

Impact of Organizational Leadership on Physician Burnout and Satisfaction

Tait D. Shanafelt, MD; Grace Goringe, MS; Ronald Menaker, EdD;
Kristin A. Storz, MA; David Reeves, PhD; Steven J. Buskirk, MD; Jeff A. Sloan, PhD;
and Stephen J. Swensen, MD

Abstract

Objective: To evaluate the impact of organizational leadership on the professional satisfaction and burnout of individual physicians working for a large health care organization.

Participants and Methods: We surveyed physicians and scientists working for a large health care organization in October 2013. Validated tools were used to assess burnout. Physicians also rated the leadership qualities of their immediate supervisor in 12 specific dimensions on a 5-point Likert scale. All supervisors were themselves physicians/scientists. A composite leadership score was calculated by summing scores for the 12 individual items (range, 12-60; higher scores indicate more effective leadership).

Results: Of the 3896 physicians surveyed, 2813 (72.2%) responded. Supervisor scores in each of the 12 leadership dimensions and composite leadership score strongly correlated with the burnout and satisfaction scores of individual physicians (all $P < .001$). On multivariate analysis adjusting for age, sex, duration of employment at Mayo Clinic, and specialty, each 1-point increase in composite leadership score was associated with a 3.3% decrease in the likelihood of burnout ($P < .001$) and a 9.0% increase in the likelihood of satisfaction ($P < .001$) of the physicians supervised. The mean composite leadership rating of each division/department chair ($n=128$) also correlated with the prevalence of burnout (correlation= -0.330 ; $r^2=0.11$; $P < .001$) and satisfaction (correlation= 0.684 ; $r^2=0.47$; $P < .001$) at the division/department level.

Conclusion: The leadership qualities of physician supervisors appear to impact the well-being and satisfaction of individual physicians working in health care organizations. These findings have important implications for the selection and training of physician leaders and provide new insights into organizational factors that affect physician well-being.

© 2015 Mayo Foundation for Medical Education and Research ■ Mayo Clin Proc. 2015;90(4):432-440



For editorial
comment, See
page 425

From the Department of Medicine (T.D.S.), Office of Leadership and Organization Development (G.G., S.J.S.), Department of Radiology (R.M.), Health Sciences Research (J.A.S.), Mayo Clinic, Rochester, MN; Department of Radiation Oncology, Mayo Clinic, Jacksonville, FL (S.J.B.), and Sirota Survey Intelligence, Purchase, NY (K.A.S., D.R.).

Physicians are increasingly employed by large health care organizations. Studies suggest that approximately 75% of US physicians are now employed by hospitals, academic medical centers, health maintenance organizations, and large practice groups.¹ This represents a profound structural change from the solo practitioner and small group practice models in which most physicians previously functioned.²⁻⁴ This evolution in practice structure has created new challenges for physicians, requiring them to sacrifice some autonomy/flexibility, achieve productivity requirements set by the organization, and be accountable to organizational leadership.⁵⁻⁹

Little is known about the impact of organizational leadership on the professional satisfaction and burnout of individual physicians. Physician burnout and professional satisfaction have strategic importance to health care organizations

given their well-documented effect on quality of care, attrition/turnover, and patient satisfaction.¹⁰⁻²⁰ Small studies suggest that the relationship between individual physicians and their division/department chairperson is a critical component of professional satisfaction.²¹

To better understand the impact of leadership on the degree of burnout and professional satisfaction of physicians working in large organizations, we evaluated the relationship between the leadership qualities of firstline physician supervisors and the well-being and burnout of the physicians in their work unit.

PARTICIPANTS AND METHODS

Participants

Mayo Clinic is a nonprofit, physician-led health care organization with 3 large academic campuses (Rochester, Minnesota; Scottsdale, Arizona; and

Jacksonville, Florida) and an integrated group of community-based hospitals and health care facilities serving more than 70 communities in Iowa, Georgia, Wisconsin, and Minnesota. As part of its efforts to foster a cohesive organization, Mayo Clinic surveys its physicians, scientists, allied health staff, and all other employees 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 perception of quality and safety, professional burnout, satisfaction with the organization, and assessment of the institutional culture. Each individual also provides a detailed evaluation of the leadership qualities of their immediate supervisor.

The most recent survey was administered in October 2013. The present analysis focuses on the 3896 physicians and scientists in the sample who practiced at 1 of the 3 academic campuses or 1 of the 70 facilities in the Mayo Clinic Health System. The physician version of the survey included 98 questions exploring a variety of topics, as described previously. Participation was voluntary, and all the 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. Permission to use data collected from the survey for the research analysis reported herein was approved by the Mayo Clinic Institutional Review Board.

Demographic Characteristics

Available demographic information included age, sex, and specialty area. All the physicians were categorized into 1 of 8 specialty areas: primary care (general internal medicine, family medicine, and general pediatrics), internal medicine subspecialty, surgical discipline, radiology, anesthesiology, pathology/laboratory medicine, other medical specialty area (eg, dermatology, neurology, physical medicine/rehabilitation, psychiatry, and radiation oncology), or other.

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), resulting in decreased effectiveness at work.²²

Although the 22-item Maslach Burnout Inventory (MBI)²² is the gold 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 herein. Thus, to evaluate the emotional exhaustion and depersonalization domains of burnout in physicians, 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 physicians²³⁻²⁶ and have been shown to have a high correlation with burnout as measured by the full MBI in samples of more than 10,000 physicians.^{18,27} The area under the receiver operating characteristic curve for emotional exhaustion for the single emotional exhaustion item relative to the full MBI is 0.94.²⁷ The area under the receiver operating characteristic curve for depersonalization using the single depersonalization item relative to the full MBI domain is 0.93.²⁷ Using the published approach to categorize responders, the positive predictive values of the single items for high emotional exhaustion and depersonalization relative to the full MBI are 88.2% and 89.6%, respectively.²⁷ Concurrent validity of this approach for assessing burnout has also been established.¹⁸ These 2 items remain the property of Mind Garden Inc (which holds the copyright on the MBI) and were used with the appropriate license.

Overall satisfaction with the health care organization in which participating physicians practiced was evaluated by asking, "Considering everything, how would you rate your overall satisfaction with Mayo Clinic as a whole at the present time?" Physicians responded using a 5-point Likert scale (5=very satisfied, 4=satisfied, 3=neither satisfied nor dissatisfied, 2=dissatisfied, 1=very dissatisfied).

Evaluation of Frontline Leaders in Clinical Divisions and Departments

Physicians rated the leadership qualities of their immediate supervisor (division/department chairperson) in 12 specific dimensions (Table 1). All the leaders evaluated were themselves physicians/scientists. These 12-items were devised to assess specific characteristics of leadership that are measurable and actionable (able to be improved on). For 11 of the items, physicians rated their level of agreement on a

TABLE 1. Items Evaluating Physician Opinion of the Leadership Qualities of Their Immediate Physician Supervisor

To what extent do you agree or disagree with each of the following statements about (name of immediate supervisor)?

Holds career development conversations with me ^a
Inspires me to do my best ^a
Empowers me to do my job ^a
Is interested in my opinion ^a
Encourages employees to suggest ideas for improvement ^a
Treats me with respect and dignity ^a
Provides helpful feedback and coaching on my performance ^a
Recognizes me for a job well done ^a
Keeps me informed about changes taking place at Mayo Clinic ^a
Encourages me to develop my talents and skills ^a
I would recommend working for (name of immediate supervisor) ^a
Overall, how satisfied are you with (name of immediate supervisor) ^b

^aResponse options: 5=strongly agree, 4=agree, 3=neither agree nor disagree, 2=disagree, 1=strongly disagree; NA=do not know/not applicable.

^bResponse options: 5=very satisfied, 4=satisfied, 3=neither satisfied nor dissatisfied, 2=dissatisfied, 1=very dissatisfied.

5-point Likert scale (5=strongly agree, 4=agree, 3=neither agree nor disagree, 2=disagree, 1=strongly disagree; NA=do not know/not applicable). The final item asked individuals to rate their overall satisfaction with their immediate supervisor (5=very satisfied, 4=satisfied, 3=neither satisfied nor dissatisfied, 2=dissatisfied, 1=very dissatisfied). In addition to evaluating the 12 items individually, an overall leadership score was created by summing the scores for the 12 individual items into a composite leadership score (minimum score of 12, maximum score of 60; higher scores indicate more effective leadership).

Statistical Analyses

Continuous variables are summarized using mean \pm SD, and categorical variables are summarized using frequency. Continuous and categorical variables were compared using *t* tests and χ^2 tests as appropriate. Two-tailed bivariate Pearson correlations were initially performed to assess relationships between leadership ratings and burnout/satisfaction. Multivariate logistic regression analysis was used to evaluate the relationship between composite leadership score and both burnout and satisfaction after adjusting for age, sex, duration of employment at Mayo Clinic, and specialty area.

In addition to evaluating the relationship between an individual physician's degree of burnout/satisfaction and supervisor ratings, we also evaluated the relationship between leadership and satisfaction/burnout at the division/department level. For this analysis, an average composite leadership score was determined for each of 128 frontline division/department chairpersons with at least 5 evaluations (median, 10; range, 5-110) based on the collective ratings of all responding physicians they supervised. The relationship between mean composite leadership score and the prevalence of burnout and satisfaction for the department as a whole was then assessed. Sensitivity analyses were conducted to investigate the impact of natural autocorrelation due to the nesting of clinicians within supervisors. For this analysis, logistic regression models were constructed with indicator variables for the supervisors to determine whether correlation within supervisors affected the results. All the analyses were performed using IBM SPSS Statistics version 20.

RESULTS

Of the 3896 physicians/scientists surveyed, 2813 (72.2%) responded (2684 physicians and 129 scientists), of whom 2540 (90.3%) were engaged in direct patient care activities. The demographic characteristics, professional characteristics, rates of burnout, and satisfaction of responders are shown in Table 2. The median age was 45 to 54 years, 71% were men, and half had been in practice for more than 10 years. No statistically significant differences were observed between responders and nonresponders with respect to age or sex. As a group, 38% of physicians reported high emotional exhaustion, 15% high depersonalization, and 40% at least 1 symptom of burnout. Collectively, 79% of physicians were either satisfied or very satisfied with the organization, 12% were neutral, and 9% were dissatisfied or very dissatisfied.

Physicians' evaluation of their firstline leader in the 12 dimensions assessed is shown in Supplemental Table 1 (available online at <http://www.mayoclinicproceedings.org>). All the leaders evaluated were themselves physicians/scientists (125 medical doctors/doctors of osteopathy, 2 medical physicists, and 1 psychologist). Each of the 12 leadership dimensions demonstrated a

statistically significant association with burnout and satisfaction. Mean scores in each leadership dimension by burnout and satisfaction are shown in Supplemental Table 2 (available online at <http://www.mayoclinicproceedings.org>). The prevalence of burnout and satisfaction in those who agreed or strongly agreed that their physician leader exhibited each quality evaluated is shown in Table 3. Correlations between dimensions are shown in Supplemental Table 3 (available online at <http://www.mayoclinicproceedings.org>). The relationships between composite leadership score and emotional exhaustion, depersonalization, and satisfaction are shown in Figure 1.

We next performed multivariate analysis to evaluate the relationship between composite leadership score and burnout/satisfaction after adjusting for age, sex, duration of employment at Mayo Clinic, and specialty area. In this adjusted analysis, each 1-point increase in composite leadership score (range, 12-60) was associated with a 3.3% decrease in the likelihood of burnout ($P<.001$) and a 9.0% increase in the likelihood of satisfaction ($P<.001$).

Next, we evaluated the impact of frontline leadership on burnout and satisfaction at the division/department level. For this analysis, the mean composite leadership score was calculated for each of 128 frontline division/department chairpersons based on the collective ratings of the physicians they supervised. The relationship between each division/department chairperson's average composite leadership score (mean, 49.7; range, 25.4-59.1) and the rate of burnout/satisfaction in the group of physicians they supervised is shown in Figure 2. Mean composite leader rating demonstrated a significant relationship with the rate of burnout at the division/department level (correlation= -0.330 ; $P<.0001$). An even stronger relationship was found between mean leadership score and rates of satisfaction (correlation= 0.684 ; $P<.0001$). The r^2 value for the relationship between mean composite leadership score and rates of burnout and satisfaction at the division/department level were 0.11 and 0.47, respectively. No changes in the results were observed on sensitivity analysis to identify the impact of within-supervisor autocorrelations.

Finally, we evaluated the relationship between each leader's personal degree of burnout and satisfaction and the prevalence

TABLE 2. Demographic Characteristics, Burnout, and Satisfaction of the 2813 Responders

Characteristic	Responders (No. [%])
Age	
<35 y	178 (7)
35-44 y	800 (30)
45-54 y	809 (31)
55-64 y	702 (26)
≥65 y	161 (6)
Missing	163
Sex	
Female	765 (29)
Male	1885 (71)
Missing	163
Duration of employment at Mayo Clinic	
<5 y	803 (30)
6-10 y	477 (18)
11-15 y	570 (22)
>15 y	800 (30)
Missing	163
Specialty	
Primary care ^a	383 (14)
Internal medicine subspecialty	696 (25)
Surgical specialty	400 (14)
Other medical specialty ^b	572 (20)
Anesthesiology	122 (4)
Radiology	101 (4)
Pathology and laboratory medicine	125 (4)
Other	414 (15)
Burnout ^c	
High emotional exhaustion ^d	1063 (38)
High depersonalization ^e	401 (15)
Burnout ^f	1095 (40)
Missing	57
Satisfaction	
Very satisfied	947 (34)
Satisfied	1260 (46)
Neither satisfied nor dissatisfied	344 (13)
Dissatisfied	187 (7)
Very dissatisfied	12 (0)
Missing	33

^aFamily medicine, general pediatrics, general internal medicine.

^bNeurology, dermatology, physical medicine/rehabilitation, radiation oncology, subspecialty pediatrics, psychiatry, etc.

^cAs assessed using the single-item measures for emotional exhaustion and depersonalization adapted from the full Maslach Burnout Inventory. Area under the receiver operating characteristic curves for the emotional exhaustion and depersonalization single items relative to that of their respective full Maslach Burnout Inventory domain score in previous studies were 0.94 and 0.93, respectively, and the positive predictive values of the single-item thresholds for high levels of emotional exhaustion and depersonalization were 88.2% and 89.6%, respectively.^{18,27}

^dIndividuals indicating symptoms of emotional exhaustion weekly or more often have median domain scores on the full Maslach Burnout Inventory of greater than 30 and have a greater than 75% probability of having a high emotional exhaustion domain score as defined by the Maslach Burnout Inventory (≥27).

^eIndividuals indicating symptoms of depersonalization weekly or more often have median domain scores on the full Maslach Burnout Inventory of greater than 13 and have a greater than 85% probability of having a high depersonalization domain score as defined by the Maslach Burnout Inventory (≥10).

^fHigh score (at least weekly) on the emotional exhaustion or depersonalization scale.

TABLE 3. Leadership Qualities of Immediate Supervisors and the Prevalence of Burnout and Satisfaction in the Physicians They Supervise

Leadership quality	Burnout (% [95% CI])			Satisfaction (% [95% CI])		
	Prevalence of those rating leader favorably	Prevalence of those rating leader unfavorably	P value	Prevalence of those rating leader favorably	Prevalence of those rating leader unfavorably	P value
Holds career development conversations with me	36 (34.1-38.4)	51 (47.5-55.2)	<.001	82 (80.2-83.5)	51 (46.6-55.1)	<.001
Inspires me to do my best	36 (33.6-37.8)	52 (48.6-56.3)	<.001	83 (81.6-84.8)	46 (42.2-50.5)	<.001
Empowers me to do my job	35 (33-37.1)	56 (52.4-60.4)	<.001	86 (84.9-87.8)	46 (41.8-50.1)	<.001
Is interested in my opinion	36 (33.7-37.9)	54 (49.6-57.5)	<.001	85 (83.4-86.5)	48 (44.1-52.5)	<.001
Encourages employees to suggest ideas for improvement	37 (34.5-38.6)	52 (48-56.4)	<.001	86 (84.9-87.8)	53 (48.7-57.1)	<.001
Treats me with respect and dignity	38 (35.6-39.5)	56 (50.7-61.9)	<.001	94 (93.1-95.1)	69 (64.7-72.5)	<.001
Provides helpful feedback and coaching on my performance	35 (33.1-37.4)	50 (46.5-53.6)	<.001	78 (76.2-79.7)	41 (37-45.4)	<.001
Recognizes me for a job well done	36 (33.9-38)	53 (48.6-56.5)	<.001	84 (82.8-85.9)	48 (43.5-51.9)	<.001
Keeps me informed about changes taking place at Mayo Clinic	37 (34.5-38.6)	53 (49-57.7)	<.001	88 (86.7-89.4)	54 (49.8-58.1)	<.001
Encourages me to develop my talents and skills	35 (33.2-37.3)	54 (50.4-58)	<.001	84 (82.1-85.3)	45 (40.4-48.8)	<.001
I would recommend working for your immediate supervisor	36 (34.1-38.2)	53 (49.3-57.6)	<.001	87 (86-88.8)	49 (44.9-53.3)	<.001
Overall, how satisfied are you with your immediate supervisor	36 (34-38.1)	53 (49-57)	<.001	87 (85.3-88.2)	47 (42.5-50.7)	<.001

of burnout and satisfaction among the physicians they supervised. No relationship was observed between the leader's level of emotional exhaustion, depersonalization, or burnout and the prevalence of burnout in their work unit (Supplemental Figure 1, available online at <http://www.mayoclinicproceedings.org>). A small but significant correlation was observed between the leader's personal level of satisfaction with the organization and the rate of satisfaction in their work unit (correlation=0.278; $r^2=0.07$; $P=.003$) (Supplemental Figure 2, available online at <http://www.mayoclinicproceedings.org>).

DISCUSSION

These findings demonstrate the importance of frontline leadership on the well-being and professional satisfaction of physicians working for a large health care organization. Leadership ratings demonstrated a strong association with burnout and satisfaction at the level of individual physicians after adjusting for age, sex, duration of employment at Mayo Clinic, and specialty area. At the work unit level, 11% of the variation in burnout and 47% of the variation in satisfaction with the organization was explained by the leadership rating of the division/department chairperson. This is remarkable when one considers the extent of other factors that influence satisfaction (eg, salary, workload expectations, speciality, culture, strategic direction of the organization, personality conflicts, and opportunities for professional development). In contrast, the

leader's own level of burnout was not related to the prevalence of burnout in the division/department, and the leader's personal satisfaction had a much smaller correlation with satisfaction in their division/department than their leadership scores (r^2 0.07 vs 0.47).

These observations add to a growing understanding of organizational factors that impact physician well-being,^{13,28-32} including the efficiency of the practice environment, the level of flexibility/autonomy provided to physicians, and workload expectations.^{13,28-32} Extensive research now indicates that the well-being and professional satisfaction of physicians has a profound effect on the quality of care that physicians provide and affects patient adherence with treatment recommendations and satisfaction with medical care.¹⁰⁻¹⁷ These effects on quality of care, combined with the impact of satisfaction and burnout on turnover and associated costs,^{19,20,33,34} underscore the critical importance of physician satisfaction and burnout to the long-term success of health care organizations. This fact has led to greater recognition that reducing burnout and cultivating resilience/career satisfaction are the shared responsibility of physicians and the organizations in which they function.^{28,29,31,32}

Although the importance of good leadership to the success of health care organizations is increasingly recognized, its direct effect on the professional satisfaction and burnout of individual physicians is poorly understood. Selecting

and developing individuals with the requisite qualities to effectively motivate, inspire, develop, and manage physicians presents unique challenges.³⁵ First, physicians are highly trained, have a tremendous amount of technical knowledge, often function independently, and develop an individual approach to providing patient care. The process of physician training also is designed to inculcate healthy degrees of skepticism, attention to detail, and a desire for evidence to undergird decision making, qualities that can create challenges to building consensus and implementing new ideas.^{9,35,36} The deep understanding of medical practice requisite to leading and guiding the professional development of physicians often necessitates that the leaders themselves be physicians.^{9,37} Physician leaders are, however, typically selected based on their clinical acumen, scientific expertise, or reputation rather than on the qualities necessary to be an effective leader.^{35,36,38} These factors often combine to create a circumstance in which an individual who has not been well prepared to lead is thrust into a very challenging leadership situation.

Clearly, new strategies are needed to identify potential physician leaders and better prepare them for their future leadership role.^{39,40} Vanguard institutions have recognized this problem and have pioneered programs to identify, develop, and equip physician leaders.^{9,35,37,38,41-43} Currently, such programs are not widespread. Several thought leaders have delineated the key competencies for physician leaders^{9,32,35,38,44,45} and have called for the introduction of leadership training in medical school and residency.^{46,47}

The dimensions of effective physician leadership as evaluated by the composite leadership score in our study could be summarized as follows: inform, engage, inspire, develop, and recognize. Many of the leadership qualities we evaluated in these dimensions were specific and teachable behaviors, such as keeping people informed, encouraging reports to suggest ideas for improvement, having career development conversations, providing feedback and coaching, and recognizing a job well done. The ability of physician leaders to inspire those who they are leading also cannot be underestimated in today's challenging and rapidly changing practice environment. Although inspiration can take many forms, we believe that engaging

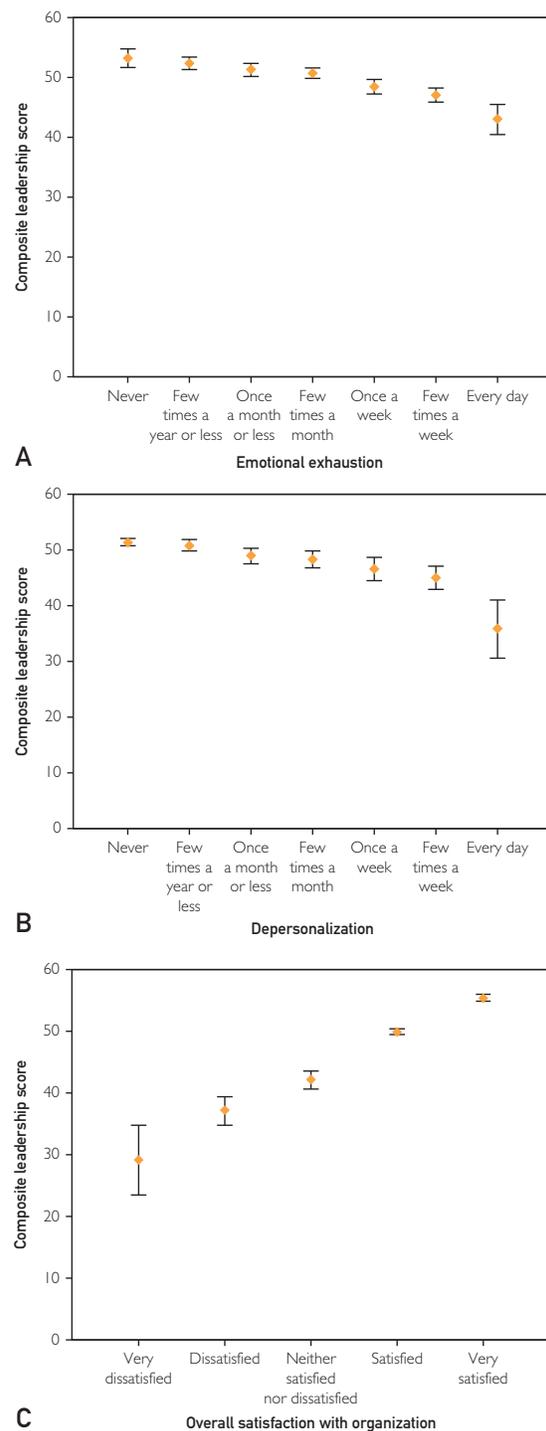
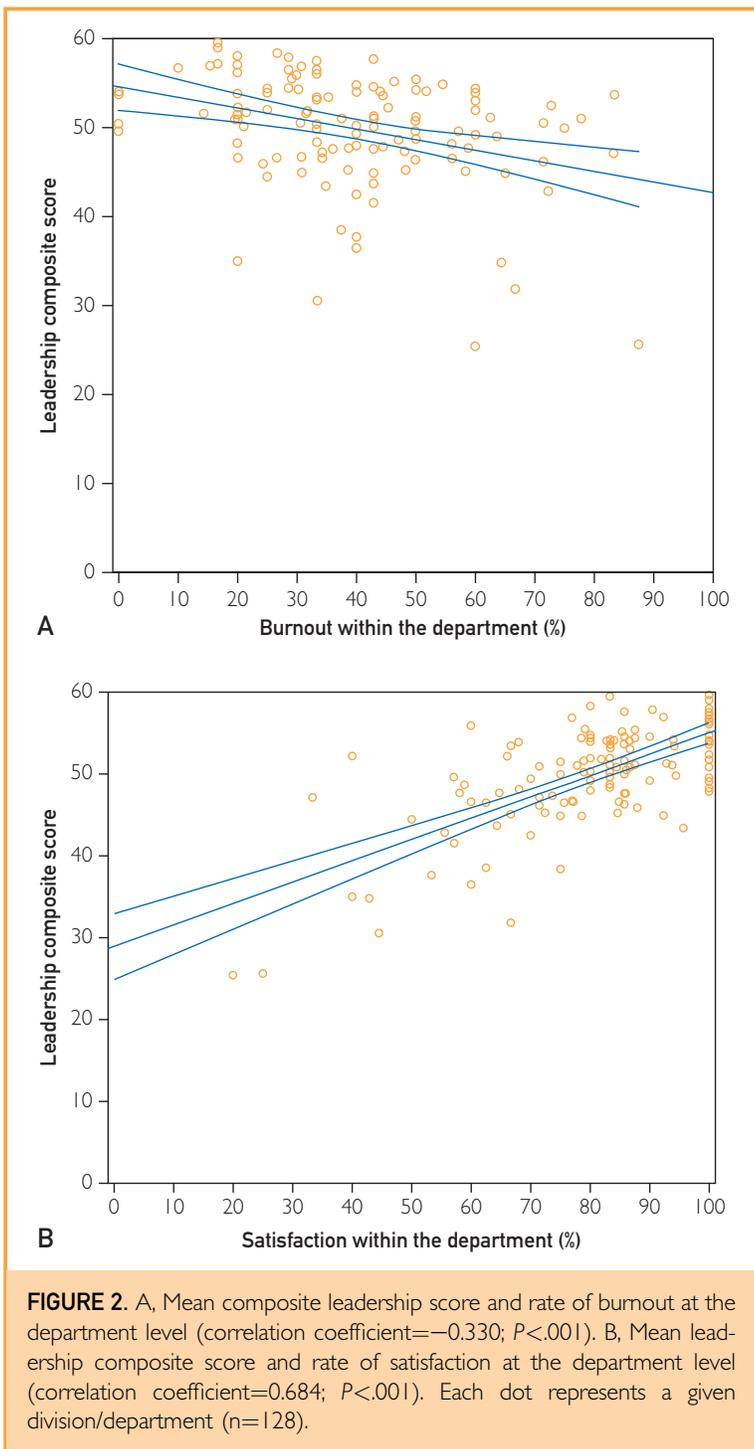


FIGURE 1. Relationships between mean composite leadership score of the immediate supervisor and physician emotional exhaustion (correlation coefficient=0.217; $P<.001$) (A), physician depersonalization (correlation coefficient=0.213; $P<.001$) (B), and physician satisfaction (correlation coefficient=0.504; $P<.001$) (C). Error bars indicate 95% CIs.



and empowering physicians to help solve the problems facing the organization and the work unit is a critical component. Physicians are inherently critical thinkers and problems solvers who want to be involved in assessing and improving their practice environment. Indeed, 3 of the 12 items in the composite

score related to empowering physicians to do their work, being interested in their opinion, and encouraging suggestions for improvement. Embodying these qualities requires a leader to be secure in his or her position, unafraid to tackle difficult problems, willing to explore diverse opinions regarding new approaches, and encouraging of others to provide input in shaping solutions.

This study has several important limitations. First, it represents the experience of a single health care organization. It should be noted, however, that the findings were consistent across 3 separate academic campuses that function largely independently and across a large community-based health system. Second, the study is cross-sectional and cannot determine causality. Future longitudinal evaluations, particularly before and after leadership changes occur, will provide important additional insights. Third, it is possible that dissatisfied or burned out individuals are simply more likely to evaluate their leaders less favorably. The relationship between mean leader ratings and the prevalence of burnout and satisfaction at the work unit level, however, argues against this being the primary etiology of these findings. The fact that leadership scores at the work unit level had a much larger effect on satisfaction ($r^2=0.47$) than on burnout ($r^2=0.11$) also suggests specificity to the impact of leadership on different dimensions of physician well-being and argues against this notion. Fourth, although the 12-item leadership assessment used is based on well-recognized leadership traits and uses a standard Likert scale, it is not a previously validated assessment.

This study also has important strengths. The study participants worked in diverse practice settings, including academic and community-based models. The sample included physicians from all specialties who were distributed in multiple regions of the country. The prevalence of burnout among participating physicians was similar to that in a recent national study.²³ The fact that all the participants were part of the same larger organization with a single culture and unified organizational strategy also has advantages as it allowed us to isolate the impact of frontline leadership on physician well-being, to explore the impact of leadership at the individual and division/department levels, and to evaluate the relationship between leaders' own

well-being and the well-being of those they supervise. In this regard, multicenter studies would present other limitations where differences in environment, organizational culture, and macro-level strategy could confound reliable isolation of the impact of frontline leadership on physician satisfaction. Although the cultural aspects of the institution studied may influence some of the results, the impact of frontline leaders on the well-being of the physicians they supervise is unlikely to be unique to Mayo Clinic. Additional strengths of this study include the high participation rate⁴⁸ and the use of validated metrics to assess burnout.^{18,27}

CONCLUSION

The leadership qualities of physician supervisors have a direct effect on the personal well-being of the physicians they lead. These findings have important implications for the selection and training of physician leaders. The results also provide new insights into organizational factors that impact physician well-being.

ACKNOWLEDGMENTS

We thank Michelle Mungo for her administrative support related to this analysis.

SUPPLEMENTAL ONLINE MATERIAL

Supplemental material can be found online at <http://www.mayoclinicproceedings.org>.

Abbreviations and Acronyms: MBI = Maslach Burnout Inventory; NA = do not know/not applicable

Grant Support: Funding for this study was provided by the Mayo Clinic Office of Organization and Leadership Development and the Mayo Clinic Department of Medicine Program on Physician Well-being.

Correspondence: Address to Tait D. Shanafelt, MD, Mayo Clinic, 200 First St, Rochester, MN 55902 (shanafelt.tait@mayo.edu).

REFERENCES

- Hawkins M. 2012 Review of physician recruiting incentives. Meritt Hawkins website. <http://www.meritthawkins.com/uploadedFiles/MerittHawkins/Pdf/mha2012incentivesurveyPDF.pdf>. Accessed May 5, 2014.
- Stevens GW. Engaging employed physicians: reconceptualizing the role of collective identification. *Adv Health Care Manag.* 2013;15:185-209.
- Robinson JC. Consolidation of medical groups into physician practice management organizations. *JAMA.* 1998;279(2):144-149.
- Burchell RC, White RE, Smith HL, Pland NF. Physicians and the organizational evolution of medicine. *JAMA.* 1988;260(6):826-831.
- Lin KY. Physicians' perceptions of autonomy across practice types: is autonomy in solo practice a myth? *Soc Sci Med.* 2014;100:21-29.
- Relman AS. Medical professionalism in a commercialized health care market. *JAMA.* 2007;298(22):2668-2670.
- Collier DA, Collier CE, Kelly TM. Benchmarking physician performance, part 2. *J Med Pract Manage.* 2006;21(5):273-279.
- Madison DL, Konrad TR. Large medical group-practice organizations and employed physicians: a relationship in transition. *Milbank Q.* 1988;66(2):240-282.
- Schwartz RW, Pogge C. Physician leadership: essential skills in a changing environment. *Am J Surg.* 2000;180(3):187-192.
- Shanafelt TD, Balch CM, Bechamps G, et al. Burnout and medical errors among American surgeons. *Ann Surg.* 2010;251(6):995-1000.
- 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(9):1071-1078.
- West CP, Tan AD, Habermann TM, Sloan JA, Shanafelt TD. Association of resident fatigue and distress with perceived medical errors. *JAMA.* 2009;302(12):1294-1300.
- Wallace JE, Lemaire JB, Ghali WA. Physician wellness: a missing quality indicator. *Lancet.* 2009;374(9702):1714-1721.
- Haas JS, Cook EF, Puopolo AL, Burstin HR, Cleary PD, Brennan TA. Is the professional satisfaction of general internists associated with patient satisfaction? *J Gen Intern Med.* 2000;15(2):122-128.
- Firth-Cozens J, Greenhalgh J. Doctors' perceptions of the links between stress and lowered clinical care. *Soc Sci Med.* 1997;44(7):1017-1022.
- Linn LS, Brook RH, Clark VA, Davies AR, Fink A, Kosecoff J. Physician and patient satisfaction as factors related to the organization of internal medicine group practices. *Med Care.* 1985;23(10):1171-1178.
- Grol R, Mokkink H, Smits A, et al. Work satisfaction of general practitioners and the quality of patient care. *Fam Pract.* 1985;2(3):128-135.
- 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.
- Shanafelt TD, Raymond M, Kosty M, et al. Satisfaction with work-life balance and the career and retirement plans of U.S. oncologists. *J Clin Oncol.* 2014;32(11):1127-1135.
- Shanafelt T, Sloan J, Satele D, Balch C. Why do surgeons consider leaving practice? *J Am Coll Surg.* 2011;212(3):421-422.
- Demmy TL, Kivlahan C, Stone TT, Teague L, Sapienza P. Physicians' perceptions of institutional and leadership factors influencing their job satisfaction at one academic medical center. *Acad Med.* 2002;77(12, pt 1):1235-1240.
- Maslach C, Jackson S, Leiter M. *Maslach Burnout Inventory Manual*. 3rd ed. Palo Alto, CA: Consulting Psychologists Press; 1996.
- 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.
- 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.
- 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.
- Dyrbye LN, West CP, Satele D, et al. Burnout among U.S. medical students, residents, and early career physicians relative to the general U.S. population. *Acad Med.* 2014;89(3):443-451.
- 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.
28. Shanafelt TD, Sloan JA, Habermann TM. The well-being of physicians. *Am J Med.* 2003;114(6):513-519.
 29. Shanafelt TD. Enhancing meaning in work: a prescription for preventing physician burnout and promoting patient-centered care. *JAMA.* 2009;302(12):1338-1340.
 30. Dyrbye LN, Shanafelt TD. Physician burnout: a potential threat to successful health care reform. *JAMA.* 2011;305(19):2009-2010.
 31. Dunn PM, Arnetz BB, Christensen JF, Homer L. Meeting the imperative to improve physician well-being: assessment of an innovative program. *J Gen Intern Med.* 2007;22(11):1544-1552.
 32. Egener B, McDonald W, Rosof B, Gullen D. Perspective: organizational professionalism: relevant competencies and behaviors. *Acad Med.* 2012;87(5):668-674.
 33. Buchbinder SB, Wilson M, Melick CF, Powe NR. Estimates of costs of primary care physician turnover. *Am J Manag Care.* 1999;5(11):1431-1438.
 34. Atkinson W, Misra-Hebert A, Stoller JK. The impact on revenue of physician turnover: an assessment model and experience in a large healthcare center. *J Med Pract Manage.* 2006;21(6):351-355.
 35. Stoller JK. Commentary: recommendations and remaining questions for health care leadership training programs. *Acad Med.* 2013;88(1):12-15.
 36. Stoller JK. Developing physician-leaders: a call to action. *J Gen Intern Med.* 2009;24(7):876-878.
 37. Tangalos EG, Blomberg RA, Hicks SS, Bender CE. Mayo leadership programs for physicians. *Mayo Clinic Proc.* 1998;73(3):279-284.
 38. Lobas JG. Leadership in academic medicine: capabilities and conditions for organizational success. *Am J Med.* 2006;119(7):617-621.
 39. Arroliga AC, Huber C, Myers JD, Dieckert JP, Wesson D. Leadership in health care for the 21st century: challenges and opportunities. *Am J Med.* 2014;127(3):246-249.
 40. Stoller JK. Help wanted: developing clinician leaders. *Perspect Med Educ.* 2014;3(3):233-237.
 41. Stoller JK, Berkowitz E, Bailin PL. Physician management and leadership education at the Cleveland Clinic Foundation: program impact and experience over 14 years. *J Med Pract Manage.* 2007;22(4):237-242.
 42. Lee TH. Turning doctors into leaders. *Harv Bus Rev.* 2010; 88(4):50-58.
 43. Schwartz RW, Pogge CR, Gillis SA, Holsinger JW. Programs for the development of physician leaders: a curricular process in its infancy. *Acad Med.* 2000;75(2):133-140.
 44. Trastek VF, Hamilton NW, Niles EE. Leadership models in health care: a case for servant leadership. *Mayo Clin Proc.* 2014;89(3):374-381.
 45. Menaker R. Leadership strategies in healthcare. *J Med Pract Manage.* 2009;24(6):339-343.
 46. Ackerly DC, Sangvai DG, Udayakumar K, et al. Training the next generation of physician-executives: an innovative residency pathway in management and leadership. *Acad Med.* 2011;86(5):575-579.
 47. Blumenthal DM, Bernard K, Bohnen J, Bohmer R. Addressing the leadership gap in medicine: residents' need for systematic leadership development training. *Acad Med.* 2012;87(4):513-522.
 48. Asch D, Jedziewski M, Christakis N. Response rates to mail surveys published in medical journals. *J Clin Epidemiol.* 1997;50(10): 1129-1136.