

Burnout Among U.S. Medical Students, Residents, and Early Career Physicians Relative to the General U.S. Population

Liselotte N. Dyrbye, MD, MHPE, Colin P. West, MD, PhD, Daniel Satele, Sonja Boone, MD, Litjen Tan, MS, PhD, Jeff Sloan, PhD, and Tait D. Shanafelt, MD

Abstract

Purpose

To compare the prevalence of burnout and other forms of distress across career stages and the experiences of trainees and early career (EC) physicians versus those of similarly aged college graduates pursuing other careers.

Method

In 2011 and 2012, the authors conducted a national survey of medical students, residents/fellows, and EC physicians (≤ 5 years in practice) and of a probability-based sample of the general U.S. population. All surveys assessed burnout, symptoms of depression and suicidal ideation, quality of life, and fatigue.

Results

Response rates were 35.2% (4,402/12,500) for medical students, 22.5% (1,701/7,560) for residents/fellows, and 26.7% (7,288/27,276) for EC physicians. In multivariate models that controlled for relationship status, sex, age, and career stage, being a resident/fellow was associated with increased odds of burnout and being a medical student with increased odds of depressive symptoms, whereas EC physicians had the lowest odds of high fatigue. Compared with the population control samples, medical students, residents/fellows, and EC physicians were more likely to be

burned out (all $P < .0001$). Medical students and residents/fellows were more likely to exhibit symptoms of depression than the population control samples (both $P < .0001$) but not more likely to have experienced recent suicidal ideation.

Conclusions

Training appears to be the peak time for distress among physicians, but differences in the prevalence of burnout, depressive symptoms, and recent suicidal ideation are relatively small. At each stage, burnout is more prevalent among physicians than among their peers in the U.S. population.

Numerous studies have found that many medical trainees experience burnout,¹⁻³ a syndrome resulting from work-related stress characterized by emotional exhaustion, feelings of cynicism and detachment toward patients (depersonalization), and a low sense of personal accomplishment.⁴ This finding is problematic as burnout may erode professionalism, contribute to medical errors, lead to suicidal ideation and attrition, and be a factor in substance abuse and relationship difficulties.^{2,3,5-8} Partially in response to the high prevalence of burnout and other forms of distress, medical schools are required to have student wellness programs,⁹ and residents' work hours have been restricted in recent years.¹⁰

Coupled with these institutional approaches to addressing distress in

trainees are individualized ones. For instance, many trainees adopt a survival attitude to cope with the stress.¹¹ By relying on the belief that, in the near future, their efforts will pay off and stress will decrease once their training is complete, many persevere. Yet, little is known about the experiences of early career (EC) physicians (i.e., ≤ 5 years in practice).^{12,13} The transition from training to practice may be a particularly challenging time as physicians establish themselves in their profession, adjust to a new environment, and learn the business aspect of medicine. Indeed, previous studies have documented an inverse relationship between the prevalence of burnout and age among physicians in practice,^{14,15} suggesting that, early in their careers, physicians may experience little relief from the high levels of work-related stress documented during training.

To date, no national study has evaluated the rates of burnout and other forms of distress across different stages of training or compared the experiences of trainees with those of EC physicians. Although a recent national study found a substantially higher prevalence of burnout among U.S. physicians (68% of

whom were 20 years or more removed from medical school graduation) than among other U.S. workers,¹⁵ how medical trainees' well-being compares to that of similarly aged college graduates who are pursuing other careers is unknown.

In this study, we compared the prevalence of burnout in a large national sample of medical students, residents/fellows, and EC physicians. In addition, we obtained data from a probability-based sample of the general U.S. population to compare their experiences with those of medical students, residents/fellows, and EC physicians.

Method

Participants

Medical student and resident/fellow samples. In February and March of 2012, we surveyed all 26,760 medical students and 20,475 residents/fellows in all specialty fields who were listed in the Physician Masterfile (PMF) and had given the American Medical Association (AMA) permission to contact them by e-mail. The PMF contains nearly all medical students, residents, and fellows

Please see the end of this article for information about the authors.

Correspondence should be addressed to Dr. Dyrbye, 200 First St. SW, Rochester, MN 55905; telephone: (507) 284-2511; e-mail: dyrbye.liselotte@mayo.edu.

Acad Med. 2014;89:443-451.

First published online January 20, 2014
doi: 10.1097/ACM.0000000000000134

independent of AMA membership. Accredited MD-degree-granting schools in the United States provide information on every matriculating student to the Association of American Medical Colleges (AAMC). The AAMC shares these data with the AMA, and the data become part of the PMF. Residents and fellows are typically already in the PMF, with the exception of those who attended DO-degree-granting or foreign medical schools. Those physicians not listed in the PMF are added after the AMA and AAMC conduct the National Graduate Medical Education Census (average response rate of 98%).

Each medical student and resident/fellow received an e-mail inviting him or her to participate in our study along with a link to the survey. We sent three reminders over the ensuing two weeks. According to convention,¹⁶ we considered the 12,500 medical students and 7,560 residents/fellows who opened at least one e-mail invitation to have received the invitation to participate in the study. Participation was voluntary, and all responses were anonymous.

Practicing physician sample. The PMF contains data on 814,022 physicians. A subset of these physicians had an e-mail address on file with the AMA and permitted their e-mail to be used for correspondence. As the primary goal of our larger study, of which this study is a part, was to explore burnout and career satisfaction by specialty,¹⁵ we chose our sample in a manner that enabled us to obtain an adequate representation from each major specialty field. As such, we obtained a random sample of approximately 22,000 primary care physicians, 12,000 internal medicine subspecialists, 12,000 surgical subspecialists, and 4,000 physicians from each remaining specialty area. In those fields that had fewer than 4,000 physicians, we surveyed them all. In June 2011, we sent an e-mail invitation to our sample of 89,831 physicians asking them to participate in a study to better understand the factors associated with career satisfaction among U.S. physicians. Overall, 27,276 physicians opened at least one e-mail invitation and were considered to have received the invitation to participate in the study. In this study, to compare the experiences of EC physicians with those of medical students and

residents/fellows, we focused on physicians in their first five years of practice.

Population control sample. The details of the method we used to obtain the population control sample have been previously reported.¹⁵ Briefly, in December 2010, we surveyed a probability-based sample of U.S. individuals ages 22 to 65 years with modest oversampling of those younger than 34 years old to allow a larger sample for comparison with medical students and residents/fellows. We compared medical students ages 22 to 32 (95% confidence interval [CI] of their age group) with 736 population-derived control subjects ages 22 to 32 who had graduated from a four-year college. We compared residents/fellows ages 27 to 40 (95% CI of their age group) with 992 population-derived control subjects ages 27 to 40 who had graduated from a four-year college. We compared EC physicians ages 31 to 47 (95% CI of their age group) with 1,832 population-derived control subjects ages 31 to 47 who were employed. The Mayo Clinic institutional review board approved all components of this study.

Study measures

All surveys included items about demographics (age, sex, and relationship status), burnout, symptoms of depression, and suicidal ideation within the previous 12 months. We asked medical students and residents/fellows about their year in school/training and residents/fellows and physicians in practice to indicate their specialty area. Population-derived control subjects provided details regarding their highest level of education completed, employment status, and current occupation.

Burnout. The medical student, resident/fellow, and physician surveys included the 22-item Maslach Burnout Inventory (MBI),⁴ which contains three subscales (emotional exhaustion, depersonalization, and sense of personal accomplishment). Consistent with convention,^{15,17} we considered those who scored high on either the emotional exhaustion (score of 27 or higher) or depersonalization (score of 10 or higher) domain of burnout to have at least one manifestation of professional burnout. We used data from the 22-item MBI to

compare prevalence rates of burnout between medical students, residents/fellows, and physicians.

Although the full MBI is the gold standard for measuring burnout, its length limits its utility in large surveys. Thus, as previously described,¹⁵ we measured burnout in the population control group using two single-item measures adapted from the full MBI. In multiple independent samples of over 10,000 physicians and medical students, these single items have been shown to stratify the risk of burnout.^{18,19} In previous studies, the areas under the receiver operating characteristic curve for the emotional exhaustion and depersonalization single items in comparison with the full MBI domain scores were 0.94 and 0.93, respectively, and the positive predictive values of these single-item thresholds for high levels of emotional exhaustion and depersonalization were 88.2% and 89.6%, respectively.^{18,19} We used data from these two item measures when we compared the medical student, resident/fellow, and EC physician samples with the population control sample.

Symptoms of depression and suicidal ideation.

All surveys included the two-item PRIME MD, which asks about anhedonia and feelings of being down, depressed, or hopeless. This measure has a sensitivity of 86% to 96% and a specificity of 57% to 75% for a major depressive disorder.^{20,21} We assessed for suicidal ideation by asking all respondents, "During the past 12 months, have you had thoughts of taking your own life?" This item is similar to questions used in large U.S. epidemiologic studies^{22,23} and has been used in previous surveys of physicians and medical students.^{3,24,25}

Quality of life and fatigue. We asked all respondents to rate their overall, mental, physical, and emotional quality of life (QOL) over the past week on a standardized linear analogue scale (0 = as bad as it can be to 10 = as good as it can be). This scale has established validity in a variety of medical conditions and populations.^{26,27} Using the approach described by West and colleagues,²⁸ all participants rated their level of fatigue on a similar standardized linear analogue scale (0 = as bad as it can be to 10 = as

good as it can be; lower scores indicate higher fatigue). We considered those who indicated a level of fatigue of 5 or less to have a high degree of fatigue.²⁹

Statistical analysis

We used standard descriptive statistics and Fisher exact test or Wilcoxon/two-sample *t* test procedures, as appropriate, for univariate analyses to characterize and compare the medical student, resident/fellow, EC physician, and population control samples. We conducted multivariate logistic regression analyses of medical students, residents/fellows, and EC physicians to identify demographic and professional characteristics associated with (1) burnout, (2) symptoms of depression, (3) recent suicidal ideation, and (4) high fatigue. In the modeling process, we included the following independent variables: relationship status, sex, age, and career stage (i.e., medical student, resident/fellow, EC physician). We performed all analyses using SAS version 9 (SAS Institute, Cary, North Carolina), with two-sided $\alpha = .05$.

Results

U.S. medical students, residents/fellows, and EC physicians

Among those who opened the e-mail inviting them to participate in the study, 4,402 medical students (of 12,500; 35.2% participation rate), 1,701 residents/fellows (of 7,560; 22.5% participation rate), and 7,288 practicing physicians (of 27,276; 26.7% participation rate) completed the survey. Of the practicing physicians, 880 were in their first five years of practice; thus, we considered them to be “early career.” The demographic characteristics (i.e., sex, age, year in training) of medical student and resident/fellow respondents were generally similar to the medical students and residents/fellows listed in the PMF, although in both cases fewer respondents were male (medical students: 1,972/4,376 [45.1%] versus 35,031/66,461 [52.7%]; residents/fellows: 824/1,694 [48.6%] versus 69,962/129,608 [54%]). The specialty distribution of responding residents/fellows was similar to that of U.S. physicians-in-training in general,³⁰ with the exception of slightly fewer respondents being in family medicine (117/1,701 [6.9%] versus 9,764/113,142 [8.6%]) and a larger percentage in obstetrics–gynecology

(185/1,685 [11.0%] versus 4,920/113,142 [4.3%]). As previously reported,¹⁵ the demographic characteristics of physician respondents relative to all physicians in the PMF were generally similar, although respondents were slightly older and further removed from medical school graduation and less likely to work in primary care disciplines (consistent with our sampling methodology, which oversampled specialists). See Table 1 for the demographic characteristics of the responding medical students, residents/fellows, and EC physicians.

See Table 2 for the prevalence of burnout, symptoms of depression, and suicidal ideation along with mean overall, mental, physical, and emotional QOL and level of fatigue scores among medical students, residents/fellows, and EC physicians. When measured with the full MBI, burnout and high depersonalization were highest during residency and lowest during the early career stage. High emotional exhaustion was more prevalent among medical students and residents/fellows than EC physicians. Sense of personal accomplishment improved incrementally through the career stages. In the multivariate model, age and being a resident/fellow remained independently associated with burnout (see Table 3).

Symptoms of depression and suicidal ideation were most prevalent during medical school and were less prevalent during residency and the early career stage. In the multivariate model (see Table 3), being a resident/fellow, an EC physician, male, and married remained independently associated with lower odds of having symptoms of depression, whereas only being married remained independently associated with lower odds of having recent suicidal ideation.

High fatigue was most common during residency and least common during the early career stage. In the multivariate model, being an EC physician and being male remained independently associated with lower odds of high fatigue (see Table 3).

QOL in each dimension assessed was highest among EC physicians (all $P < .0001$). Despite relatively better emotional exhaustion, depersonalization, sense of personal accomplishment, depressive symptoms, and QOL scores among EC physicians, 451 (of 878;

51.4%) were burned out, 349 (of 872; 40.0%) reported at least one symptom of depression, and 441 (of 877; 50.3%) had high fatigue.

Comparison with the general U.S. population

Compared with their respective population control samples, both medical students and residents/fellows were younger, more likely to be male, and more likely to be single ($P < .01$), whereas EC physicians were younger and more likely to be married (both $P < .0001$) (see Table 1).

In comparison with U.S. college graduates ages 22 to 32, medical students had a higher prevalence of high emotional exhaustion, high depersonalization, and burnout (see Table 4).^{18,19} Medical students also were more likely to exhibit symptoms of depression and had higher levels of fatigue. Whereas medical students reported slightly better overall QOL, they reported slightly worse physical and emotional QOL, but these differences were small in magnitude.

Residents/fellows were more likely to report high emotional exhaustion, high depersonalization, and burnout than the population control sample. Residents/fellows also were more likely to screen positive for depression and have higher levels of fatigue. In addition, their QOL in all dimensions was significantly lower, although most differences were small.

In contrast, we found fewer differences between EC physicians and their population control sample. EC physicians reported a higher prevalence of high emotional exhaustion, high depersonalization, and burnout. However, the prevalence of symptoms of depression and reported levels of fatigue were similar. EC physicians reported higher overall QOL, although other QOL dimensions (i.e., mental, physical, and emotional) were similar.

Discussion

In this large national study of medical students, residents/fellows, and EC physicians, we observed several notable findings. First, symptoms of depression, suicidal ideation, and low sense of personal accomplishment were most prevalent during medical school and then declined incrementally with each

Table 1

Demographic Characteristics of Medical Student, Resident/Fellow, and Early Career Physician (≤ 5 Years In Practice) Respondents to a Survey About Burnout and Distress, 2012

Characteristic	Medical students (n = 4,402)	Residents/fellows (n = 1,701)	Early career physicians (n = 880)
Sex, no. (%)			
Male	1,972 (45.1)	824 (48.6)	467 (53.1)
Female	2,404 (54.9)	870 (51.4)	413 (46.9)
Missing	26	7	0
Median age, years			
	25	31	36
Relationship status, no. (%)			
Single	2,589 (59.1)	553 (32.6)	145 (16.6)
Married	996 (22.7)	1,004 (59.2)	693 (79.3)
Partnered	794 (18.1)	140 (8.2)	35 (4.0)
Widowed/widower	1 (0.0)	0 (0.0)	1 (0.1)
Missing	22	4	6
Year in training, no. (%)			
First year/postgraduate year (PGY)-1	1,146 (26.2)	394 (23.3)	—
Second year/PGY-2	1,385 (31.6)	291 (17.2)	—
Third year/PGY-3	840 (19.2)	359 (21.2)	—
Fourth year/PGY-4	887 (20.3)	250 (14.8)	—
PGY-5	—	204 (12.1)	—
PGY-6	—	132 (7.8)	—
PGY-7	—	62 (3.7)	—
Missing or other	122	9	—
Specialty, no. (%)			
Anesthesiology	—	96 (5.7)	49 (5.6)
Dermatology	—	49 (2.9)	28 (3.2)
Emergency medicine	—	64 (3.8)	56 (6.4)
Family medicine	—	117 (6.9)	88 (10.0)
Internal medicine or related subspecialty	—	421 (25.0)	214 (24.4)
Radiology	—	65 (3.9)	21 (2.4)
Neurology	—	41 (2.4)	30 (3.4)
Obstetrics–gynecology	—	185 (11.0)	27 (3.1)
Ophthalmology	—	24 (1.4)	25 (2.8)
Pathology	—	51 (3.0)	26 (3.0)
Pediatrics or related subspecialty	—	142 (8.4)	62 (7.1)
Physical medicine and rehabilitation	—	25 (1.5)	14 (1.6)
Psychiatry	—	93 (5.5)	54 (6.2)
Surgical specialty	—	220 (13.1)	137 (15.6)
Other	—	92 (5.5)	47 (5.3)
Missing	—	16	2

career stage. Second, overall burnout, high depersonalization, and high fatigue were most prevalent during residency/fellowship and then improved for EC physicians. Third, high emotional exhaustion was least prevalent among EC physicians. Thus, our data suggest that different dimensions of distress may be more acute at different stages of physicians' careers, with medical training being the peak.

Our findings further suggest that burnout is more prevalent among medical trainees and EC physicians than among the similarly aged U.S. population. Although the higher prevalence of burnout among physicians in practice has been previously reported,¹⁵ ours is the first study, to our knowledge, to report burnout rates in medical students and residents/fellows in comparison with those rates for similarly aged college graduates. We also found

that depressive symptoms were more commonly reported by medical students and residents/fellows than the similarly aged U.S. population, while we found no such difference between EC physicians and their population control. In addition, fatigue among medical students and residents/fellows was common, despite current work hours restrictions intended to ensure that residents are adequately rested to deliver high-quality patient

Table 2

Burnout, Depression, and Quality of Life of Medical Student, Resident/Fellow, and Early Career Physician (≤ 5 Years In Practice) Respondents to a Survey About Burnout and Distress, 2012

Characteristic	Medical students (n = 4,402)	Residents/fellows (n = 1,701)	Early career physicians (n = 880)	P value
Burnout index*				
Emotional exhaustion				
Median score	25.0	24.0	22.0	.0002
High level, no. (%)	1,892 (44.6)	752 (44.4)	347 (39.6)	<.0001
Intermediate level, no. (%)	1,188 (28.0)	404 (23.8)	205 (23.4)	
Low level, no. (%)	1,161 (27.4)	538 (31.8)	325 (37.1)	
Depersonalization				
Median score	7.0	10.0	7.0	<.0001
High level, no. (%)	1,562 (37.9)	857 (50.7)	329 (37.7)	<.0001
Intermediate level, no. (%)	1,011 (24.5)	344 (20.3)	206 (23.6)	
Low level, no. (%)	1,547 (37.5)	490 (29.0)	338 (38.7)	
Personal accomplishment†				
Median score	36.0	39.0	41.0	<.0001
High level, no. (%)	1,251 (31.3)	818 (48.5)	494 (57.0)	<.0001
Intermediate level, no. (%)	1,312 (32.9)	499 (29.6)	214 (24.7)	
Low level, no. (%)	1,429 (35.8)	371 (22.0)	158 (18.2)	
Burned out, no. (%)‡	2,378 (55.9)	1,021 (60.3)	451 (51.4)	.0001
Screened positive for depression, no. (%)	2,552 (58.2)	861 (50.8)	349 (40.0)	<.0001
Suicidal ideation in the last 12 months, no. (%)	414 (9.4)	137 (8.1)	55 (6.3)	.0058
Quality of life, mean (standard deviation [SD])				
Overall	7.0 (1.9)	6.8 (2.0)	7.3 (1.8)	<.0001
Mental	6.5 (2.1)	6.5 (2.1)	7.0 (2.0)	<.0001
Physical	6.0 (2.2)	5.7 (2.2)	6.4 (2.1)	<.0001
Emotional	6.3 (2.2)	6.2 (2.2)	6.8 (2.1)	<.0001
Fatigue				
Mean (SD)§	5.0 (2.3)	4.9 (2.4)	5.5 (2.3)	<.0001
High fatigue, no. (%)	2,530 (57.7)	990 (58.5)	441 (50.3)	.0001

*Measured using the full Maslach Burnout Inventory. We categorized scores within individual burnout domains into low, intermediate, and high scores using established cutoffs.^{15,17}

†A low level of personal accomplishment is a symptom of burnout.

‡We used a high emotional exhaustion or depersonalization score on the Maslach Burnout Inventory (indicating a frequency of weekly or more often) to categorize a respondent as "burned out."

§A lower mean fatigue score suggests higher (worsened) fatigue.

care.³¹ Yet, outside the United States, where work hours are even more restricted, resident fatigue also remains a problem.³² As fatigue independently and meaningfully contributes to medical errors,^{28,33} percutaneous needlestick injuries,³⁴ and motor vehicle crashes,^{34,35} further interventions, perhaps aimed at work density as suggested by others,³⁶ appear warranted. Our results imply both that medical trainees' well-being is worse than that of their similarly aged peers who graduate from college but choose other careers and that, apart from burnout, well-being improves and reaches a level

typical of the employed U.S. population within the first five years of practice.

Even though medical training appears to be the peak career stage for distress, some syndromes, including burnout, symptoms of depression, and high fatigue, occurred at alarmingly high rates (i.e., 40%–50%) among EC physicians, at a time when they are dealing with the challenges inherent to launching a career and starting a new practice. Although the prevalence of high fatigue statistically declined during the first five years of practice, half of EC physicians reported

high fatigue, and their mean (SD) fatigue score was 5.5 (2.3). Similarly, although fewer medical students reported high fatigue and burnout than residents/fellows, both were still common among medical students. In fact, we found that medical students reported more fatigue and burnout than similarly aged college graduates pursuing other careers. Thus, there is the need and the opportunity to improve well-being at all career stages.

How best to do so is difficult to decipher from this and other published studies as longitudinal and intervention studies of

Table 3

Results of a Multivariable Analysis of Factors Independently Associated With Burnout and Distress in Medical Students, Residents/Fellows, and Early Career Physicians (≤ 5 Years In Practice), 2012

Dependent	Independent	Odds ratio (95% confidence interval)*	P value	
Burnout	Career stage		<.0001	
	<i>Early career</i>	1.10 (0.90 to 1.34)	.37	
	<i>Resident/fellow</i>	1.38 (1.20 to 1.58)	<.0001	
	<i>Medical student</i>	1.0 (Reference)	—	
	Age (for each additional year older)	0.98 (0.96 to 0.99)	<.0001	
	Male (versus female)	1.03 (0.93 to 1.14)	.54	
	Marital status		.07	
	<i>Married</i>	0.92 (0.81 to 1.03)	.16	
	<i>Partnered</i>	1.14 (0.98 to 1.32)	.08	
	<i>Widowed</i>	0.98 (0.06 to 15.87)	.99	
	<i>Single</i>	1.0 (Reference)	—	
	High fatigue	Career stage		<.001
		<i>Early career</i>	0.76 (0.65 to 0.88)	<.001
<i>Resident/fellow</i>		1.04 (0.93 to 1.17)	.49	
<i>Medical student</i>		1.0 (Reference)	—	
Age (for each additional year older)		1.0 (0.99 to 1.01)	.91	
Male (versus female)		0.77 (0.70 to 0.85)	<.0001	
Marital status			.12	
<i>Married</i>		0.96 (0.85 to 1.08)	.47	
<i>Partnered</i>		1.17 (1.01 to 1.35)	.12	
<i>Widowed</i>		>999 (<0.01 to >999)	.96	
<i>Single</i>		1.0 (Reference)	—	
Screened positive for depression		Career stage		<.0001
		<i>Early career</i>	0.58 (0.49 to 0.69)	<.0001
	<i>Resident/fellow</i>	0.83 (0.74 to 0.94)	.003	
	<i>Medical student</i>	1.0 (Reference)	—	
	Age (for each additional year older)	0.01 (1.0 to 1.02)	.19	
	Male (versus female)	0.74 (0.67 to 0.82)	<.0001	
	Marital status		<.0001	
	<i>Married</i>	0.73 (0.65 to 0.82)	<.0001	
	<i>Partnered</i>	0.98 (0.84 to 1.13)	.77	
	<i>Widowed</i>	0.76 (0.05 to 12.50)	.85	
	<i>Single</i>	1.0 (Reference)	—	
	Recent suicidal ideation	Career stage		.25
		<i>Early career</i>	0.77 (0.56 to 1.06)	.11
<i>Resident/fellow</i>		0.91 (0.73 to 1.12)	.36	
<i>Medical student</i>		1.0 (Reference)	—	
Age (for each additional year older)		1.00 (0.99 to 1.03)	.38	
Male (versus female)		0.99 (0.84 to 1.18)	.95	
Marital status			<.01	
<i>Married</i>		0.73 (0.60 to 0.88)	<.001	
<i>Partnered</i>		0.98 (0.77 to 1.26)	.89	
<i>Widowed</i>		<0.01 (<0.01 to 99.99)	.98	
<i>Single</i>		1.0 (Reference)	—	

*A higher odds ratio is more desirable. Odds ratios represent increased risk of burnout or high fatigue in the categorical group relative to the reference group. The independent variables included in both models were relationship status, sex, age, and career stage (i.e., medical student, resident/fellow, early career physician).

Table 4

Comparison of Medical Student, Resident/Fellow, and Early Career Physician (≤ 5 Years In Practice) Respondents to a Survey About Burnout and Distress With Probability-Based, Age-Matched Samples of U.S. College Graduates, 2011–2012

Characteristic	Medical students, ages 22–32 (n = 4,032)	Population, college graduates, ages 22–32 (n = 736)	P value	Residents/ fellows, ages 27–40 (n = 1,489)	Population, college graduates, ages 27–40 (n = 992)	P value	Early career physicians, ages 31–47 (n = 806)	Population, employed, ages 31–47 (n = 1,832)	P value
Burnout index, no. (%)[*]									
Emotional exhaustion: high score	1,647 (41.1)	511 (31.8)	<.0001	557 (37.6)	260 (26.4)	<.0001	243 (30.5)	462 (25.3)	.01
Depersonalization: high score	1,084 (27.2)	297 (18.5)	<.0001	528 (35.7)	164 (16.6)	<.0001	181 (22.6)	302 (16.6)	<.001
Burned out [†]	1,976 (49.6)	573 (35.7)	<.0001	739 (50.0)	310 (31.4)	<.0001	297 (37.3)	545 (29.9)	<.001
Screened positive for depression, no. (%)	2,337 (58.0)	761 (47.5)	<.0001	753 (50.7)	406 (41.1)	<.0001	319 (39.9)	801 (43.9)	.06
Suicidal ideation in the last 12 months, no. (%)	375 (9.3)	171 (10.6)	.25	120 (8.1)	86 (8.7)	.58	53 (6.6)	132 (7.2)	.55
Quality of life, mean (standard deviation)									
Overall	7.0 (1.8)	6.7 (2.1)	<.0001	6.8 (2.0)	7.0 (1.9)	<.01	7.3 (1.8)	6.9 (2.0)	<.0001
Mental	6.6 (2.1)	6.6 (2.2)	.30	6.5 (2.1)	6.8 (2.0)	<.001	7.0 (2.0)	6.8 (2.2)	.01
Physical	6.1 (2.2)	6.3 (2.2)	<.01	5.7 (2.2)	6.5 (2.0)	<.0001	6.4 (2.1)	6.4 (2.1)	.38
Emotional	6.3 (2.2)	6.4 (2.3)	.04	6.3 (2.2)	6.6 (2.1)	<.0001	6.8 (2.1)	6.5 (2.2)	.01
Fatigue, mean (standard deviation)	5.0 (2.3)	5.5 (2.3)	<.0001	4.9 (2.4)	5.7 (2.2)	<.0001	5.5 (2.3)	5.6 (2.3)	.79

*We assessed burnout using the single-item measures for emotional exhaustion and depersonalization adapted from the full Maslach Burnout Inventory.

†We used a high emotional exhaustion or depersonalization score on the Maslach Burnout Inventory (indicating a frequency of weekly or more often) to categorize a respondent as “burned out.”

distress are rare. Certainly, trainees and EC physicians are under substantial stress. During training and into the early stages of physicians' careers, some stressors will persist (e.g., patient death and suffering, work–life balance), whereas others will resolve (e.g., anatomy dissection, grades) or develop (e.g., malpractice, reimbursement, personal life events); thus, stressors may differ across stages of training and careers. For example, medical students may have more personal distress (i.e., depressive symptoms and suicidal ideation) due to a greater presence of stressors affecting the personal domain (e.g., adjustment to training environment) and may also struggle more with a low sense of personal accomplishment as they have fewer opportunities to have meaningful roles in providing patient care. Residents, alternately, may more often suffer from burnout, depersonalization, and fatigue, as they are adjusting to new work responsibilities. All trainees and EC physicians may be more burned out than similarly aged

members of the general population as a result of systemic problems rooted in our health care training and delivery system.¹⁵ Thus, one solution that fits across the training and practice spectrum likely does not exist. Interventions to date have primarily focused on individual strategies (e.g., stress reduction, mindfulness).³⁷ Although such strategies may be useful for some individuals, organizational interventions are needed to address the curricular, training, and system factors that also contribute to the high prevalence of distress. Thus, we need studies that closely examine the relationships between the components within these domains and distress, such as the one we conducted across 12 campuses to dissect the complex array of curricular factors that could potentially be influencing students' distress.³⁸

Limitations and strengths

Our study has a number of limitations. First, although similar to the response

rates of other national survey studies of physicians and medical students,^{2,28,39,40} ours was only 23% to 35% of those who received an invitation to participate. Distressed medical students, residents/fellows, and physicians may be less motivated to fill out a survey, or, on the other hand, they may be more likely to participate as the topic is relevant to them. We found few demographic differences between respondents and nonrespondents, with two exceptions—our medical student and resident/fellow samples were slightly biased toward female medical students and residents/fellows, and specialty distribution differed slightly between our resident/fellow and EC physician samples. Our analysis of early respondents compared with late respondents (a standard approach to evaluate for response bias) did not identify any statistically significant differences with respect to age, gender, or specialty (primary care versus nonprimary care), further suggesting that the sample was generally representative

of U.S. physicians. We cannot determine whether the level of distress among nonrespondents differed by these characteristics. However, the burnout rate, QOL scores, and level of fatigue in our study were similar to those reported previously in the literature,^{1,2,14,28,41} including in other studies with substantially higher participation rates.¹ Together, these factors indicate that the respondents to our study appear likely to be representative of today's medical trainees and physicians in practice. A second limitation of our study is that it is a cross-sectional study. Although this type of study is useful at the population level, a longitudinal study is needed to gain more insight into changes in burnout and other domains of well-being over the course of individual careers.

The strengths of our study include the use of the PMF, which is a nearly complete registry of all U.S. medical students, residents/fellows, and EC physicians, to devise the sample. Also, we included all specialty areas, practice settings, and learning/work environments. In addition, by including a large, probability-based sample of U.S. college graduates, we were able to compare the prevalence of burnout, depressive symptoms, suicidal ideation, QOL, and fatigue severity among medical students, residents/fellows, and EC physicians with a relevant population.

Conclusions

In conclusion, training appears to be the peak time for distress among physicians, but burnout, depressive symptoms, and recent suicidal ideation are common during both training and the early years of medical practice. At each stage, burnout is more prevalent among physicians than among their peers in the general U.S. population. As burnout may adversely affect the competency and professionalism of physicians and the quality of care provided to patients,^{1,2,6,41} further research is needed to identify effective solutions to address distress in trainees and physicians.

Funding/Support: The American Medical Association and the Mayo Clinic Department of Medicine Program on Physician Well-Being provided funding for this study.

Other disclosures: None reported.

Ethical approval: The Mayo Clinic institutional review board approved all components of this study.

Dr. Dyrbye is associate professor of medicine, Division of Primary Care Internal Medicine, Department of Medicine, Mayo Clinic, Rochester, Minnesota.

Dr. West is associate professor of medicine and biostatistics, Division of General Internal Medicine, Department of Medicine, Mayo Clinic, Rochester, Minnesota.

Mr. Satele is statistician in Biomedical Statistics and Informatics, Mayo Clinic, Rochester, Minnesota.

Dr. Boone was with the American Medical Association, Chicago, Illinois, at the time this study was conducted and is with the University of Illinois, Chicago, Chicago, Illinois, now.

Dr. Tan was with the American Medical Association, Chicago, Illinois, at the time this study was conducted and is chief strategy officer, Immunization Action Coalition, St. Paul, Minnesota, now.

Dr. Sloan is professor of biostatistics and oncology, Health Sciences Research, Mayo Clinic, Rochester, Minnesota.

Dr. Shanafelt is professor of medicine, Division of Hematology, Department of Medicine, Mayo Clinic, Rochester, Minnesota.

References

- West CP, Shanafelt TD, Kolars JC. Quality of life, burnout, educational debt, and medical knowledge among internal medicine residents. *JAMA*. 2011;306:952–960.
- Dyrbye LN, Massie FS Jr, Eacker A, et al. Relationship between burnout and professional conduct and attitudes among US medical students. *JAMA*. 2010;304:1173–1180.
- Dyrbye LN, Thomas MR, Massie FS, et al. Burnout and suicidal ideation among U.S. medical students. *Ann Intern Med*. 2008;149:334–341.
- Maslach C, Jackson SE, Leiter MP. *Maslach Burnout Inventory Manual*. 3rd ed. Palo Alto, Calif: Consulting Psychologists Press; 1996.
- Dyrbye LN, Thomas MR, Power DV, et al. Burnout and serious thoughts of dropping out of medical school: A multi-institutional study. *Acad Med*. 2010;85:94–102.
- West CP, Huschka MM, Novotny PJ, et al. Association of perceived medical errors with resident distress and empathy: A prospective longitudinal study. *JAMA*. 2006;296:1071–1078.
- Oreskovich MR, Kaups KL, Balch CM, et al. The prevalence of alcohol use disorders among American surgeons. *Arch Surg*. 2012;147:168–174.
- Shanafelt TD, Sloan JA, Habermann TM. The well-being of physicians. *Am J Med*. 2003;114:513–519.
- Liasion Committee on Medical Education. Accreditation Standards. Washington, DC: Liasion Committee on Medical Education; 2003. <http://www.lcme.org/>. Accessed November 19, 2013.
- Accreditation Council for Graduate Medical Education. Duty Hours: ACGME Standards. Common Program Requirements. [http://www.acgme.org/acgmeweb/Portals/0/PDFs/Common_Program_Requirements_07012011\[2\].pdf](http://www.acgme.org/acgmeweb/Portals/0/PDFs/Common_Program_Requirements_07012011[2].pdf). Accessed November 19, 2013.
- Shanafelt TD, Bradley KA, Wipf JE, Back AL. Burnout and self-reported patient care in an internal medicine residency program. *Ann Intern Med*. 2002;136:358–367.
- McManus IC, Keeling A, Paice E. Stress, burnout and doctors' attitudes to work are determined by personality and learning style: A twelve year longitudinal study of UK medical graduates. *BMC Med*. 2004;2:29.
- Tyssen R, Hem E, Vaglum P, Grønvdal NT, Ekeberg Ø. The process of suicidal planning among medical doctors: Predictors in a longitudinal Norwegian sample. *J Affect Disord*. 2004;80:191–198.
- Shanafelt TD, Balch CM, Bechamps GJ, et al. Burnout and career satisfaction among American surgeons. *Ann Surg*. 2009;250:463–471.
- Shanafelt TD, Boone S, Tan L, et al. Burnout and satisfaction with work–life balance among US physicians relative to the general US population. *Arch Intern Med*. 2012;172:1377–1385.
- American Association for Public Opinion Research. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. http://www.aapor.org/AM/Template.cfm?Section=Standard_Definitions2&Template=/CM/ContentDisplay.cfm&ContentID=3156. Accessed November 19, 2013.
- Schaufeli WB, Bakker AB, Hoogduin K, Schaufeli C, Kladler A. On the clinical validity of the Maslach burnout inventory and the burnout measure. *Psychol Health*. 2001;16:565–582.
- West CP, Dyrbye LN, Satele DV, Sloan JA, Shanafelt TD. Concurrent validity of single-item measures of emotional exhaustion and depersonalization in burnout assessment. *J Gen Intern Med*. 2012;27:1445–1452.
- West CP, Dyrbye LN, Sloan JA, Shanafelt TD. Single item measures of emotional exhaustion and depersonalization are useful for assessing burnout in medical professionals. *J Gen Intern Med*. 2009;24:1318–1321.
- Spitzer RL, Williams JB, Kroenke K, et al. Utility of a new procedure for diagnosing mental disorders in primary care. The PRIME-MD 1000 study. *JAMA*. 1994;272:1749–1756.
- Whooley MA, Avins AL, Miranda J, Browner WS. Case-finding instruments for depression. Two questions are as good as many. *J Gen Intern Med*. 1997;12:439–445.
- National Comorbidity Survey. Collaborative Psychiatric Epidemiology Surveys. Suicidality. <http://www.icpsr.umich.edu/icpsrweb/CPES/>. Accessed November 22, 2013.
- U.S. Department of Health and Human Services. Youth Risk Behavior Survey. Hyattsville, Md: National Center for Health Statistics, Centers for Disease Control and Prevention. <http://www.cdc.gov/HealthyYouth/yrbs/trends.htm>. Accessed November 19, 2013.
- Shanafelt TD, Balch CM, Dyrbye LN, et al. Special report: Suicidal ideation among American surgeons. *Arch Surg*. 2011;146:54–62.
- van der Heijden F, Dillingh G, Bakker A, Prins J. Suicidal thoughts among medical residents with burnout. *Arch Suicide Res*. 2008;12:344–346.

- 26 Gudex C, Dolan P, Kind P, Williams A. Health state valuations from the general public using the visual analogue scale. *Qual Life Res.* 1996;5:521–531.
- 27 Rummans TA, Clark MM, Sloan JA, et al. Impacting quality of life for patients with advanced cancer with a structured multidisciplinary intervention: A randomized controlled trial. *J Clin Oncol.* 2006;24:635–642.
- 28 West CP, Tan AD, Habermann TM, Sloan JA, Shanafelt TD. Association of resident fatigue and distress with perceived medical errors. *JAMA.* 2009;302:1294–1300.
- 29 Sloan JA, Zhao X, Novotny PJ, et al. Relationship between deficits in overall quality of life and non-small-cell lung cancer survival. *J Clin Oncol.* 2012;30:1498–1504.
- 30 Accreditation Council for Graduate Medical Education. Data Resource Book. Academic Year 2010–2011. http://www.acgme.org/acgmeweb/Portals/0/PFAssets/PublicationsBooks/2010-2011_ACGME_DATA_RESOURCE_BOOK.pdf. Accessed November 19, 2013.
- 31 Accreditation Council for Graduate Medical Education. ACGME Duty Hours. Effective July 2011. <http://www.acgme.org/acgmeweb/tabid/271/GraduateMedicalEducation/DutyHours.aspx>. Accessed November 19, 2013.
- 32 Gander P, Briar C, Garden A, Purnell H, Woodward A. A gender-based analysis of work patterns, fatigue, and work/life balance among physicians in postgraduate training. *Acad Med.* 2010;85:1526–1536.
- 33 McCormick F, Kadzielski J, Landrigan CP, Evans B, Herndon JH, Rubash HE. Surgeon fatigue: A prospective analysis of the incidence, risk, and intervals of predicted fatigue-related impairment in residents. *Arch Surg.* 2012;147:430–435.
- 34 Reed DA, Fletcher KE, Arora VM. Systematic review: Association of shift length, protected sleep time, and night float with patient care, residents' health, and education. *Ann Intern Med.* 2010;153:829–842.
- 35 West CP, Tan AD, Shanafelt TD. Association of resident fatigue and distress with occupational blood and body fluid exposures and motor vehicle incidents. *Mayo Clin Proc.* 2012;87:1138–1144.
- 36 Fletcher KE, Reed DA, Arora VM. Doing the dirty work: Measuring and optimizing resident workload. *J Gen Intern Med.* 2011;26:8–9.
- 37 Krasner MS, Epstein RM, Beckman H, et al. Association of an educational program in mindful communication with burnout, empathy, and attitudes among primary care physicians. *JAMA.* 2009;302:1284–1293.
- 38 Reed DA, Shanafelt TD, Satele DW, et al. Relationship of pass–fail grading and curriculum structure with well-being among preclinical medical students: A multi-institutional study. *Acad Med.* 2011;86:1367–1373.
- 39 Allegra CJ, Hall R, Yothers G. Prevalence of burnout in the U.S. oncology community: Results of a 2003 survey. *J Oncol Pract.* 2005;1:140–147.
- 40 Kuerer HM, Eberlein TJ, Pollock RE, et al. Career satisfaction, practice patterns and burnout among surgical oncologists: Report on the quality of life of members of the Society of Surgical Oncology. *Ann Surg Oncol.* 2007;14:3043–3053.
- 41 Wallace JE, Lemaire JB, Ghali WA. Physician wellness: A missing quality indicator. *Lancet.* 2009;374:1714–1721.