



Longitudinal Study Evaluating the Association Between Physician Burnout and Changes in Professional Work Effort

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Abstract

Objective: To longitudinally evaluate the relationship between burnout and professional satisfaction with changes in physicians' professional effort.

Participants and Methods: Administrative/payroll records were used to longitudinally evaluate the professional work effort of faculty physicians working for Mayo Clinic from October 1, 2008, to October 1, 2014. Professional effort was measured in full-time equivalent (FTE) units. Physicians were longitudinally surveyed in October 2011 and October 2013 with standardized tools to assess burnout and satisfaction.

Results: Between 2008 and 2014, the proportion of physicians working less than full-time at our organization increased from 13.5% to 16.0% ($P=.05$). Of the 2663 physicians surveyed in 2011 and 2776 physicians surveyed in 2013, 1856 (69.7%) and 2132 (76.9%), respectively, returned surveys. Burnout and satisfaction scores in 2011 correlated with actual reductions in FTE over the following 24 months as independently measured by administrative/payroll records. After controlling for age, sex, site, and specialty, each 1-point increase in the 7-point emotional exhaustion scale was associated with a greater likelihood of reducing FTE (odds ratio [OR], 1.43; 95% CI, 1.23-1.67; $P<.001$) over the following 24 months, and each 1-point decrease in the 5-point satisfaction score was associated with greater likelihood of reducing FTE (OR, 1.34; 95% CI, 1.03-1.74; $P=.03$). On longitudinal analysis at the individual physician level, each 1-point increase in emotional exhaustion (OR, 1.28; 95% CI, 1.05-1.55; $P=.01$) or 1-point decrease in satisfaction (OR, 1.67; 95% CI, 1.19-2.35; $P=.003$) between 2011 and 2013 was associated with a greater likelihood of reducing FTE over the following 12 months.

Conclusion: Among physicians in a large health care organization, burnout and declining satisfaction were strongly associated with actual reductions in professional work effort over the following 24 months.

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The United States faces a large projected physician workforce shortage over the next decade, with several agencies, including the US Department of Health and Human Services, projecting a shortfall of 45,000 to 90,000 physicians by 2025.^{1,2} The magnitude of this problem varies by specialty. Although some question whether there will be a shortage in the absolute number of physicians or simply a relative shortage due to geographic and specialty distribution,³ all agree there will be too few primary care physicians and general surgeons.^{1,3,4} A variety of factors contribute to the physician workforce shortage, including population growth, an aging US population, more

widespread access to medical care because of the Affordable Care Act, a rapid increase in the complexity of medical care and need for certain specialists, an inadequate supply of physicians in medical school training, limits on the number of residency training positions, and mismatch between the residency positions available and the type of specialists needed.^{1,2}

Physician burnout is another factor that may influence the adequacy of the physician workforce. National studies suggest that approximately half of US physicians are experiencing burnout and that this proportion continues to increase.^{5,6} Cross-sectional studies evaluating self-reported career plans suggest that burned

out physicians are more likely to be planning to reduce the amount of time they devote to clinical work over the next 12 to 24 months.⁷⁻¹¹ Other studies have found a link between decreased physician satisfaction and intent to reduce work hours or leave clinical care.¹¹⁻¹³ Conceptual models of the relationship between physician stress and intent to quit or reduce work hours have been proposed, with cross-sectional data providing validation of this framework.⁹

Despite these associations, it is unknown how well self-reported intentions to reduce work hours relate to actual future behavior. If burned out physicians are truly more likely to reduce clinical work hours, it could pose a large threat to the adequacy of the US physician workforce as well as a large financial cost to society.¹⁴ The potential impact of burnout on the physician workforce may be compounded by the fact that many of the specialties facing the largest projected shortage of physicians are the disciplines with the highest rates of burnout.⁵ To explore the relationship between burnout and actual changes in work hours, we conducted a prospective, longitudinal study of physicians working at a large US health care organization.

PARTICIPANTS AND METHODS

Demographic Characteristics and Professional Effort

Mayo Clinic is a nonprofit, physician-led health care organization with 3 large academic campuses (Rochester, Minnesota; Scottsdale, Arizona; and Jacksonville, Florida) as well as an integrated group of community-based hospitals and health care facilities. The professional effort of physicians at Mayo Clinic is measured as a fraction of full-time equivalent (FTE) units. For example, an FTE of 1.0 indicates a physician working full-time, and an FTE of 0.5 indicates a physician working half-time. Administrative/payroll records were used to describe the FTE level of all Mayo Clinic physicians at the Rochester, Scottsdale, and Jacksonville campuses who were members of the permanent faculty. Available demographic information included age, sex, and specialty area. Physicians were categorized into 1 of 8 specialty areas: primary care (general internal medicine, family medicine, general pediatrics),

internal medicine subspecialty, surgical discipline, radiology, anesthesiology, pathology/laboratory medicine, other medical specialty area (eg, dermatology, neurology, physical medicine/rehabilitation, psychiatry, radiation oncology), or other.

Survey Participants

As part of its efforts to foster the health of the organization, Mayo Clinic surveys its physicians, scientists, and allied health staff approximately every 24 months. This all-staff survey is administered by an independent consulting organization (Sirota Survey Intelligence) and covers a broad array of topics including employees' perception of quality and safety, measures of professional burnout, and satisfaction with the organization.

The 2 most recent surveys for which data are available were administered in October 2011 and October 2013. Participation in these surveys was voluntary and all data were confidential. Although the external survey consulting firm tracks responses by employee identification number, identifying information is not available to any Mayo Clinic employee or the Mayo-employed researchers. To facilitate analysis of the relationship between responses to survey questions and changes in FTE, information on the FTE level of permanent faculty physicians at each survey time point was determined using administrative/payroll records and sent from Mayo Clinic to the external survey consulting firm so they could pair this information with survey responses. The use of data collected from the survey for the research analysis reported in this article was reviewed by the Mayo Clinic Institutional Review Board and determined to be exempt.

Burnout and Satisfaction

Burnout is a syndrome characterized by emotional exhaustion (losing your enthusiasm for work) and depersonalization (viewing/treating people as if they were objects) that results in decreased effectiveness at work.¹⁵ Although the Maslach Burnout Inventory (MBI)¹⁵ is the criterion standard for assessing burnout, its length (22 items) limits feasibility for use in an organization-wide survey covering a wide range of topics such as the one reported here. Thus, to evaluate the emotional exhaustion and depersonalization domains of burnout in physicians,

TABLE 1. Proportion of Physicians at Mayo Clinic Working Less Than Full-time, 2008-2014^{a,b}

Working less than full-time	2008 (N=2518)	2009 (N=2555)	2010 (N=2569)	2011 (N=2641)	2012 (N=2759)	2013 (N=2836)	2014 (N=2915)	P value for trend
All physicians	339 (13.5)	362 (14.2)	362 (14.1)	392 (14.8)	427 (15.5)	455 (16.0)	466 (16.0)	.045
Men ^c	115 (6.0)	131 (6.8)	128 (6.6)	143 (7.3)	167 (8.3)	184 (9.0)	191 (9.1)	<.001
≤35 y	3 (2.6)	4 (4.0)	2 (2.3)	2 (2.2)	3 (3.1)	1 (1.2)	0 (0.0)	.61
36-45 y	20 (3.7)	18 (3.5)	14 (2.8)	15 (3.0)	15 (3.0)	15 (2.8)	16 (3.0)	.98
46-55 y	29 (3.8)	34 (4.6)	31 (4.4)	35 (5.0)	36 (5.2)	32 (4.8)	33 (5.2)	.88
>55 y	63 (12.6)	75 (13.2)	79 (12.8)	91 (13.6)	113 (15.7)	134 (17.6)	142 (17.7)	.01
Women ^d	224 (37.5)	231 (37.0)	234 (36.7)	249 (36.9)	260 (35.3)	271 (34.6)	275 (33.4)	.62
≤35 y	21 (29.2)	19 (25.3)	15 (22.7)	15 (19.2)	15 (16.9)	10 (10.9)	11 (11.8)	.02
36-45 y	102 (39.5)	99 (39.3)	92 (37.4)	92 (35.8)	103 (35.8)	103 (33.6)	95 (30.4)	.26
46-55 y	73 (38.2)	78 (37.3)	82 (38.5)	92 (41.3)	89 (38.9)	96 (41.2)	105 (41.2)	.96
>55 y	25 (36.8)	35 (40.7)	43 (41.3)	48 (43.2)	53 (41.7)	60 (42.6)	60 (39.2)	.98
Specialty								
Primary care ^e	49 (25.8)	49 (28.7)	50 (30.1)	52 (29.7)	53 (30.3)	51 (30.0)	52 (30.4)	.96
Other medical specialty ^f	92 (17.7)	101 (18.4)	101 (18.5)	101 (17.8)	106 (17.7)	112 (17.8)	115 (17.6)	>.99
Anesthesiology	23 (15.6)	22 (14.5)	22 (14.4)	24 (15.0)	23 (13.9)	28 (16.5)	28 (15.8)	>.99
Internal medicine subspecialty	125 (15.5)	136 (16.7)	140 (17.0)	156 (18.3)	167 (18.9)	175 (19.4)	184 (20.0)	.16
Radiology	13 (11.1)	11 (9.5)	9 (7.7)	9 (7.6)	19 (14.5)	27 (20.0)	27 (19.7)	.004
Pathology and laboratory medicine	12 (8.5)	13 (8.8)	15 (9.8)	20 (12.7)	19 (11.2)	19 (11.3)	17 (9.7)	.89
Other	9 (4.5)	12 (5.6)	9 (4.2)	7 (3.4)	11 (5.0)	10 (4.2)	13 (5.5)	.93
Surgical specialty	16 (4.1)	18 (4.6)	16 (4.0)	23 (5.6)	29 (6.9)	33 (7.8)	29 (6.6)	.12

^aData are presented as No. (percentage) of participants.

^bBased on the full-time equivalent of each physician on October 1 of each year for 2008 to 2014 according to Mayo Clinic Human Resources employment records.

^cValues indicate the % of men physicians with an FTE <1.0 at the indicated time-point. See [Supplemental Table 1](#) (available online at <http://www.mayoclinicproceedings.org>) for the total number of male physicians for each year.

^dValues indicate the % of women physicians with an FTE <1.0 at the indicated time-point. See [Supplemental Table 1](#) for the total number of male physicians for each year.

^eFamily medicine, general pediatrics, general internal medicine.

^fNeurology, dermatology, physical medicine/rehab, radiation oncology, subspecialty pediatrics, psychiatry, etc.

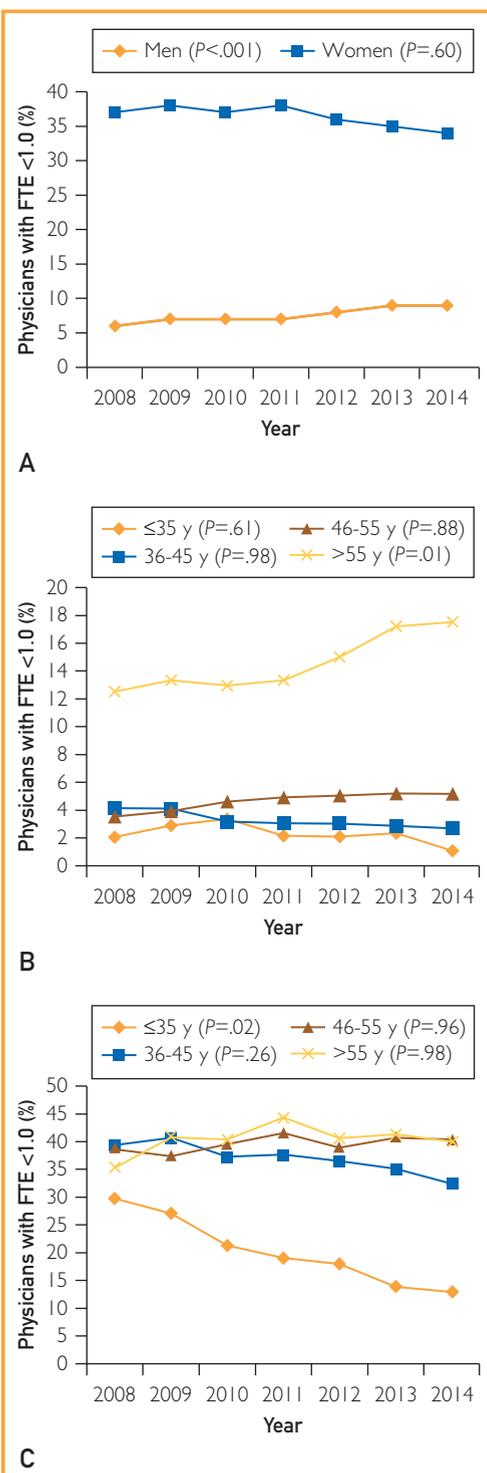


FIGURE 1. Changes in physicians working less than full-time between 2008 and 2014. A, Changes in full-time equivalent (FTE) in men and women. B, Changes in FTE among men stratified by age group. C, Changes in FTE among women stratified by age group.

we used 2 single-item measures adapted from the full MBI. These 2 items have been used in previous studies involving more than 30,000 physicians¹⁶⁻¹⁸ and have been reported to have a high correlation with burnout as measured by the full MBI in samples of over 10,000 physicians.^{19,20} The area under the receiver operating characteristic curve for emotional exhaustion for the single emotional exhaustion item relative to the full MBI is 0.94,¹⁹ and the area under the receiver operating characteristic curve for the single-item depersonalization measure is 0.93.¹⁹ The concurrent validity of this approach for assessing burnout has also been established.²⁰ These 2 items remain the property of Mind Garden Inc (which holds the copyright on the MBI) and were used with appropriate license.

Overall satisfaction with the organization was also evaluated by asking, “Considering everything, how would you rate your overall satisfaction with Mayo Clinic as a whole at the present time?” Physicians responded to this question using a 5-point Likert scale (5 = very satisfied, 4 = satisfied, 3 = neither satisfied nor dissatisfied, 2 = dissatisfied, and 1 = very dissatisfied).

Statistical Analyses

Continuous variables were summarized using mean ± SD, and categorical variables were summarized using frequency. Multivariate logistic regression analysis was used to evaluate the relationship between changes in FTE and both burnout and satisfaction after adjusting for age, sex, and specialty. Changes in emotional exhaustion score between 2011 and 2013 were also calculated for individuals who provided data at both time points. The relationship between changes in emotional exhaustion and changes in FTE were subsequently evaluated. Two-tailed P<.05 was considered statistically significant. All analyses were performed using IBM SPSS Statistics version 20 (IBM Corporation).

RESULTS

Changes in Professional Effort of Physicians Over Time

Complete data on the percentage of physicians working less than full-time were available for all physicians working at Mayo Clinic from October 1, 2008, to October 1, 2014. The proportion of

TABLE 2. Comparison of Participating and Nonparticipating Physicians^{a,b,c}

Variable	2011		2013	
	Responding physicians (n=1856)	Nonresponding physicians (n=807)	Responding physicians (n=2132)	Nonresponding physicians (n=644)
Sex				
Men	1359 (73.2)	611 (75.7)	1527 (71.6)	477 (74.1)
Women	497 (26.8)	196 (24.3)	602 (28.2)	167 (25.9)
Missing	0 (0)	0 (0)	3 (0.1)	0
Age				
<25 y	0 (0)	0 (0)	0 (0)	0 (0)
25-34 y	106 (5.7)	49 (6.1)	115 (5.4)	32 (5.0)
35-44 y	506 (27.3)	241 (29.8)	624 (29.3)	169 (26.2)
45-54 y	654 (35.2)	258 (32.0)	676 (31.7)	216 (33.5)
55-64 y	504 (27.2)	211 (26.2)	590 (27.7)	176 (27.3)
≥65 y	86 (4.6)	48 (5.9)	124 (5.8)	51 (7.9)
Missing	0 (0)	0 (0)	3 (0.1)	0 (0)
FTE				
<1.0	269 (14.5)	128 (15.9)	334 (15.7)	94 (14.6)
Mean	0.97	0.96	0.96	0.97

^aFTE = full-time equivalent.

^bData are presented as No. (percentage) of participants. Percentages may not total 100 because of rounding.

^cThe number of physicians surveyed in 2011 and 2013 (2663 and 2776, respectively) differs slightly from the number of physicians in the FTE analysis in 2011 and 2013 (Table 1) because these values came from independent data sources (ie, data for Table 1 from Mayo Clinic Human Resources employment records; the physicians in the survey sample for Table 2). The roster for physicians to be included in the 2011 and 2013 staff surveys were created the first week of September in 2011 and the first week of August in 2013, whereas the data in Table 1 are based on the FTE of each physician on October 1 of each year for 2008 to 2014.

physicians working less than full-time on October 1 of each year according to Mayo Clinic Human Resources employment records is provided in Table 1 (see Supplemental Tables 1 and 2 for additional details, available online at <http://www.mayoclinicproceedings.org>). The proportion of physicians working less than full-time increased from 13.5% (339 of 2518) to 16.0% (466 of 2915; $P=.05$) over the 7-year interval from 2008 to 2014.

A strong relationship between sex and changes in FTE was observed. Women physicians were more likely to work less than full-time in all years evaluated (Figure 1, A). The proportion of male physicians working less than full-time increased from 6.0% (115 of 1921) in 2008 to 9.1% (191 of 2092) in 2014 ($P<.001$). Among men, a statistically significant increase in the proportion of physicians working less than full-time was observed among men older than 55 years (from 12.6% [63 of 499] to 17.7% [142 of 802]; $P=.01$) between 2008 and 2014 (Figure 1, B). No statistically

significant change was observed among men in other age categories.

Although not statistically significant, the proportion of women physicians working less than full-time decreased from 37.5% (224 of 597) in 2008 to 33.4% (275 of 823) in 2014. Among women, the proportion of physicians working less than full-time decreased for those aged 35 years or younger (from 29.2% [21 of 72] to 11.8% [11 of 93]; $P=.02$) between 2008 and 2014 (Figure 1, C). A decrease in the proportion of women physicians working less than full-time was also observed among those aged 36 to 45 years (from 39.5% [102 of 258] to 30.4% [95 of 312]; $P=.26$); however, this difference was not statistically significant. No statistically significant changes were observed among women aged 46 to 55 or older than 55 years.

Specialty-specific differences in the percentage of physicians working less than full-time were also observed (Table 1). Primary care physicians were more likely to work less than full-time in all years evaluated. The only specialty area with a statistically significant change in the proportion of physicians working less than full-time between 2008 and 2014 was radiology (from 11.1% [13 of 117] to 19.7% [27 of 137]; $P=.004$).

Relationship Between Professional Burnout and Satisfaction and Changes in Professional Effort

Of the 2663 and 2776 physicians employed at the time of the 2011 and 2013 staff surveys (rosters for physicians to be included in the 2011 and 2013 staff surveys were created the first week of September in 2011 and the first week of August in 2013), 1856 (69.7%) and 2132 (76.9%), respectively, returned surveys. Demographic characteristics of responding and nonresponding physicians were similar at both survey time points with respect to age and sex (Table 2).

We evaluated whether physicians with higher emotional exhaustion scores at the time of the 2011 survey were more likely to reduce their FTE over the following 24 months (ie, before the 2013 survey). After controlling for the effects of age, sex, site (Arizona, Florida, Minnesota), and specialty, each 1-point increase in the 7-point emotional

exhaustion scale was associated with a greater likelihood of reducing FTE over the 24 months following the 2011 survey (OR, 1.43; 95% CI, 1.23-1.67; $P < .001$). Individuals with lower satisfaction at the time of the 2011 survey were also more likely to reduce their FTE over the following 24 months. After adjusting for the effects of age, sex, site, and specialty, each 1-point decrease in the 5-point satisfaction scale was associated with a greater likelihood of reducing FTE over the 24 months following the 2011 survey (OR, 1.34; 95% CI, 1.03-1.74; $P = .03$). The results of χ^2 tests regarding model fit indicated acceptable fit of the model to the data. No association between depersonalization score in 2011 and changes in FTE over the following 24 months was observed.

We next evaluated how changes in emotional exhaustion at the individual physician level between 2011 and 2013 related to the likelihood of reducing FTE in the 12 months following the 2013 survey. Of the 1856 physicians who completed surveys in 2011, 1483 (79.9%) also completed a survey in 2013. Changes in the emotional exhaustion level of physicians who completed surveys at both time points are provided in Table 3. After controlling for age, sex, site, and specialty area, each 1-point increase in a physician's emotional exhaustion score between 2011 and 2013 was associated with a higher likelihood of reducing FTE in the 12 months following the 2013 survey (OR, 1.28; 95% CI, 1.05-1.55; $P = .01$). Changes in satisfaction score were also related to changes in FTE. After controlling for age, sex, site, and specialty area, each 1-point decrease in a physician's satisfaction score between 2011 and 2013 was associated with a higher likelihood of reducing FTE in the 12 months following the 2013 survey (OR, 1.67; 95% CI, 1.19-2.35; $P = .003$). The results of χ^2 tests regarding model fit indicated acceptable fit of the model to the data. No association between changes in depersonalization score and the likelihood of reducing FTE were observed on similar analysis.

DISCUSSION

In this prospective study of physicians, burnout and satisfaction were related to future reductions in professional work hours as assessed by administrative/payroll records.

TABLE 3. Changes in Burnout Among Physicians Who Completed Surveys in Both 2011 and 2013^a

Variable	All physicians	Men	Women
Changes in overall satisfaction ^c	N=1463 ^b	n=1072	n=391
≥2-point improvement	33 (2.3)	26 (2.4)	7 (1.8)
1-point improvement	228 (15.6)	175 (16.3)	53 (13.6)
No change	882 (60.3)	654 (61.0)	228 (58.3)
1-point worsening	262 (17.9)	180 (16.8)	82 (21.0)
≥2-point worsening	58 (4.0)	37 (3.5)	21 (5.4)
Burnout			
Changes in emotional exhaustion score ^d	N=1455 ²	n=1065	n=390
≥3-point improvement	25 (1.7)	18 (1.7)	7 (1.8)
2-point improvement	63 (4.3)	47 (4.4)	16 (4.1)
1-point improvement	158 (10.9)	108 (10.1)	50 (12.8)
No change	473 (32.5)	367 (34.5)	106 (27.2)
1-point worsening	340 (23.4)	250 (23.5)	90 (23.1)
2-point worsening	248 (17.0)	173 (16.2)	75 (19.2)
≥3-point worsening	148 (10.2)	102 (9.6)	46 (11.8)
Changes in depersonalization score ^e	N=1438 ²	n=1051	n=387
≥3-point improvement	32 (2)	21 (2)	11 (3)
2-point improvement	54 (4)	40 (4)	14 (4)
1-point improvement	176 (12)	126 (12)	50 (13)
No change	658 (48)	513 (49)	172 (44)
1-point worsening	256 (18)	184 (18)	72 (19)
2-point worsening	111 (8)	86 (8)	25 (6)
≥3-point worsening	124 (9)	81 (8)	43 (11)

^aData are presented as No. (percentage) of participants. Percentages may not total 100 because of rounding.

^bA total of 1483 physicians completed surveys at both the 2011 and 2013 survey time points, of whom 1463 provided data for overall satisfaction at both time points, 1455 provided data for emotional exhaustion at both time points, and 1438 provided data for depersonalization at both time points.

^cChange in satisfaction between 2011 and 2013 surveys; 5-point scale.

^dChange in emotional exhaustion score between 2011 and 2013 surveys; 7-point Likert scale.

^eChange in depersonalization score between 2011 and 2013 surveys; 7-point Likert scale.

Specifically, physicians with greater degrees of emotional exhaustion in 2011 were more likely to reduce their FTE over the following 24 months. Physicians with lower degrees of satisfaction were also more likely to reduce their FTE over the following 24 months. The relationship between emotional exhaustion and satisfaction with reductions in FTE exhibited a "dose-response" relationship. Independent of age, sex, site, and specialty, each 1-point change in emotional exhaustion (7-point scale) or satisfaction (5-point scale) was associated with a 43% and 34% higher likelihood of reducing FTE over the ensuing 24 months, respectively. We were also able to longitudinally evaluate the effects of changes in burnout and satisfaction at the level of individual physicians over a 2-year interval and prospectively assess the subsequent association with changes

in professional effort. Physicians with worsening burnout or declining satisfaction between 2011 and 2013 were more likely to reduce their FTE between 2013 and 2014 (ie, in the 12 months following the 2013 assessment). A dose-response relationship was once again observed between changes in emotional exhaustion and satisfaction and actual reductions in FTE. No relationship between the depersonalization domain of burnout and reductions in FTE were observed in either of these analyses, suggesting specificity to these findings.

Independent of burnout, we observed an increase in the proportion of physicians working less than full-time over the 7 years of our study. Notably, this trend was primarily due to an increased proportion of men, particularly men over age 55 years, reducing their FTE. Although women were more likely to work less than full-time than men throughout all years of the study, the proportion of women working less than full-time did not increase during the 7-year study interval, and the proportion of women aged 35 years or younger working less than full-time actually decreased. These findings suggest that the trends in FTE we observed were not attributable to millennials oriented toward better work-life integration but rather reductions in work hours by their older colleagues. This observation is consistent with findings from other studies that indicate the increase in physicians working less than full-time is not limited to women or younger physicians.^{21,22} Although the reasons for this trend are unknown, several studies have suggested that the interval of 10 to 20 years after entering practice is a particularly stressful time for physicians,²³ and it is possible that many physicians reduce their workload in response to the distress they experience during this period of their career.

Reducing professional work hours may be a helpful strategy for individual physicians experiencing burnout.^{21,24-26} A part-time physician is certainly preferable to a physician leaving practice altogether. Organizations that provide physicians the flexibility to adjust their FTE as a “safety valve” to preserve meaning and satisfaction may have a competitive advantage in recruiting and retaining physicians. Although working less than full-time creates its own set of

challenges,^{27,28} the available cross-sectional data suggest that reducing work from full-time to part-time can be an effective strategy for physicians to improve satisfaction^{21,24-26} and increase their sense of control over work.^{24,25} These studies also indicate that physicians working part-time does not adversely impact patient satisfaction,^{25,29-32} quality of care,^{30,31} or efficiency.³⁰

Although it may be a beneficial approach to improve personal well-being, physicians reducing their professional effort has the potential to exacerbate the already substantial US physician workforce shortage and could also impact continuity of care for patients.^{1,2} Physicians reducing their professional effort may also compound the challenge that many medical centers have in preserving adequate patient access to physicians—particularly primary care physicians. It is notable that primary care physicians, who experience some of the highest rates of professional burnout,¹⁶ were more likely to work part-time across all years of our study.

There is a societal imperative to provide physicians a better option than choosing between reducing their professional effort or burning out.^{14,33} Efforts to address this challenge must first recognize that physician burnout is, in large part, a system issue. Sincere efforts to alleviate the problem must address the drivers of burnout, including excessive workloads, inefficiencies in the practice environment, loss of flexibility and control over work, barriers to healthy work-life integration, and erosion of the meaning in work.³⁴⁻³⁷ Individual, work unit, organization, and national factors also contribute to each of these dimensions (Figure 2). A number of important studies have provided insights in this regard. Health care organizations must improve the efficiency of the practice environment,^{35,36,38} set realistic productivity expectations,³⁹ cultivate physician engagement,⁴⁰ help physicians optimize “career fit,”³⁷ nurture teamwork and community,⁴¹ foster flexibility and control over work,^{35,36} and help physicians cultivate meaning in their work.^{37,42}

Our study is subject to several important limitations. Although it is a prospective and longitudinal study, we cannot definitively determine cause and effect. There are many reasons to reduce work hours other than

Primary drivers of burnout and satisfaction in physicians	 Individual	 Work unit	 Organization	 National factors
Workload	<ul style="list-style-type: none"> • Specialty • Practice location • Decision to increase work to increase income 	<ul style="list-style-type: none"> • Productivity expectations • Team structure • Efficiency • Use of allied health professionals 	<ul style="list-style-type: none"> • Productivity targets • Method of compensation Salary Productivity based 	<ul style="list-style-type: none"> • Structure reimbursement Medicare/Medicaid Bundled payments Documentation requirements
Efficiency	<ul style="list-style-type: none"> • Experience • Ability to prioritize • Personal efficiency • Organization skills • Willingness to delegate • Ability to say "no" 	<ul style="list-style-type: none"> • Availability of support staff & their experience • Patient check-in efficiency/process • Use of scribes • Team huddles • Use of allied health professionals 	<ul style="list-style-type: none"> • Integration of care • Use of patient portal • Institutional efficiency EHR Appointment system Ordering systems 	<ul style="list-style-type: none"> • Integration of care • Requirements for: Electronic prescribing Medication reconciliation Meaningful use of EHR • Certification agency facility regulations
Control over work/autonomy/flexibility	<ul style="list-style-type: none"> • Personality • Assertiveness • Intentionality 	<ul style="list-style-type: none"> • Degree of flexibility: Control of physician calendars Clinic start/end times Vacation scheduling Call schedule 	<ul style="list-style-type: none"> • Scheduling system • Policies • Affiliations that restrict referrals • Rigid application practice guidelines 	<ul style="list-style-type: none"> • Precertifications for tests/treatments • Insurance networks that restrict referrals • Practice guidelines
Work-life integration	<ul style="list-style-type: none"> • Priorities and values • Personal characteristics Spouse/partner Children/dependents Health issues 	<ul style="list-style-type: none"> • Call schedule • Structure night/weekend coverage • Cross-coverage for time away 	<ul style="list-style-type: none"> • Vacation policies • Sick/medical leave • Policies Part-time work Flexible scheduling 	<ul style="list-style-type: none"> • Requirements for: Maintenance certification Licensing
Meaning in work	<ul style="list-style-type: none"> • Self-awareness most personally meaningful aspect of work • Ability to shape career to focus on interests • Doctor-patient relationships • Personal recognition of positive events at work 	<ul style="list-style-type: none"> • Match work to talents & interests of individuals • Collegiality in practice environment • Work unit leadership • Opportunities for involvement Education Research Leadership 	<ul style="list-style-type: none"> • Organizational culture • Organizational leadership • Organization values • Practice environment • Opportunities for professional development • Organization's mission Service/quality vs profit • Collegiality across the organization 	<ul style="list-style-type: none"> • Evolving supervisory role of physicians (potentially less direct patient contact) • Reduced funding Research Education

FIGURE 2. Drivers of burnout and examples of factors that influence each driver.

experiencing problems with burnout and satisfaction, including personal or family health problems, child rearing, need to spend more time with family, and a desire to pursue other interests.⁴³ Providing flexibility that allows physicians to adjust their professional effort at different points in their career may be a useful approach to promote diversity and help physicians meet both personal and professional priorities.^{29,43-45} Because we were unable to measure and control for all these potential confounders,

however, it could be argued that our findings on the relationship between burnout/satisfaction and reductions in FTE are all the more striking. It should be noted that although the physicians in our study worked on separate academic campuses in 3 different states, they all worked for a single health care organization, a factor that may influence the generalizability of our findings.

Our study also has several important strengths. First, the study was prospective, included physicians from all specialties,

and utilized actual human resources/payroll department data to measure changes in professional effort. Participants were unaware of the specific aspects of this analysis correlating survey response to changes in professional effort, which were independently assessed using administrative payroll records. Second, participation in the survey component of our study was exceptionally high, particularly for a study of physicians.⁴⁶ Third, burnout was assessed using a well-validated metric.^{19,20} Fourth, we were able to longitudinally evaluate changes in burnout and satisfaction at the level of individual physicians and assess the relationship with changes in FTE.

CONCLUSION

Among the physicians in a large health care organization, measures of burnout and satisfaction were strongly associated with subsequent reductions in work effort as measured by independent employment records over the following 24 months. Further research is needed to understand whether these factors are causal and whether modifications to the practice environment aimed at reducing burnout and improving satisfaction would modify this relationship.

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SUPPLEMENTAL ONLINE MATERIAL

Supplemental material can be found online at <http://www.mayoclinicproceedings.org>. Supplemental material attached to journal articles has not been edited, and the authors take responsibility for the accuracy of all data.

Abbreviations and Acronyms: FTE = full-time equivalent; MBI = Maslach Burnout Inventory; OR = odds ratio

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REFERENCES

1. Association of American Medical Colleges. The Complexities of Physician Supply and Demand: Projections from 2013 to 2025: Final Report. Association of American Medical Colleges website. https://www.aamc.org/download/426248/data/the_complexities_of_physicians_supply_and_demand_projections_from_2013_to_2025.pdf. Published March 2015. Accessed September 2, 2015.
2. US Department of Health and Human Services. The Physician Workforce: Projections and Research into Current Issues Affecting Supply and Demand. US Dept of Health and Human Services website. <http://bhpr.hrsa.gov/healthworkforce/reports/physwfiissues.pdf>. Published December 2008. Accessed April 15, 2015.
3. Eden J, Berwick D, Wilensky G, eds. *Graduate Medical Education That Meets the Nation's Health Needs*. Washington, DC: National Academies Press; 2014.
4. Bressi C, Manenti S, Porcellana M, et al. Haemato-oncology and burnout: an Italian survey. *Br J Cancer*. 2008;98(6):1046-1052.
5. Shanafelt TD, Dyrbye LN, West CP. Physician burnout: an urgent call for early intervention—reply. *JAMA Intern Med*. 2013;173(8):710-711.
6. Shanafelt TD, Hasan O, Dyrbye LN, et al. Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014. *Mayo Clin Proc*. 2015;90(12):1600-1613.
7. Shanafelt T, Sloan J, Satele D, Balch C. Why do surgeons consider leaving practice [letter]? *J Am Coll Surg* 2011;212(3):421-422.
8. Shanafelt TD, Raymond M, Kosty M, et al. Satisfaction with work-life balance and the career and retirement plans of US oncologists. *J Clin Oncol*. 2014;32(11):1127-1135.
9. Williams ES, Konrad TR, Scheckler WE, et al. Understanding physicians' intentions to withdraw from practice: the role of job satisfaction, job stress, mental and physical health. *Health Care Manage Rev*. 2010;35(2):105-115.
10. Dewa CS, Loong D, Bonato S, Thanh NX, Jacobs P. How does burnout affect physician productivity? a systematic literature review. *BMC Health Serv Res*. 2014;14:325.
11. Zhang Y, Feng X. The relationship between job satisfaction, burnout, and turnover intention among physicians from urban state-owned medical institutions in Hubei, China: a cross-sectional study. *BMC Health Serv Res*. 2011;11:235.
12. Landon BE, Reschovsky JD, Pham HH, Blumenthal D. Leaving medicine: the consequences of physician dissatisfaction. *Med Care*. 2006;44(3):234-242.
13. Sibbald B, Bojke C, Gravelle H. National survey of job satisfaction and retirement intentions among general practitioners in England. *BMJ*. 2003;326(7379):22.
14. Dewa CS, Jacobs P, Thanh NX, Loong D. An estimate of the cost of burnout on early retirement and reduction in clinical hours of practicing physicians in Canada. *BMC Health Serv Res*. 2014;14:254.
15. Maslach C, Jackson SE, Leiter MP. *Maslach Burnout Inventory Manual*. 3rd ed. Palo Alto, CA: Consulting Psychologists Press; 1996.
16. 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(18):1377-1385.
17. Shanafelt TD, Kaups KL, Nelson H, et al. An interactive individualized intervention to promote behavioral change to increase personal well-being in US surgeons. *Ann Surg*. 2014;259(1):82-88.

18. West CP, Shanafelt TD, Kolars JC. Quality of life, burnout, educational debt, and medical knowledge among internal medicine residents. *JAMA*. 2011;306(9):952-960.
19. 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(12):1318-1321.
20. 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(11):1445-1452.
21. Cull WL, O'Connor KG, Olson LM. Part-time work among pediatricians expands. *Pediatrics*. 2010;125(1):152-157.
22. Orkin FK, McGinnis SL, Forte GJ, et al. United States anesthesiologists over 50: retirement decision making and workforce implications. *Anesthesiology*. 2012;117(5):953-963.
23. Dyrbye LN, Varkey P, Boone SL, Satele DV, Sloan JA, Shanafelt TD. Physician satisfaction and burnout at different career stages. *Mayo Clin Proc*. 2013;88(12):1358-1367.
24. Murray A, Safran DG, Rogers WH, Inui T, Chang H, Montgomery JE. Part-time physicians: physician workload and patient-based assessments of primary care performance. *Arch Fam Med*. 2000;9(4):327-332.
25. Mechaber HF, Levine RB, Manwell LB, et al. Part-time physicians...prevalent, connected, and satisfied. *J Gen Intern Med*. 2008;23(3):300-303.
26. McMurray JE, Heiligers PJ, Shugerman RP, et al; Society of General Internal Medicine Career Satisfaction Study Group (CSSG). Part-time medical practice: where is it headed? *Am J Med*. 2005;118(1):87-92.
27. Ofri D. Part-time medicine. *JAMA*. 2009;301(3):254-255.
28. Harrison RA, Gregg JL. A time for change: an exploration of attitudes toward part-time work in academia among women internists and their division chiefs. *Acad Med*. 2009;84(1):80-86.
29. Levine RB, Harrison RA, Mechaber HF, Phillips C, Gallagher TH. Professional characteristics and job satisfaction among SGIM members: a comparison of part-time and full-time physician members. *J Gen Intern Med*. 2008;23(8):1218-1221.
30. Fein OT, Garfield R. Impact of physicians' part-time status on inpatients' use of medical care and their satisfaction with physicians in an academic group practice. *Acad Med*. 1991;66(11):694-698.
31. Parkerton PH, Wagner EH, Smith DG, Straley HL. Effect of part-time practice on patient outcomes. *J Gen Intern Med*. 2003;18(9):717-724.
32. Panattoni L, Stone A, Chung S, Tai-Seale M. Patients report better satisfaction with part-time primary care physicians, despite less continuity of care and access. *J Gen Intern Med*. 2015;30(3):327-333.
33. Dyrbye LN, Shanafelt TD. Physician burnout: a potential threat to successful health care reform. *JAMA*. 2011;305(19):2009-2010.
34. Shanafelt TD, Sloan JA, Habermann TM. The well-being of physicians. *Am J Med*. 2003;114(6):513-519.
35. Sinsky CA, Willard-Grace R, Schutzbank AM, Sinsky TA, Margolis D, Bodenheimer T. In search of joy in practice: a report of 23 high-functioning primary care practices. *Ann Fam Med*. 2013;11(3):272-278.
36. Linzer M, Levine R, Meltzer D, Poplau S, Warde C, West CP. 10 Bold steps to prevent burnout in general internal medicine [editorial]. *J Gen Intern Med*. 2014;29(1):18-20.
37. Shanafelt TD, West CP, Sloan JA, et al. Career fit and burnout among academic faculty. *Arch Intern Med*. 2009;169(10):990-995.
38. Linzer M, Baier Manwell L, Mundt M, et al. Organizational climate, stress, and error in primary care: the MEMO Study. In: Henriksen K, Battles JB, Marks ES, Lewin DI, eds. *Advances in Patient Safety: From Research to Implementation*, Vol 1. Rockville, MD: Agency for Healthcare Research and Quality; 2005:65-77.
39. Balch CM, Shanafelt TD, Dyrbye L, et al. Surgeon distress as calibrated by hours worked and nights on call. *J Am Coll Surg*. 2010;211(5):609-619.
40. Shanafelt TD, Gorringer G, Menaker R, et al. Impact of organizational leadership on physician burnout and satisfaction. *Mayo Clin Proc*. 2015;90(4):432-440.
41. West CP, Dyrbye LN, Rabatin JT, et al. Intervention to promote physician well-being, job satisfaction, and professionalism: a randomized clinical trial. *JAMA Intern Med*. 2014;174(4):527-533.
42. Horowitz CR, Suchman AL, Branch WT Jr, Frankel RM. What do doctors find meaningful about their work? *Ann Intern Med*. 2003;138(9):772-775.
43. Carr PL, Ash AS, Friedman RH, et al. Relation of family responsibilities and gender to the productivity and career satisfaction of medical faculty. *Ann Intern Med*. 1998;129(7):532-538.
44. Linzer M, Warde C, Alexander RW, et al. Part-time careers in academic internal medicine: a report from the Association of Specialty Professors Part-Time Careers Task Force on behalf of the Alliance for Academic Internal Medicine. *Acad Med*. 2009;84(10):1395-1400.
45. Kahn JA, Degen SJ, Mansour ME, et al. Pediatric faculty members' attitudes about part-time faculty positions and policies to support part-time faculty: a study at one medical center. *Acad Med*. 2005;80(10):931-939.
46. Asch DA, Jedziewski MK, Christakis NA. Response rates to mail surveys published in medical journals. *J Clin Epidemiol*. 1997;50(10):1129-1136.