI, 1.30 to 2.54]; RD, 8.2% [95% CI, 3.4% to 14.0%]) was associated with a higher RR for career choice regret during the second year of residency relative to training in internal medicine. A higher anxiety score during year 4 of medical school was associated with a higher RR for career choice regret during the second year of residency (RR, 1.04 per 1-point increase [95% CI, 1.01 to 1.07]; RD, 0.3% [95% CI, 0.1% to 0.4%]). The C statistic for the model was 0.74 (pseudo R^2 = 0.11).

Symptoms of burnout reported on the PGY-2 questionnaire (3.82 [95% CI, 2.83 to 5.18]; RD, 6.8% [95% CI, 5.2% to 8.5%]) and age (RR, 1.08 per 1 year older [95% CI, 1.02 to 1.14]; RD, 0.0% [95% CI, 0.0% to 0.1%]) were associated with an elevated RR of specialty choice regret during the second year of residency after controlling for demographics, educational debt, USMLE Step 1 score, specialty, and levels of anxiety, empathy, and social support during year 4 of medical school (Table 4). Training in anesthesiology, emergency medicine, family medicine, pediatrics, psychiatry, ophthalmology, and orthopedic surgery (range of RRs, 0.26 to 0.58) was associated with a lower RR of specialty choice regret during the second year of residency relative to training in internal medicine.

Not being Hispanic or Latino was associated with a lower RR for specialty choice regret (RR, 0.59 [95% CI, 0.37 to 0.97]; RD, −3.0% [95% CI, −7.3% to −0.1%]). A higher empathy score during year 4 of medical school (RR, 0.98 per 1-point increase [95% CI, 0.97 to 1.00]; RD, −0.3% [95% CI, −1.2% to 0.0%]) and a higher emotional social support score (RR, 0.82 per 1-point increase [95% CI, 0.70 to 1.01]; RD, −1.9% [95% CI, −7.4% to 0.1%]) were associated with a lower RR for specialty choice regret during the second year of residency. The C statistic for the model was 0.79 (pseudo R^2 = 0.15).

Discussion

Among US resident physicians in this study, reported symptoms of burnout and career choice regret were prevalent. Training in the fields of urology, neurology, emergency medicine, ophthalmology, or general surgery (relative to internal medicine) and being female were independently associated with a higher RR for reported symptoms of burnout. Higher anxiety and lower empathy during year 4 of medical school also were associated with higher RRs for reported symptoms of burnout during residency.

The findings suggest the prevalence of burnout symptoms among resident physicians may be similar to that of practicing physicians (48.8%) and higher than other US workers (28.4% as assessed in 2014 using the same single-item measures adapted from the MBI).[7] National studies of practicing physicians also have found the frequency of burnout symptoms to be higher among female physicians.[7] Difficulties with work-life balance and work-home conflicts, sexism, stereotype threat, and discrimination may play a part.[7,34-36]

Table 2. Association of Resident Specialty and Characteristics With Symptoms of Burnout

	Burnout Status			Bivariable Analysis			Multivariable Analysis		
	No. With Burnout[a]	No. Without Burnout	Burnout Prevalence, %	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value
Specialty[c]									
Internal medicine	346	466	42.6	1 [Reference]	1 [Reference]		1 [Reference]	1 [Reference]	
Dermatology	21	50	29.6	−13.0 (−23.0 to −1.1)	0.69 (0.47 to 0.97)		−16.9 (−26.6 to −5.0)	0.60 (0.39 to 0.88)	
Radiology	70	128	35.4	−7.3 (−14.4 to 0.5)	0.83 (0.67 to 1.01)		−7.0 (−14.6 to 1.2)	0.84 (0.67 to 1.03)	
Emergency medicine	161	138	53.8	11.2 (4.8 to 17.8)	1.26 (1.11 to 1.44)		13.6 (6.6 to 20.2)	1.32 (1.15 to 1.50)	
Family medicine	113	191	37.2	−5.4 (−11.7 to 1.0)	0.87 (0.74 to 1.02)		−4.1 (−10.9 to 2.8)	0.90 (0.76 to 1.07)	
Anesthesiology	107	145	42.5	−0.2 (−7.1 to 7.0)	1.00 (0.84 to 1.17)		0.7 (−6.4 to 8.1)	1.02 (0.86 to 1.19)	
Neurology	53	33	61.6	19.0 (7.9 to 29.4)	1.45 (1.18 to 1.71)		19.2 (7.8 to 29.7)	1.45 (1.18 to 1.72)	
Obstetrics and gynecology	114	119	48.9	6.3 (−0.9 to 13.6)	1.15 (0.98 to 1.33)		3.6 (−3.9 to 11.2)	1.09 (0.91 to 1.27)	
Pathology	17	32	34.7	−7.9 (−20.6 to 6.6)	0.81 (0.53 to 1.16)		−13.6 (−25.3 to 0.8)	0.68 (0.42 to 1.02)	
Pediatrics	178	234	43.2	0.6 (−5.3 to 6.4)	1.01 (0.88 to 1.16)	<.001	−1.7 (−7.8 to 4.4)	0.96 (0.83 to 1.11)	
Physical medicine and rehabilitation	15	15	50.0	7.4 (−10.0 to 25.4)	1.17 (0.77 to 1.60)		9.4 (−9.1 to 26.8)	1.22 (0.79 to 1.64)	<.001
Psychiatry	65	83	43.9	1.3 (−7.2 to 10.0)	1.03 (0.84 to 1.24)		0.3 (−8.4 to 9.2)	1.01 (0.81 to 1.23)	
Surgery (general)	107	92	53.8	11.2 (3.3 to 18.8)	1.26 (1.08 to 1.46)		10.0 (1.9 to 17.9)	1.23 (1.04 to 1.43)	
Other surgery	27	29	48.2	5.6 (−7.6 to 19.0)	1.13 (0.83 to 1.45)		2.8 (−10.7 to 16.8)	1.07 (0.75 to 1.40)	
Ophthalmology	53	42	55.8	13.2 (2.8 to 23.4)	1.31 (1.06 to 1.57)		11.1 (0.2 to 22.0)	1.26 (1.01 to 1.53)	
Orthopedic surgery	76	77	49.7	7.1 (−1.7 to 15.7)	1.17 (0.96 to 1.38)		8.6 (−0.5 to 17.7)	1.20 (0.99 to 1.43)	
Otolaryngology	30	37	44.8	2.2 (−9.8 to 14.8)	1.05 (0.78 to 1.35)		2.4 (−10.0 to 15.1)	1.06 (0.77 to 1.36)	
Plastic surgery	12	15	44.4	1.8 (−15.8 to 20.8)	1.04 (0.63 to 1.49)		3.3 (−15.4 to 22.5)	1.08 (0.65 to 1.54)	
Neurological surgery	13	12	52.0	9.4 (−9.7 to 27.7)	1.22 (0.77 to 1.66)		7.4 (−12.4 to 27.6)	1.17 (0.71 to 1.66)	
Urology	37	21	63.8	21.2 (7.8 to 33.0)	1.50 (1.18 to 1.80)		20.7 (6.9 to 33.1)	1.48 (1.16 to 1.80)	
Measured during year 4 of medical school, mean (SD)									
Anxiety[d]	11.5 (3.7)	10.1 (3.6)		1.8 (1.6 to 1.9)	1.08 (1.06 to 1.10)	<.001	1.7 (1.5 to 1.9)	1.08 (1.06 to 1.10)	<.001
Empathy[e]	49.8 (5.8)	50.6 (5.2)		−0.5 (−0.5 to −0.3)	0.99 (0.99 to 1.00)	<.001	−0.5 (−0.5 to −0.2)	0.99 (0.99 to 1.00)	<.001
Emotional support[f]	4.2 (0.8)	4.4 (0.8)		−4.6 (−5.9 to −2.7)	0.93 (0.92 to 0.95)	<.001	−1.1 (−4.1 to 2.0)	0.98 (0.93 to 1.06)	.49
Tangible support[f]	3.8 (1.1)	4.0 (1.0)		−3.4 (−4.7 to −1.9)	0.94 (0.93 to 0.96)	.001	−1.4 (−3.7 to 0.8)	0.97 (0.94 to 1.02)	.14
Age in 2016, mean (SD), y[g,h]	29.8 (2.3)	29.8 (2.5)		−0.1 (−0.7 to 0.5)	1.00 (0.99 to 1.02)	.27	0.4 (−0.4 to 0.7)	1.01 (0.99 to 1.04)	.81

(continued)

Table 2. Association of Resident Specialty and Characteristics With Symptoms of Burnout (continued)

	Burnout Status			Bivariable Analysis			Multivariable Analysis		
	No. With Burnout[a]	No. Without Burnout	Burnout Prevalence, %	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value
Sex[g]									
Male	726	1022	41.5	1 [Reference]	1 [Reference]	.002	1 [Reference]	1 [Reference]	.003
Female	885	930	48.8	7.2 (3.9 to 10.5)	1.17 (1.09 to 1.26)		7.6 (3.8 to 11.3)	1.19 (1.09 to 1.29)	
Other	2	5	28.6	−13.0 (−34.4 to 25.4)	0.69 (0.17 to 1.62)		−18.1 (−36.1 to 19.9)	0.56 (0.13 to 1.49)	
Race[g]									
White	1036	1257	45.2	1 [Reference]	1 [Reference]	.89	1 [Reference]	1 [Reference]	.46
Nonwhite	536	646	45.3	0.2 (−3.4 to 3.6)	1.00 (0.93 to 1.08)		−1.8 (−6.0 to 2.5)	0.96 (0.87 to 1.06)	
Ethnicity[g]									
Hispanic or Latino	95	85	52.8	1 [Reference]	1 [Reference]	.09	1 [Reference]	1 [Reference]	.09
Not Hispanic or Latino	1486	1852	44.5	−8.1 (−15.5 to −0.7)	0.85 (0.74 to 0.98)		−8.6 (−16.7 to −0.3)	0.84 (0.72 to 0.99)	
Relationship status[c]									
Single	856	996	46.2	1 [Reference]	1 [Reference]	.31	1 [Reference]	1 [Reference]	.22
Married or domestic partner	738	942	43.9	−2.3 (−5.5 to 1.0)	0.95 (0.88 to 1.02)		2.5 (−2.1 to 7.1)	1.06 (0.95 to 1.17)	
Parental status[c]									
No children	1422	1644	46.4	1 [Reference]	1 [Reference]	<.001	1 [Reference]	1 [Reference]	.10
≥1 Child	176	297	37.2	−9.1 (−13.7 to −4.4)	0.80 (0.71 to 0.90)		−9.9 (−23.3 to 5.2)	0.79 (0.52 to 1.12)	
Have children <5 y of age									
No	1441	1678	46.2	1 [Reference]	1 [Reference]	.003	1 [Reference]	1 [Reference]	.25
Yes	157	263	37.4	−8.8 (−13.6 to −3.7)	0.81 (0.71 to 0.92)		3.7 (−12.1 to 19.3)	1.08 (0.74 to 1.45)	
Birth location[g]									
Other country	190	261	42.1	1 [Reference]	1 [Reference]	.13	1 [Reference]	1 [Reference]	.07
United States	1260	1492	45.8	3.6 (−1.4 to 8.4)	1.09 (0.97 to 1.22)		4.5 (−0.9 to 9.9)	1.11 (0.98 to 1.27)	
Household income during residency, $[c]									
<49 000	173	203	46.0	1 [Reference]	1 [Reference]	.14	1 [Reference]	1 [Reference]	.13
50 000-74 999	830	972	46.1	0.1 (−5.5 to 5.6)	1.00 (0.89 to 1.13)		1.9 (−4.0 to 7.7)	1.04 (0.92 to 1.20)	
75 000-99 999	200	297	40.2	−5.5 (−12.1 to 1.1)	0.88 (0.76 to 1.03)		−3.9 (−11.1 to 3.5)	0.91 (0.77 to 1.09)	
100 000-249 999	365	440	45.3	−0.6 (−6.7 to 5.5)	0.99 (0.87 to 1.13)		0.6 (−6.4 to 7.7)	1.01 (0.87 to 1.19)	
≥250 000	25	22	53.2	7.4 (−7.8 to 21.9)	1.16 (0.84 to 1.50)		7.9 (−8.0 to 23.2)	1.18 (0.83 to 1.56)	

(continued)

Table 2. Association of Resident Specialty and Characteristics With Symptoms of Burnout (continued)

	Burnout Status		Bivariable Analysis				Multivariable Analysis		
	No. With Burnout[a]	No. Without Burnout	Burnout Prevalence, %	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value
Educational debt >$1000[c]									
Yes	1281	1567	45.0	1 [Reference]	1 [Reference]	.57	1 [Reference]	1 [Reference]	.99
No	180	208	46.4	1.4 (−3.9 to 6.6)	1.03 (0.92 to 1.15)		0.1 (−5.4 to 5.7)	1.00 (0.88 to 1.13)	
US Medical Licensing Examination Step 1 score[i]									
≤200	66	88	42.9	1 [Reference]	1 [Reference]	.13	1 [Reference]	1 [Reference]	.18
201-210	102	157	39.4	−2.5 (−12.3 to 7.1)	0.94 (0.75 to 1.19)		−1.7 (−12.1 to 8.2)	0.96 (0.75 to 1.23)	
211-220	167	210	44.3	1.6 (−7.7 to 10.5)	1.04 (0.84 to 1.29)		1.6 (−8.2 to 11.1)	1.04 (0.83 to 1.31)	
221-230	283	308	47.9	4.9 (−3.9 to 13.4)	1.12 (0.92 to 1.37)		4.1 (−5.5 to 13.2)	1.10 (0.89 to 1.38)	
231-240	301	332	47.6	4.4 (−4.5 to 12.9)	1.10 (0.91 to 1.36)		4.1 (−5.4 to 13.1)	1.10 (0.89 to 1.37)	
241-250	260	356	42.2	−0.5 (−9.4 to 8.1)	0.99 (0.81 to 1.23)		−0.8 (−10.5 to 8.6)	0.98 (0.79 to 1.24)	
251-260	211	231	47.7	4.7 (−4.7 to 13.7)	1.11 (0.91 to 1.38)		5.0 (−5.4 to 15.0)	1.12 (0.89 to 1.43)	
≥261	63	71	47.0	4.3 (−7.3 to 15.8)	1.10 (0.85 to 1.43)		4.9 (−7.8 to 17.9)	1.12 (0.84 to 1.49)	

a Positive for symptoms of burnout if had a score of 5 (≥once per week) or higher (range, 1-7) on either of 2 questions. Taken from the Maslach Burnout Inventory, one question was on "emotional exhaustion" and the other was on "depersonalization." The C statistic for the model was 0.66 (pseudo R^2 = 0.06).

b A higher relative risk is less desirable. Relative risk represents risk of reported symptoms of burnout in the categorical group relative to the reference group. Risk difference or absolute risk reduction is the change in risk of burnout relative to the reference group. For age, anxiety, empathy, emotional support, and tangible support, the relative risk and risk difference indicate the incremental increase in the relative risk of symptoms of burnout associated with each 1-unit increase in age or scores. P values are for the test in which coefficients are zero; confidence intervals for risk differences and relative risks do no necessarily align to the corresponding coefficient test. All models used multiple imputation with 20 imputations to account for missing values.

c Data derived from the questionnaire during the second year of residency.

d The score range is 4-20; higher scores indicate greater anxiety. The Patient-Reported Outcome Measurement Information System anxiety short form was used. A raw score of 10 converts to a t score of 59.5 (SE, 2.6), which is approximately 1 SD above the US general population mean.

e The score range is 7-56; higher scores indicate greater empathic orientation. Eight items from the Jefferson Scale of Physician Empathy were used.

f The score range is 1-5; higher scores indicate better social support. The Tangible Support and Emotional Support subscales from the Medical Outcomes Study Social Support Measure were used. An Emotional Support subscale score of 4.3 transforms on a 0-100 scale to 82.5, which is higher than the population norm of 69.9. A Tangible Support subscale score of 3.9 transforms on a 0-100 scale to 72.5, which is higher than the population norm of 69.8.[31]

g Data derived from baseline medical school questionnaire.

h Age calculated from year of birth to 2016.

i Self-reported on the questionnaire during year 4 of medical school. The score range is 1-300; higher scores indicate better performance. Most examinees score in the range of 140-260.

Table 3. Association of Resident Specialty and Characteristics With Career Choice Regret

	Career Choice Regret Status			Bivariable Analysis			Multivariable Analysis		
	No. With Career Choice Regret[a]	No. Without Career Choice Regret	Career Choice Regret Prevalence, %	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value
Specialty[c]									
Internal medicine	99	713	12.2	1 [Reference]	1 [Reference]	<.001	1 [Reference]	1 [Reference]	.002
Dermatology	11	60	15.5	3.3 (−4.0 to 13.8)	1.27 (0.69 to 2.19)		8.2 (−0.5 to 21.0)	1.82 (0.95 to 3.21)	
Radiology	33	165	16.7	4.5 (−0.8 to 10.6)	1.37 (0.94 to 1.95)		6.0 (0.6 to 12.6)	1.60 (1.06 to 2.38)	
Emergency medicine	34	264	11.4	−0.8 (−4.8 to 3.8)	0.94 (0.65 to 1.35)		−1.8 (−5.1 to 1.9)	0.82 (0.55 to 1.21)	
Family medicine	27	275	8.9	−3.3 (−6.9 to 1.2)	0.73 (0.49 to 1.11)		−2.7 (−5.9 to 1.2)	0.73 (0.47 to 1.13)	
Anesthesiology	52	200	20.6	8.4 (3.2 to 14.3)	1.69 (1.24 to 2.29)		8.2 (3.4 to 14.0)	1.82 (1.30 to 2.54)	
Neurology	15	71	17.4	5.2 (−2.0 to 14.8)	1.43 (0.85 to 2.29)		2.0 (−3.5 to 9.9)	1.20 (0.68 to 2.05)	
Obstetrics and gynecology	28	205	12.0	−0.2 (−4.6 to 5.2)	0.99 (0.66 to 1.46)		−1.4 (−4.9 to 2.9)	0.86 (0.56 to 1.32)	
Pathology	16	33	32.7	20.5 (8.3 to 35.0)	2.68 (1.66 to 4.05)		19.6 (7.6 to 34.6)	2.96 (1.72 to 4.66)	
Pediatrics	56	356	13.6	1.4 (−2.5 to 5.6)	1.11 (0.82 to 1.51)		1.2 (−2.3 to 5.1)	1.12 (0.80 to 1.57)	
Physical medicine and rehabilitation	5	25	16.7	4.5 (−5.4 to 22.5)	1.37 (0.57 to 2.91)		3.4 (−5.0 to 19.6)	1.34 (0.52 to 3.01)	
Psychiatry	25	123	16.9	4.7 (−1.1 to 12.0)	1.39 (0.92 to 2.05)		3.2 (−1.8 to 9.6)	1.32 (0.84 to 2.03)	
Surgery (general)	38	161	19.1	6.9 (1.5 to 13.1)	1.57 (1.11 to 2.18)		3.9 (−0.7 to 9.3)	1.39 (0.93 to 2.02)	
Other surgery	8	48	14.3	2.1 (−5.3 to 14.0)	1.17 (0.59 to 2.20)		0.4 (−5.5 to 10.5)	1.04 (0.49 to 2.08)	
Ophthalmology	15	80	15.8	3.6 (−3.1 to 12.6)	1.30 (0.77 to 2.11)		2.5 (−3.0 to 10.6)	1.25 (0.72 to 2.12)	
Orthopedic surgery	19	134	12.4	0.2 (−4.8 to 6.7)	1.02 (0.64 to 1.59)		0.4 (−4.1 to 6.4)	1.04 (0.63 to 1.69)	
Otolaryngology	6	61	9.0	−3.2 (−8.8 to 6.3)	0.73 (0.33 to 1.55)		−1.6 (−7.0 to 7.8)	0.84 (0.36 to 1.81)	
Plastic surgery	2	25	7.4	−4.8 (−11.1 to 13.9)	0.61 (0.15 to 2.15)		−3.8 (−9.1 to 12.8)	0.62 (0.15 to 2.31)	
Neurological surgery	4	21	16.0	3.8 (−6.5 to 23.4)	1.31 (0.49 to 3.00)		1.8 (−6.3 to 19.4)	1.18 (0.40 to 2.98)	
Urology	9	49	15.5	3.3 (−4.6 to 15.2)	1.27 (0.65 to 2.30)		0.4 (−5.3 to 10.0)	1.04 (0.51 to 2.05)	
Symptoms of burnout[c,d]									
No	130	1827	6.6	1 [Reference]	1 [Reference]	<.001	1 [Reference]	1 [Reference]	<.001
Yes	372	1242	23.0	16.4 (14.1 to 18.8)	3.47 (2.87 to 4.18)		15.2 (12.8 to 17.5)	3.46 (2.83 to 4.23)	
Measured during year 4 of medical school, mean (SD)									
Anxiety[e]	11.8 (4.1)	10.6 (3.6)		0.5 (0.4 to 0.5)	1.08 (1.05 to 1.11)	<.001	0.3 (0.1 to 0.4)	1.04 (1.01 to 1.07)	.002
Empathy[f]	49.1 (6.5)	50.4 (5.2)		−0.9 (−1.1 to −0.4)	0.98 (0.98 to 0.99)	<.001	−0.3 (−0.9 to 0.0)	0.99 (0.98 to 1.00)	.11
Emotional support[g]	4.1 (0.9)	4.4 (0.8)		−6.9 (−10.4 to −3.6)	0.82 (0.79 to 0.87)	<.001	−2.3 (−7.2 to 0.2)	0.88 (0.79 to 1.02)	.07
Tangible support[g]	3.7 (1.2)	4.0 (1.1)		−2.8 (−5.0 to −1.0)	0.88 (0.83 to 0.94)	.002	−0.1 (−1.9 to 0.8)	0.99 (0.89 to 1.11)	.78
Age in 2016, mean (SD), y[h,i]	29.9 (2.3)	29.8 (2.5)		0.1 (−0.5 to 0.2)	1.01 (0.98 to 1.05)	.77	0 (−1.0 to 0.1)	1.00 (0.97 to 1.04)	.87

(continued)

Table 3. Association of Resident Specialty and Characteristics With Career Choice Regret (continued)

	Career Choice Regret Status			Bivariable Analysis			Multivariable Analysis		
	No. With Career Choice Regret[a]	No. Without Career Choice Regret	Career Choice Regret Prevalence, %	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value
Sex[h]									
Male	240	1507	13.7	1 [Reference]	1 [Reference]	.92	1 [Reference]	1 [Reference]	.77
Female	260	1553	14.3	0.6 (−1.7 to 2.9)	1.04 (0.89 to 1.23)		−0.3 (−2.4 to 1.9)	0.98 (0.81 to 1.19)	
Other	2	5	28.6	14.8 (−6.6 to 53.1)	2.08 (0.53 to 4.89)		18.2 (−5.1 to 61.5)	2.63 (0.55 to 6.64)	
Race[h]									
White	297	1995	13.0	1 [Reference]	1 [Reference]	.01	1 [Reference]	1 [Reference]	.14
Nonwhite	193	988	16.3	3.3 (0.7 to 5.8)	1.26 (1.05 to 1.48)		1.6 (−0.8 to 4.2)	1.15 (0.93 to 1.43)	
Ethnicity[h]									
Hispanic or Latino	40	140	22.2	1 [Reference]	1 [Reference]	.01	1 [Reference]	1 [Reference]	.07
Not Hispanic or Latino	450	2885	13.5	−8.7 (−15.5 to −3.0)	0.61 (0.46 to 0.82)		−5.3 (−11.7 to −0.4)	0.67 (0.48 to 0.97)	
Relationship status[c]									
Single	270	1581	14.6	1 [Reference]	1 [Reference]	.43	1 [Reference]	1 [Reference]	.81
Married or domestic partner	227	1452	13.5	−1.0 (−3.3 to 1.3)	0.93 (0.79 to 1.09)		0.2 (−2.5 to 2.9)	1.01 (0.80 to 1.29)	
Parental status[c]									
No children	434	2630	14.2	1 [Reference]	1 [Reference]	.39	1 [Reference]	1 [Reference]	.51
≥1 Child	64	409	13.5	−0.6 (−3.7 to 3.1)	0.96 (0.75 to 1.22)		2.8 (−4.7 to 14.7)	1.26 (0.60 to 2.52)	
Have children <5 y of age									
No	442	2675	14.2	1 [Reference]	1 [Reference]	.53	1 [Reference]	1 [Reference]	.35
Yes	56	364	13.3	−0.9 (−4.1 to 2.9)	0.94 (0.72 to 1.21)		−0.8 (−7.1 to 9.7)	0.93 (0.42 to 1.97)	
Birth location[h]									
Other country	66	384	14.7	1 [Reference]	1 [Reference]	.61	1 [Reference]	1 [Reference]	.45
United States	383	2367	13.9	−0.8 (−4.6 to 2.5)	0.95 (0.75 to 1.21)		0.6 (−2.8 to 3.4)	1.05 (0.79 to 1.41)	
Household income during residency, $[c]									
<49 000	57	318	15.2	1 [Reference]	1 [Reference]	.81	1 [Reference]	1 [Reference]	.92
50 000 to 74 999	257	1544	14.3	−1.0 (−5.2 to 2.7)	0.93 (0.72 to 1.22)		−0.1 (−3.7 to 2.9)	0.99 (0.74 to 1.34)	
75 000 to 99 999	62	435	12.5	−2.8 (−7.6 to 1.7)	0.82 (0.58 to 1.13)		−0.1 (−4.6 to 4.3)	0.99 (0.66 to 1.47)	
100 000 to 249 999	111	694	13.8	−1.5 (−6.1 to 2.9)	0.90 (0.67 to 1.23)		0.2 (−4.0 to 4.0)	1.02 (0.71 to 1.46)	
≥250 000	11	36	23.4	8.2 (−2.5 to 22.2)	1.54 (0.85 to 2.60)		8.4 (−1.4 to 22.7)	1.76 (0.89 to 3.31)	
Educational debt >$1000[c]									
Yes	402	2444	14.1	1 [Reference]	1 [Reference]	.30	1 [Reference]	1 [Reference]	.23
No	47	340	12.1	−1.8 (−5.0 to 2.1)	0.87 (0.66 to 1.16)		−1.6 (−4.2 to 1.7)	0.86 (0.64 to 1.16)	

(continued)

Table 3. Association of Resident Specialty and Characteristics With Career Choice Regret (continued)

	Career Choice Regret Status			Bivariable Analysis			Multivariable Analysis		
	No. With Career Choice Regret[a]	No. Without Career Choice Regret	Career Choice Regret Prevalence, %	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value
US Medical Licensing Examination Step 1 score[j]									
≤200	25	128	16.3	1 [Reference]	1 [Reference]	.29	1 [Reference]	1 [Reference]	.24
201-210	38	221	14.7	−1.1 (−8.7 to 5.7)	0.93 (0.59 to 1.47)		−0.5 (−7.9 to 6.0)	0.96 (0.58 to 1.60)	
211-220	58	318	15.4	−0.4 (−7.6 to 6.0)	0.98 (0.64 to 1.51)		−0.5 (−7.7 to 5.4)	0.96 (0.60 to 1.55)	
221-230	92	498	15.6	−0.1 (−7.2 to 5.7)	0.99 (0.67 to 1.50)		−1.3 (−8.4 to 4.0)	0.90 (0.57 to 1.43)	
231-240	92	541	14.5	−1.1 (−8.1 to 4.6)	0.93 (0.63 to 1.40)		−2.2 (−9.2 to 3.1)	0.83 (0.53 to 1.33)	
241-250	70	546	11.4	−4.3 (−11.2 to 1.3)	0.73 (0.48 to 1.11)		−4.2 (−11.1 to 1.0)	0.69 (0.44 to 1.11)	
251-260	58	384	13.1	−2.4 (−9.6 to 3.7)	0.85 (0.55 to 1.32)		−3.6 (−10.6 to 2.1)	0.73 (0.45 to 1.22)	
≥261	13	121	9.7	−5.6 (−13.5 to 2.6)	0.65 (0.34 to 1.21)		−6.3 (−13.9 to 0.7)	0.53 (0.26 to 1.07)	

[a] Responded with "probably not" or "definitely not" to the following question: "If you could revisit your career choice, would you choose to become a physician again?" The C statistic for the model was 0.74 (pseudo R^2 = 0.11).

[b] A higher relative risk is less desirable. Relative risk represents risk of career choice regret in the categorical group relative to the reference group. Risk difference or absolute risk reduction is the change in risk of career choice regret relative to the reference group. For age, anxiety, empathy, emotional support, and tangible support, the relative risk and risk difference indicate the incremental increase in the relative risk of career choice regret associated with each 1-unit increase in age or scores. P values are for the test in which coefficients are zero; confidence intervals for risk differences and relative risks do not necessarily align to the corresponding coefficient test. All models used multiple imputation with 20 imputations to account for missing values.

[c] Data derived from the questionnaire during the second year of residency.

[d] Positive for symptoms of burnout if had a score of 5 (≥once per week) or higher (range, 1-7) on either of 2 questions. Taken from the Maslach Burnout Inventory; one question was on "emotional exhaustion" and the other was on "depersonalization."

[e] The score range is 4-20; higher scores indicate greater anxiety. The Patient-Reported Outcome Measurement

Information System anxiety short form was used. A raw score of 10 converts to a t score of 59.5 (SE, 2.6), which is approximately 1 SD above the US general population mean.

[f] The score range is 7-56; higher scores indicate greater empathic orientation. Eight items from the Jefferson Scale of Physician Empathy were used.

[g] The score range is 1-5; higher scores indicate better social support. The Tangible Support and Emotional Support subscales from the Medical Outcomes Study Social Support Measure were used. An Emotional Support subscale score of 4.3 transforms on a 0-100 scale to 82.5, which is higher than the population norm of 69.9. A Tangible Support subscale score of 3.9 transforms on a 0-100 scale to 72.5, which is higher than the population norm of 69.8.[31]

[h] Data derived from baseline medical school questionnaire.

[i] Age calculated from year of birth to 2016.

[j] Self-reported on the questionnaire during year 4 of medical school. The score range is 1-300; higher scores indicate better performance. Most examinees score in the range of 140-260.

Table 4. Association of Resident Specialty and Characteristics With Specialty Choice Regret

	Specialty Choice Regret Status		Specialty Choice Regret Prevalence, %	Bivariable Analysis			Multivariable Analysis		
	No. With Specialty Choice Regret[a]	No. Without Specialty Choice Regret		Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value
Specialty[c]									
Internal medicine	86	723	10.6	1 [Reference]	1 [Reference]	<.001	1 [Reference]	1 [Reference]	<.001
Dermatology	1	70	1.4	−9.2 (−11.9 to −1.4)	0.13 (0.02 to 0.86)		−6.3 (−8.8 to 1.2)	0.17 (0.02 to 1.16)	
Radiology	12	186	6.1	−4.6 (−8.2 to 0.1)	0.57 (0.31 to 1.01)		−3.5 (−6.2 to 0.1)	0.54 (0.29 to 1.01)	
Emergency medicine	10	289	3.3	−7.3 (−10.1 to −3.9)	0.31 (0.16 to 0.60)		−5.6 (−7.9 to −3.2)	0.26 (0.14 to 0.52)	
Family medicine	15	288	5.0	−5.7 (−8.8 to −2.1)	0.47 (0.27 to 0.79)		−3.6 (−6.2 to −0.4)	0.53 (0.30 to 0.94)	
Anesthesiology	15	237	6.0	−4.7 (−8.0 to −0.6)	0.56 (0.33 to 0.94)		−3.4 (−6.0 to −0.1)	0.55 (0.31 to 0.98)	
Neurology	6	80	7.0	−3.7 (−8.2 to 4.2)	0.66 (0.29 to 1.42)		−4.0 (−6.9 to 0.8)	0.48 (0.20 to 1.11)	
Obstetrics and gynecology	18	215	7.7	−2.9 (−6.6 to 1.7)	0.73 (0.45 to 1.17)		−1.6 (−4.6 to 2.4)	0.80 (0.46 to 1.34)	
Pathology	6	43	12.2	1.6 (−5.5 to 14.5)	1.15 (0.52 to 2.42)		0 (−4.9 to 9.7)	1.00 (0.40 to 2.34)	
Pediatrics	22	390	5.3	−5.3 (−8.3 to −2.1)	0.50 (0.32 to 0.78)		−3.2 (−5.7 to −0.4)	0.58 (0.36 to 0.94)	
Physical medicine and rehabilitation	1	29	3.3	−7.3 (−11.3 to 9.5)	0.31 (0.04 to 1.90)		−5.3 (−8.3 to 8.2)	0.31 (0.04 to 2.13)	
Psychiatry	5	143	3.4	−7.3 (−10.4 to −2.4)	0.32 (0.13 to 0.75)		−5.3 (−7.7 to −1.8)	0.30 (0.12 to 0.75)	
Surgery (general)	34	165	17.1	6.5 (1.1 to 12.6)	1.61 (1.09 to 2.31)		3.4 (−0.5 to 8.2)	1.44 (0.95 to 2.18)	
Other surgery	3	53	5.4	−5.3 (−9.7 to 4.6)	0.50 (0.16 to 1.46)		−5.1 (−7.9 to 0.6)	0.33 (0.09 to 1.08)	
Ophthalmology	4	91	4.2	−6.4 (−10.0 to 0.3)	0.40 (0.15 to 1.03)		−5.0 (−7.7 to −0.4)	0.34 (0.12 to 0.94)	
Orthopedic surgery	5	148	3.3	−7.4 (−10.4 to −2.6)	0.31 (0.13 to 0.74)		−5.5 (−8.0 to −2.2)	0.28 (0.11 to 0.70)	
Otolaryngology	3	64	4.5	−6.2 (−10.1 to 2.4)	0.42 (0.14 to 1.24)		−4.1 (−7.4 to 3.1)	0.46 (0.14 to 1.43)	
Plastic surgery	2	25	7.4	−3.2 (−9.4 to 14.2)	0.70 (0.18 to 2.38)		−2.4 (−7.0 to 11.8)	0.69 (0.16 to 2.58)	
Neurological surgery	0	25	0	0	1.00 (1.00 to 1.00)		0	1.00 (1.00 to 1.00)	
Urology	5	53	8.6	−2.0 (−7.6 to 8.5)	0.81 (0.33 to 1.83)		−3.2 (−6.6 to 3.4)	0.58 (0.22 to 1.47)	
Symptoms of burnout[c,d]									
No	60	1898	3.1	1 [Reference]	1 [Reference]	<.001	1 [Reference]	1 [Reference]	<.001
Yes	193	1419	12.0	8.9 (7.2 to 10.7)	3.91 (2.93 to 5.16)		6.8 (5.2 to 8.5)	3.82 (2.83 to 5.18)	
Measured during year 4 of medical school, mean (SD)									
Anxiety[e]	12.0 (4.3)	10.6 (3.6)		0.2 (0.2 to 0.3)	1.08 (1.05 to 1.12)	<.001	0.1 (0.0 to 0.2)	1.03 (1.00 to 1.08)	.09
Empathy[f]	48.7 (7.1)	50.4 (5.3)		−1.0 (−1.5 to −0.3)	0.97 (0.97 to 0.98)	<.001	−0.3 (−1.2 to 0.0)	0.98 (0.97 to 1.00)	.02
Emotional support[g]	3.9 (1.0)	4.3 (0.8)		−9.9 (−15.0 to −5.4)	0.72 (0.69 to 0.77)	<.001	−1.9 (−7.4 to 0.1)	0.82 (0.70 to 1.01)	.03
Tangible support[g]	3.6 (1.2)	4.0 (1.1)		−3.5 (−6.4 to −1.4)	0.80 (0.74 to 0.88)	<.001	−0.1 (−1.5 to 0.4)	0.99 (0.84 to 1.18)	.94
Age in 2016, mean (SD), y[h,i]	30.0 (2.9)	29.8 (2.4)		0.1 (−0.2 to 0.1)	1.03 (0.98 to 1.08)	.14	0.0 (0.00 to 0.1)	1.08 (1.02 to 1.14)	.003

(continued)

Table 4. Association of Resident Specialty and Characteristics With Specialty Choice Regret (continued)

	Specialty Choice Regret Status		Specialty Choice Regret Prevalence, %	Bivariable Analysis			Multivariable Analysis		
	No. With Specialty Choice Regret[a]	No. Without Specialty Choice Regret		Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value
Sex[h]									
Male	129	1616	7.4	1 [Reference]	1 [Reference]	.32	1 [Reference]	1 [Reference]	.13
Female	123	1691	6.8	-0.6 (-2.3 to 1.1)	0.92 (0.72 to 1.16)		-1.0 (-2.4 to 0.2)	0.79 (0.60 to 1.05)	
Other	0	7	0	0	1.00 (1.00 to 1.00)		0	1.00 (1.00 to 1.00)	
Race[h]									
White	125	2167	5.5	1 [Reference]	1 [Reference]	<.001	1 [Reference]	1 [Reference]	.06
Nonwhite	119	1061	10.1	4.5 (2.6 to 6.6)	1.82 (1.42 to 2.30)		1.8 (0.3 to 3.4)	1.45 (1.07 to 1.96)	
Ethnicity[h]									
Hispanic or Latino	24	156	13.3	1 [Reference]	1 [Reference]	<.001	1 [Reference]	1 [Reference]	.02
Not Hispanic or Latino	220	3114	6.6	-6.7 (-12.5 to -2.3)	0.50 (0.34 to 0.75)		-3.0 (-7.3 to -0.1)	0.59 (0.37 to 0.97)	
Relationship status[c]									
Single	160	1690	8.6	1 [Reference]	1 [Reference]	<.001	1 [Reference]	1 [Reference]	.12
Married or domestic partner	90	1589	5.4	-3.2 (-5.0 to -1.6)	0.62 (0.48 to 0.80)		-1.4 (-3.0 to 0.2)	0.74 (0.52 to 1.05)	
Parental status[c]									
No children	230	2833	7.5	1 [Reference]	1 [Reference]	.03	1 [Reference]	1 [Reference]	.54
≥1 Child	20	453	4.2	-3.3 (-5.1 to -0.9)	0.57 (0.36 to 0.87)		-2.5 (-5.2 to 3.6)	0.49 (0.12 to 1.86)	
Have children <5 y of age									
No	232	2884	7.4	1 [Reference]	1 [Reference]	.03	1 [Reference]	1 [Reference]	.67
Yes	18	402	4.3	-3.2 (-5.0 to -0.6)	0.57 (0.36 to 0.92)		2.8 (-2.9 to 17.0)	1.67 (0.43 to 5.73)	
Location of birth[h]									
Other country	46	403	10.2	1 [Reference]	1 [Reference]	.01	1 [Reference]	1 [Reference]	.43
United States	176	2574	6.4	-3.5 (-6.7 to -0.8)	0.65 (0.48 to 0.90)		-0.8 (-2.9 to 0.9)	0.85 (0.59 to 1.23)	
Household income during residency, $[c]									
<49 000	37	338	9.9	1 [Reference]	1 [Reference]	<.001	1 [Reference]	1 [Reference]	.16
50 000 to 74 999	136	1664	7.6	-2.3 (-5.9 to 0.6)	0.76 (0.54 to 1.08)		-0.9 (-3.2 to 0.9)	0.84 (0.56 to 1.25)	
75 000 to 99 999	23	474	4.6	-5.2 (-9.0 to -1.8)	0.47 (0.29 to 0.78)		-1.3 (-4.1 to 1.4)	0.75 (0.42 to 1.34)	
100 000 to 249 999	46	759	5.7	-4.1 (-7.8 to -0.9)	0.58 (0.38 to 0.88)		-0.9 (-3.7 to 1.5)	0.83 (0.49 to 1.39)	
≥250 000	10	37	21.3	11.3 (1.1 to 25.5)	2.15 (1.10 to 3.92)		10.8 (2.4 to 24.7)	3.07 (1.40 to 6.51)	
Educational debt >$1000[c]									
Yes	193	2651	6.8	1 [Reference]	1 [Reference]	.72	1 [Reference]	1 [Reference]	.79
No	28	360	7.2	0.5 (-2.0 to 3.7)	1.06 (0.73 to 1.55)		0.2 (-1.5 to 2.5)	1.05 (0.68 to 1.59)	

(continued)

Table 4. Association of Resident Specialty and Characteristics With Specialty Choice Regret (continued)

	Specialty Choice Regret Status		Specialty Choice Regret Prevalence, %	Bivariable Analysis			Multivariable Analysis		
	No. With Specialty Choice Regret[a]	No. Without Specialty Choice Regret		Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value	Absolute Risk Difference, % (95% CI)[b]	Relative Risk (95% CI)[b]	Wald P Value
US Medical Licensing Examination Step 1 score[j]									
≤200	14	139	9.2	1 [Reference]	1 [Reference]	.22	1 [Reference]	1 [Reference]	.48
201-210	17	242	6.6	−2.2 (−8.2 to 3.2)	0.76 (0.39 to 1.50)		−0.8 (−4.9 to 2.6)	0.84 (0.40 to 1.79)	
211-220	24	352	6.4	−2.4 (−8.4 to 2.2)	0.73 (0.39 to 1.37)		−1.0 (−5.0 to 2.0)	0.80 (0.40 to 1.59)	
221-230	40	549	6.8	−1.8 (−7.6 to 2.5)	0.80 (0.45 to 1.42)		−1.1 (−5.0 to 1.5)	0.79 (0.41 to 1.51)	
231-240	51	582	8.1	−0.7 (−6.5 to 3.6)	0.92 (0.53 to 1.62)		0.4 (−3.6 to 3.2)	1.07 (0.57 to 2.04)	
241-250	36	580	5.8	−2.8 (−8.6 to 1.3)	0.68 (0.39 to 1.22)		−0.5 (−4.5 to 2.3)	0.89 (0.46 to 1.77)	
251-260	31	411	7.0	−1.7 (−7.7 to 2.7)	0.81 (0.45 to 1.46)		−0.2 (−4.3 to 2.9)	0.96 (0.48 to 1.88)	
≥261	6	128	4.5	−3.7 (−10.3 to 3.1)	0.58 (0.23 to 1.47)		−1.8 (−6.1 to 2.9)	0.64 (0.23 to 1.79)	

[a] Responded with "probably not" or "definitely not" to the following question: "If you could revisit your specialty choice, would you choose the same specialty again?" The C statistic for the model was 0.79 (pseudo R^2 = 0.15).

[b] A higher relative risk is less desirable. Relative risk represents risk of specialty choice regret in the categorical group relative to the reference group. Risk difference or absolute risk reduction is the change in risk of specialty choice regret relative to the reference group. For age, anxiety, empathy, emotional support, and tangible support, the relative risk and risk difference indicate the incremental increase in the relative risk of specialty choice regret associated with each 1-unit increase in age or scores. P values are for the test in which coefficients are zero; confidence intervals for risk differences and relative risks do not necessarily align to the corresponding coefficient test. All models used multiple imputation with 20 imputations to account for missing values.

[c] Data derived from the questionnaire during the second year of residency.

[d] Positive for symptoms of burnout if had a score of 5 (≥once per week) or higher (range, 1-7) on either of 2 questions. Taken from the Maslach Burnout Inventory, one question was on "emotional exhaustion" and the other was on "depersonalization."

[e] The score range is 4-20; higher scores indicate greater anxiety. The Patient-Reported Outcome Measurement

Information System anxiety short form was used. A raw score of 10 converts to a t score of 59.5 (SE, 2.6), which is approximately 1 SD above the US general population mean.

[f] The score range is 7-56; higher scores indicate greater empathic orientation. Eight items from the Jefferson Scale of Physician Empathy were used.

[g] The score range is 1-5; higher scores indicate better social support. The Tangible Support and Emotional Support subscales from the Medical Outcomes Study Social Support Measure were used. An Emotional Support subscale score of 4.3 transforms on a 0-100 scale to 82.5, which is higher than the population norm of 69.9. A Tangible Support subscale score of 3.9 transforms on a 0-100 scale to 72.5, which is higher than the population norm of 69.8.[31]

[h] Data derived from baseline medical school questionnaire.

[i] Age calculated from year of birth to 2016.

[j] Self-reported on the questionnaire during year 4 of medical school. The score range is 1-300; higher scores indicate better performance. Most examinees score in the range of 140-260.

The clinical specialty areas with the highest prevalence of resident physicians experiencing symptoms of burnout mirrored those of practicing physicians to a large extent.[7] These findings suggest the increased burnout among physicians in these specialties may be attributable, in part, to unique characteristics of the work intrinsic to these specialties. Alternatively, the high prevalence of burnout symptoms among supervising physicians in these specialties may adversely affect the learning environment, or these supervising physicians may model burnout to resident physicians, placing the resident physicians who are training in these specialties at greater risk.

Similar to practicing physicians,[7] most resident physicians were satisfied with their career and specialty choice. Symptoms of burnout among resident physicians were strongly associated with career and specialty choice regret. After controlling for symptoms of burnout, training in pathology, radiology, or anesthesiology was significantly associated with a higher RR of career choice regret relative to training in internal medicine. These specialty areas (pathology, radiology, and anesthesiology) had a relatively low prevalence of symptoms of burnout, and when career choice regret occurs, it may be due to factors other than symptoms of burnout.

Further studies are needed to explore why being Hispanic or Latino was associated with a higher RR of specialty choice regret independent of burnout symptoms. Workplace discrimination related to ethnicity or social isolation may play a role.[37-39] Resident physicians from ethnic minority groups may feel obligated to pursue excellence in their field and leverage their professional stature to improve the well-being of their communities.[40]

In addition, residency programs and institutions often repeatedly invite ethnic minority resident physicians to participate in various diversity and disparity initiatives. The disproportionate demand on minority resident physicians' time, along with their ethnic-conscious professionalism, may add stressors, resulting in overcommitted or overwhelmed minority resident physicians who ultimately become dissatisfied.

Reported levels of anxiety and empathy during year 4 of medical school were associated with reported symptoms of burnout by second-year resident physicians. Reported level of anxiety during year 4 of medical school also was associated with career choice regret by second-year resident physicians. Similarly, reported levels of empathy and social support during year 4 of medical school, but not anxiety, were associated with clinical specialty choice regret. These data suggest that high anxiety, lack of social support, and lower empathy during year 4 of medical school relate to risk of symptoms of burnout during residency or have an effect on career and specialty choice regret.

Limitations

This study has several limitations. First, the cohort may not be representative of all US resident physicians. Although the sample was drawn from 49 US medical schools and the demographic characteristics of the sample are similar to those of all students matriculating in US medicals schools in 2010,[32,33] only 55% of students (4732 of 8594) from the sampled medical schools responded to the baseline questionnaire.

Second, cause and effect as well as the direction of the relationships observed cannot be determined from the study design because there were no baseline measurements of the outcome variables (eg, career choice regret).

Third, it is highly likely that there are other important dimensions related to burnout, as well career and specialty choice regret, that were not measured in this study.

Fourth, the limited number of participants in some specialties might have caused the study to be underpowered.

Fifth, there is no true reference standard definition of burnout and this study used a convenient proxy for the MBI, which is treated as a reference standard.

Conclusions

Among US resident physicians, symptoms of burnout and career choice regret were prevalent, but varied substantially by clinical specialty. Further research is needed to better understand these differences and to address these issues.

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interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Data Sharing Statement: See Supplement 2.

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