Association of Intrinsic Motivating Factors and Markers of Physician Well-Being: A National Physician Survey

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BACKGROUND: Although intrinsic motivating factors play important roles in physician well-being and productivity, most studies have focused on extrinsic motivating factors such as salary and work environment.

OBJECTIVE: To examine the association of intrinsic motivators with physicians' career satisfaction, life satisfaction, and clinical commitment, while accounting for established extrinsic motivators as well.

DESIGN AND PARTICIPANTS: A nationally representative survey of 2000 US physicians, fielded October to December 2011.

MAIN MEASURES: Outcome variables were five measures of physician well-being: career satisfaction, life satisfaction, high life meaning, commitment to direct patient care, and commitment to clinical practice. Primary explanatory variables were sense of calling, personally rewarding hours per day, meaningful, long-term relationships with patients, and burnout. Multivariate logit models with survey design provided nationally representative individual-level estimates.

KEY RESULTS: Among 1289 respondents, 85.8% and 86.5% were satisfied with their career and life, respectively; 88.6% had high life meaning; 54.5% and 79.5% intended to retain time in direct patient care and continue clinical practice, respectively. Sense of calling was strongly positively associated with high life meaning (odds ratio [OR] 5.14, 95% confidence interval [95% CI] 2.87–9.19) and commitment to direct patient care (OR 2.50, 95% CI 1.53–4.07). Personally rewarding hours per day were most strongly associated with career satisfaction (OR 5.28, 95% CI 2.72–10.2), life satisfaction (OR 4.46, 95% CI 2.34–8.48), and commitment to clinical practice (OR 3.46, 95% CI 1.87–6.39). Long-term relationships with patients were positively associated with career and life satisfaction and high life meaning. Burnout was strongly negatively associated with all measures of physician well-being.

CONCLUSIONS: Intrinsic motivators (e.g., calling) were associated with each measure of physician well-being (satisfaction, meaning, and commitment), but extrinsic motivators (e.g., annual income) were not associated with meaning or commitment. Understanding the effects of intrinsic motivators may help inform efforts to support physician well-being.

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INTRODUCTION

A growing body of evidence suggests that physician well-being cannot be taken for granted, given that it is significantly constituted by career achievement, work-life balance, and mental health.[1–5] Physician well-being has particular importance in the health care system[6,7] as it influences workplace productivity and efficiency,[1,7,8] quality of health care service,[9,10] and patient safety.[11,12] Furthermore, lower physician satisfaction may lead to worsening career commitment, especially in rural or underserved areas most in need of health care services.[5,13–15]

Organismic integration theory in behavioral science suggests that individuals are intrinsically motivated and integrate intrinsic and extrinsic motivating factors as they pursue well-being across their life-span (Fig. 1).[16,17] Classic motivation theory has characterized extrinsic factors as impoverished motivators relative to intrinsic factors.[18] Nonetheless, empirical assessments of physician well-being to date have generally focused on extrinsic motivating factors.[6,7] Two recent literature reviews concluded that the factors most strongly associated with physician well-being include work environment (e.g., work hours, income),[19–21] physician autonomy (e.g., control over work, ability to provide needed service),[7,19,22] and changes in the local market (e.g., managed care).[22,23]

Intrinsic motivating factors have received relatively scant attention because medical educators and practitioners have thought it too difficult to design institutional strategies and interventions that address stable physician characteristics.[24–26] Instead policymakers have tended to focus on extrinsic factors that are more readily manipulated. Several studies of other professions (e.g., nursing, teaching) suggest that intrinsic motivators make particular extrinsic factors salient[27,28] and thereby indirectly affect career satisfaction.[28,29] Very few studies in the medical literature, however, have identified intrinsic motivators for physicians and examined their effects on physician well-being.[30,31] The present study used data from a nationally representative survey of US physicians to systematically

investigate the association of both intrinsic and extrinsic motivators with multiple measures of physician well-being.

METHODS

Data Collection

The *Job Satisfaction and Meaning in the Practice of Medicine* project[32] mailed a confidential, self-administered questionnaire to 2000 practicing physicians aged 65 years or younger who were randomly extracted from the American Medical Association Physician Master File (AMA-PMF).[33] Of these, 400 primary care physicians (PCPs; defined as physicians with a primary or secondary specialty of internal medicine, family medicine, or general practice; pediatricians were not included) were drawn in 2009, and another 400 PCPs and 1200 specialists (excluding radiology and pathology) were drawn in 2011 from the AMA-PMF. AMA-PMF is a database intended to include virtually all practicing US physicians from the time they enter medical school, and the proportion of 800 PCPs to 1200 specialists is similar to the physician specialty ratio in the 2010 AMA-PMF.[34]

The survey questionnaires contained 38 items examining physician career satisfaction and commitment, personal experience in overall life and practice, and other socio-demographic characteristics (Tables 1 and 2). Questionnaires were mailed to each physician up to three times between October and December 2011. Case sampling weights were calculated from relevant physician characteristics in the final data set to adjust for non-response bias.[32,34] The study was approved by the University of Chicago Institutional Review Board.

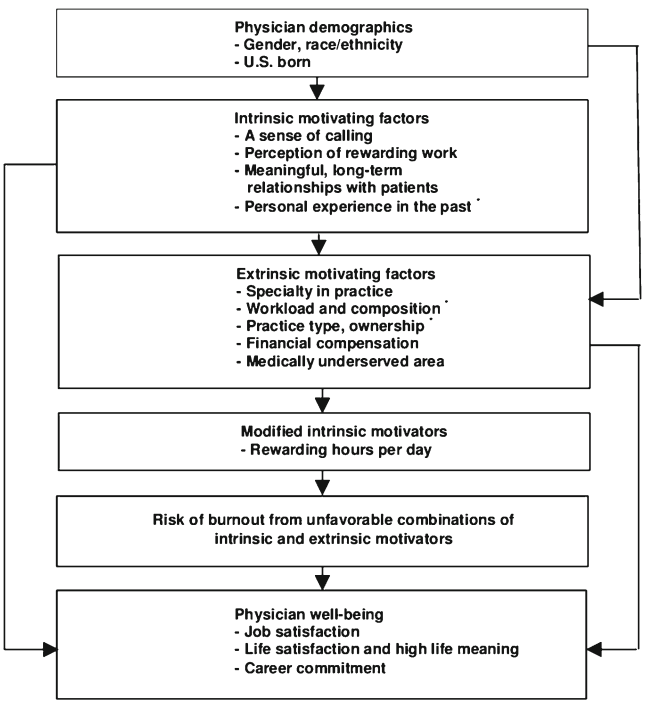

Figure 1 Application of organismic integration theory in a cross-sectional model: Intrinsic motivators, extrinsic motivators, and physician well-being. Note: Some motivators in theory model were measured in proxy (*) in our empirical study

Data Elements

Primary outcomes were five measures of physician well-being: career satisfaction, life satisfaction, high life meaning, and commitment to direct patient care and clinical practice. Questionnaire items and responses for outcome variables are shown in Table 2. Career satisfaction was measured with an item used in previous studies:[19] "Thinking very generally about your satisfaction with your overall career in medicine, would you say that you are currently…" Responses were recoded as a binary variable, dissatisfied versus satisfied. Life satisfaction and high life meaning were measured using validated scales:[35] "I am satisfied with my life" and "I have found a satisfactory meaning in life." Responses were recoded as binary variables, no versus yes. Career commitment was measured by two statements: "In the next few years, I hope to reduce the amount of time I spend in direct patient care" and "In the next few years, I hope to leave the practice of medicine." Responses were reverse coded to measure "commitment" and recoded as binary variables, uncommitted versus committed.

The primary independent variables were sense of calling, personally rewarding hours per day, having meaningful, long-term relationships with patients, and burnout at work. A sense of calling was assessed using a single-item measure utilized in previous studies:[31,36] "For me, the practice of medicine is a calling." Responses were recoded into three categories: disagree strongly and disagree somewhat, agree somewhat, and agree strongly. Personally rewarding hours per day was estimated in response to the prompt, "Please estimate how many hours you spend in a typical day at work on activities that you find personally rewarding." Responses were recoded as 0–2.5, 2.5–5, 5–7.5, and ≥7.5 h. The frequency of long-term relationships with patients was measured with the question, "With respect to your patients, with how many do you have a meaningful, long-term relationship?" Responses included none, a few, many, and most. We assessed burnout with a validated short form of the Maslach Burnout Inventory (MBI), using the following two questions on a 7-point Likert scale:[37] "I feel burned out from my work" (MBI emotional exhaustion) and "I have become more callous toward people since I took this job" (MBI depersonalization). Each item was recoded into a binary variable, no (never, a few times a year, once a month or less, a few times a month) versus yes (once a week, a few time a week, every day). High burnout was defined as a yes for one or both of the items.

In addition to primary independent variables, we controlled the following physician demographics and extrinsic motivators: gender, race/ethnicity (non-Hispanic White, Asian, Hispanic, African American, and other), US born, physician specialty (PCP versus specialist), practice year category (0–9, 10–19, and ≥20), annual income category (<$100,000,

$100,000–199,999, $200,000–299,999, and ≥$300,000), working in an academic medical center, and working for medically underserved populations.

Conceptual Model and Study Design

As visually displayed in the Fig. 1, based on organismic integration theory,[16,17] we tested the association of intrinsic motivators with measures of physician well-being in a cross sectional frame. According to motivation theories,[16–18] physicians have innate characteristics which foster different types and levels of intrinsic motivators and preferences for extrinsic motivators. Intrinsic motivators would influence vocational outcomes (e.g., physician well-being) both directly and indirectly via extrinsic motivators. Intrinsic motivators would encourage physicians to select into job environments with particular combinations of extrinsic motivators, which in turn serve to modify intrinsic motivators. For example, whether one perceives one's work as being personally rewarding could be modified by the workload, conditions of one's work environment (e.g., working for medically underserved populations), and exposure to intrinsically motivating job tasks. Unfavorable combinations of intrinsic and extrinsic motivators would lead to experiences of burnout, which in turn would diminish physician well-being.

Data Analysis

We used multivariate logit models to analyze the physician well-being binary outcome variables, controlling for all primary and other explanatory variables as described in the Data Elements section. A small amount of missing data (0.1–3.0% of each survey item) was imputed using multiple imputation methods with 20 iterations, which yielded consistent estimates with valid inference in estimation.[38] Analyses took into account the survey design (i.e., probability weight, medical institution as primary sampling units, and physician specialty as strata)[32] to produce nationally representative individual-level estimates.[39,40]

We performed two sensitivity analyses. First, we re-categorized the neutral category in the career satisfaction (neither dissatisfied nor satisfied) and life satisfaction and high life meaning (cannot say true or false), shown in Table 2, into satisfied and yes categories and repeated the estimations. Second, we performed the analyses with and without multiple imputations to confirm the robustness of the imputations. All analyses were conducted using the multiple imputations and survey design adjusted commands of Stata MP v14.0.

RESULTS

The survey response rate was 64.5% (1289/2000). Response rates were higher among older physicians, PCPs, and US born ($P < 0.05$ for all). Table 1 depicts the physicians' demographics, job characteristics, and extrinsic and intrinsic motivators.

Table 1 Physician Demographics, Job Characteristics, Sense of Calling, Rewarding Hours, Relationships with Patients, and Burnout (n = 1289)

Variables	N (%)
Female	474 (36.8)
Race/ethnicity	
Non-Hispanic white	907 (70.4)
Asian	203 (15.8)
Hispanic	62 (4.8)
African American	61 (4.7)
Other	56 (4.3)
US born	
Immigrated	374 (29.0)
US born	915 (71.0)
Physician specialty	
Primary care	516 (40.0)
Specialist	773 (60.0)
Practice year category	
Practice years ≥0, <10	289 (22.4)
Practice years ≥10, <20	376 (29.2)
Practice years ≥20	624 (48.4)
Annual income category	
Income <$100,000	235 (18.2)
Income ≥$100,000, <$200,000	469 (36.4)
Income ≥$200,000, <$300,000	340 (26.4)
Income ≥$300,000	245 (19.0)
Academic medical center	
Non-academic medical center	757 (58.7)
Academic medical center	532 (41.3)
Working for medically underserved populations	
Not underserved	720 (55.9)
Underserved	569 (44.1)
Practice of medicine is a calling	
Strongly or somewhat disagree	150 (11.6)
Somewhat agree	537 (41.7)
Strongly agree	602 (46.7)
Personally rewarding hours per day	
Hours ≥0, <2.5	230 (17.8)
Hours ≥2.5, <5.0	437 (33.9)
Hours ≥5.0, <7.5	292 (22.7)
Hours ≥7.5	330 (25.6)
Meaningful, long-term relationships with patients	
None	279 (21.6)
A few	428 (33.2)
Many	408 (31.7)
Most	174 (13.5)
Feeling of being burned out	
No	702 (54.5)
Yes	587 (45.5)

Note: percentages in parentheses were adjusted for probability weight, primary sampling units, and strata in survey data analysis

Among respondents, medical practice was perceived to be a calling by 88.4% of physicians, and 82.2% of respondents experienced at least 2.5 personally rewarding hours a day. Seventy-eight percent (78.4%) of physicians had meaningful, long-term relationships with at least a few patients, and 45.5% reported feeling burned out.

Table 2 shows the responses for survey questions about physician well-being. Most physicians (85.8%) were very or somewhat satisfied with their career; 86.5% and 88.6% agreed that they were satisfied with their lives and had satisfactory meaning in life, respectively. Lastly, 54.5% and 79.5% anticipated a similar level of commitment to direct patient care and clinical practice in the next few years, respectively.

Table 3 shows the association of extrinsic and intrinsic motivators with career and life satisfaction and high life meaning outcomes while controlling for several covariates in a multivariate logit model. Physicians with a strong sense of

Table 2 Survey Questionnaires and Responses on Physician Well-Being (n = 1289)

Variable description, N (%)		Re-categorization
Career satisfaction: "Thinking very generally about your satisfaction with your overall career in medicine, would you say that you are currently…"		
Very dissatisfied	32 (2.5)	Dissatisfied
Somewhat dissatisfied	97 (7.5)	Dissatisfied
Neither dissatisfied nor satisfied	54 (4.2)	Dissatisfied
Somewhat satisfied	575 (44.6)	Satisfied
Very satisfied	531 (41.2)	Satisfied
Life satisfaction: "I am satisfied with my life"		
Absolutely untrue	13 (1.0)	No
Mostly untrue	43 (3.3)	No
Somewhat untrue	78 (6.1)	No
Cannot say true or false	40 (3.1)	No
Somewhat true	254 (19.7)	Yes
Mostly true	562 (43.6)	Yes
Absolutely true	299 (23.2)	Yes
High life meaning: "I have found a satisfactory meaning in life"		
Absolutely untrue	6 (0.5)	No
Mostly untrue	31 (2.4)	No
Somewhat untrue	37 (2.9)	No
Cannot say true or false	72 (5.6)	No
Somewhat true	214 (16.6)	Yes
Mostly true	514 (39.8)	Yes
Absolutely true	415 (32.2)	Yes
Commitment to direct patient care: "In the next few years, I hope to reduce the amount of time I spend in direct patient care" (reverse coded)		
Agree strongly	242 (18.8)	Uncommitted
Agree somewhat	344 (26.7)	Uncommitted
Disagree somewhat	373 (28.9)	Committed
Disagree strongly	330 (25.6)	Committed
Commitment to clinical practice: "In the next few years, I hope to leave the practice of medicine" (reverse coded)		
Agree strongly	119 (9.2)	Uncommitted
Agree somewhat	146 (11.3)	Uncommitted
Disagree somewhat	282 (21.9)	Committed
Disagree strongly	742 (57.6)	Committed

Note: percentages in parentheses were adjusted for probability weight, primary sampling units, and strata in survey data analysis

calling were more likely to report high life meaning (odds ratio [OR] 5.14, 95% confidence interval [95% CI] 2.87-9.19), career satisfaction (OR 2.39, 95% CI 1.31–4.35), and life satisfaction (OR 2.28, 95% CI 1.21–4.31). Having 5–7.5 personally rewarding hours each day was most strongly associated with career (OR 5.28, 95% CI 2.72–10.2) and life satisfaction (OR 4.46, 95% CI 2.34–8.48). Physicians with long-term relationships with a few patients were more likely to be satisfied with their career (OR 1.71, 95% CI 1.03–2.82), while those having long-term relationships with many patients were more likely to report life satisfaction (OR 1.94, 95% CI 1.14–3.30) and high life meaning (OR 2.13, 95% CI 1.18–3.86). Physicians experiencing burnout were less likely to report career satisfaction (OR 0.21, 95% CI 0.13–0.32), life satisfaction (OR 0.45, 95% CI 0.29–0.67), and high life meaning (OR 0.44, 95% CI 0.28–0.68).

Table 4 shows the association of extrinsic and intrinsic motivators with clinical commitment, while adjusting for other explanatory variables in multivariate logit regression. A sense of calling was most strongly associated with commitment to direct patient care (OR 2.50, 95% CI 1.53–4.07), followed by experiencing ≥7.5 personally rewarding hours per day (OR 1.76, 95% CI 1.03–2.99). Commitment to clinical practice was most strongly associated with having ≥7.5 personally rewarding hours per day (OR 3.46, 95% CI 1.87–6.39) and a strong sense of calling (OR 2.93, 95% CI 1.62–5.29). Burnout was significantly negatively associated with commitment to direct patient care (OR 0.42, 95% CI 0.31–0.58) and clinical practice (OR 0.35, 95% CI 0.24–0.50).

Several extrinsic factors were also significantly associated with physician well-being in Tables 3 and 4. Doctors who had ≥20 years of practice had significantly lower career and life satisfaction and commitment to direct patient care and clinical practice. Physicians with income ≥$300,000 were 2.97 times (95% CI 1.27–6.97) more likely to be satisfied with their career compared to physicians with income <$100,000. Practice specialty, working in an academic medical center, and working for medically underserved populations were not significantly associated with physician well-being. Among demographics, physicians born in the US were 1.75 times (95% CI 1.03–2.96) more likely than foreign born physicians to be satisfied with their life.

In two sensitivity analyses, the magnitude and statistical significance of our findings were not significantly changed except that the OR of calling was smaller in high life meaning (OR 3.04, $P < 0.05$) when we re-categorized neutral category into yes category.

DISCUSSION

This national survey of US physicians investigated the association of both intrinsic and extrinsic motivators with multiple measures of physician well-being. We found that a sense of calling was most strongly associated with high life meaning and commitment to direct patient care. Personally rewarding hours were most strongly associated with career and life satisfaction and commitment to clinical practice. Extrinsic factors such as annual income and other work-related characteristics were not significantly associated with well-being in most cases.

This study provides the most recent, nationally representative individual-level results. Most previous studies focused on small local markets or specialties,[6,10,15,24] which prevents results from being generalized beyond the sample population in their studies. The latest nationally representative study, which was performed more than a decade ago, focused on career satisfaction and extrinsic factors and concluded that physician autonomy and working hours were the two most critical factors in satisfaction.[19] During the last decade, however, physicians have experienced seismic changes in their practice, such as national health care reform, which may continue to have complex effects on physician well-being.[6,7,41] For example, the latest evidence from *RAND* suggests that the availability of electronic health records has positive

Table 3 Multivariate Analysis of the Association of Calling, Rewarding Hours, Relationships, and Burnout with Career and Life Well-Being (n = 1289)

	Career satisfaction	Life satisfaction	High life meaning
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Female	1.00 (0.66–1.52)	0.91 (0.58–1.42)	1.28 (0.78–2.12)
Race/ethnicity			
Non-Hispanic white	–	–	–
Asian	0.56 (0.20–1.52)	0.55 (0.23–1.30)	0.55 (0.21–1.46)
Hispanic	0.78 (0.40–1.49)	0.96 (0.49–1.87)	0.87 (0.43–1.78)
African American	0.55 (0.22–1.38)	0.76 (0.27–2.11)	0.55 (0.19–1.63)
Other	1.12 (0.42–3.03)	1.73 (0.51–5.89)	1.39 (0.30–6.34)
US born			
Immigrated	–	–	–
US born	0.94 (0.50–1.78)	1.75 (1.03–2.96)	1.25 (0.70–2.25)
Physician specialty			
Primary care	–	–	–
Specialist	0.86 (0.58–1.27)	1.00 (0.66–1.51)	0.76 (0.49–1.17)
Years of practice			
Practice years ≥0, <10	–	–	–
Practice years ≥10, <20	0.62 (0.35–1.11)	0.48 (0.25–0.94)	0.52 (0.26–1.07)
Practice years ≥20	0.48 (0.25–0.90)	0.36 (0.19–0.70)	0.55 (0.26–1.15)
Annual income category			
Income <100 K	–	–	–
Income ≥100 K, <200 K	1.14 (0.61–2.15)	0.98 (0.53–1.83)	0.73 (0.35–1.52)
Income ≥200 K, <300 K	2.14 (1.06–4.35)	1.65 (0.83–3.29)	1.46 (0.61–3.47)
Income ≥300 K	2.97 (1.27–6.97)	1.37 (0.60–3.13)	0.85 (0.36–1.99)
Academic medical center			
Non-academic	–	–	–
Academic	1.41 (0.90–2.20)	0.76 (0.51–1.14)	1.02 (0.65–1.58)
Medically underserved populations			
Not underserved	–	–	–
Underserved	1.18 (0.80–1.75)	0.88 (0.59–1.30)	0.78 (0.48–1.26)
Practice of medicine is a calling			
Strongly or somewhat disagree	–	–	–
Somewhat agree	1.75 (1.04–2.95)	1.23 (0.70–2.16)	1.69 (1.01–2.83)
Strongly agree	2.39 (1.31–4.35)	2.28 (1.21–4.31)	5.14 (2.87–9.19)
Personally rewarding hours a day			
Hours ≥0, <2.5	–	–	–
Hours ≥2.5, <5.0	2.57 (1.57–4.20)	1.85 (1.15–2.95)	1.19 (0.70–2.02)
Hours ≥5.0, <7.5	5.28 (2.72–10.2)	4.46 (2.34–8.48)	2.37 (1.24–4.54)
Hours ≥7.5	4.33 (2.11–8.88)	2.49 (1.34–4.62)	1.46 (0.76–2.82)
Meaningful, long-term relationships with patients			
None	–	–	–
A few	1.71 (1.03–2.82)	1.42 (0.92–2.20)	1.24 (0.75–2.03)
Many	1.40 (0.84–2.34)	1.94 (1.14–3.30)	2.13 (1.18–3.86)
Most	1.00 (0.46–2.18)	1.59 (0.76–3.32)	1.09 (0.51–2.33)
Feeling of being burned out			
No	–	–	–
Yes	0.21 (0.13–0.32)	0.45 (0.29–0.67)	0.44 (0.28–0.68)

Note: Odds ratio (OR) and 95% confidence interval (95% CI) were adjusted for probability weight, primary sampling units, and strata in survey data analysis

effects on physician satisfaction due to the ability to rapidly and remotely access patient information, while negative effects result from the interference with face-to-face patient care.[7]

Our study makes several novel contributions to the physician well-being literature. First, we examined multiple facets of physician well-being, including career satisfaction, life satisfaction and meaning, and career commitment. Most previous studies measured physician well-being by examining career satisfaction only,[6,7,19] while the literature suggests that work-life balance is increasingly important in medical students' specialty choice and physicians' career commitment.[2,42] Our results suggest that physicians often assess their work satisfaction and life satisfaction differently. For example, income was not significantly associated with most physician well-being measures such as life satisfaction, life meaning, and career commitment, while it has traditionally been thought to be important to physician career satisfaction.[5,9,20,23,43]

Second, to our knowledge, this is the first empirical study to have assessed the association of several intrinsic motivators on measures of physician well-being, while accounting for established extrinsic motivators as well. Organismic integration theory suggests that vocational outcomes selectively reinforce or modify the original motivators of behavioral decisions, which recursively influence vocational outcomes in a career path.[16,17] On one hand, the extrinsic work environment or regulation evolves continuously to integrate reinforced or modified intrinsic motivators, motivate better vocational fulfillment, and improve well-being. On the other hand,

Table 4 Multivariate Analysis of Association of Calling, Rewarding Hours, Relationships, and Burnout with Career Commitment (n = 1289)

	Commitment to direct patient care	Commitment to clinical practice
	OR (95% CI)	OR (95% CI)
Female	1.15 (0.86–1.52)	1.14 (0.77–1.68)
Race/ethnicity		
Non-Hispanic white	–	–
Asian	0.59 (0.30–1.14)	0.64 (0.29–1.40)
Hispanic	1.02 (0.66–1.57)	0.56 (0.30–1.04)
African American	0.70 (0.38–1.29)	0.58 (0.29–1.15)
Other	0.56 (0.28–1.12)	0.86 (0.25–2.98)
US born		
Immigrated	–	–
US born	1.11 (0.79–1.57)	0.62 (0.38–1.02)
Physician specialty		
Primary care	–	–
Specialist	0.88 (0.68–1.13)	0.95 (0.69–1.32)
Years of practice		
Practice years ≥0, <10	–	–
Practice years ≥10, <20	0.61 (0.40–0.93)	0.23 (0.10–0.51)
Practice years ≥20	0.28 (0.18–0.41)	0.05 (0.02–0.10)
Annual income category		
Income <100 K	–	–
Income ≥100 K, <200 K	0.80 (0.53–1.22)	0.71 (0.37–1.36)
Income ≥200 K, <300 K	0.62 (0.39–1.05)	0.78 (0.40–1.53)
Income ≥300 K	0.80 (0.50–1.28)	0.88 (0.45–1.74)
Academic medical center		
Non-academic	–	–
Academic	1.10 (0.85–1.43)	1.33 (0.89–1.98)
Medically underserved populations		
Not underserved	–	–
Underserved	0.80 (0.61–1.04)	1.02 (0.71–1.47)
Practice of medicine is a calling		
Strongly or somewhat disagree	–	–
Somewhat agree	2.03 (1.29–3.22)	2.00 (1.21–3.30)
Strongly agree	2.50 (1.53–4.07)	2.93 (1.62–5.29)
Personally rewarding hours a day		
Hours ≥0, <2.5	–	–
Hours ≥2.5, <5.0	1.42 (0.93–2.18)	2.08 (1.23–3.50)
Hours ≥5.0, <7.5	1.49 (0.93–2.37)	2.58 (1.44–4.65)
Hours ≥7.5	1.76 (1.03–2.99)	3.46 (1.87–6.39)
Meaningful, long-term relationships with patients		
None	–	–
A few	0.83 (0.56–1.23)	0.84 (0.53–1.33)
Many	1.01 (0.69–1.49)	1.07 (0.64–1.78)
Most	1.19 (0.73–1.93)	0.71 (0.40–1.25)
Feeling of being burned out		
No	–	–
Yes	0.42 (0.31–0.58)	0.35 (0.24–0.50)

Note: Odds ratio (OR) and 95% confidence interval (95% CI) were adjusted for probability weight, primary sampling units, and strata in survey data analysis

individuals recognize these extrinsic factors and update them into their own intrinsic motivators.

However, very few empirical studies have examined intrinsic factors, though more recent studies have begun to focus on a sense of calling.[31,36] For example, one study has found that sense of calling is associated with PCPs' satisfaction in treating certain conditions such as smoking, alcoholism, and obesity.[31] Our study suggests that focusing only on extrinsic motivators neglects other determinants of physician well-being.[1–6,16,17] Besides financial compensation and social prestige, some physicians may be intrinsically motivated by the opportunity to express altruism through their work or to pursue a calling that contributes toward a social mission, teaching, or research.[44,45] Intending to leave the clinical practice has been found to be strongly associated with non-financial factors, such as negative perceptions about an unethical culture in the workplace.[46]

We consider personally rewarding hours and burnout separately in the estimation model. Although most previous studies consider the effect of excessive work hours on job satisfaction,[19–21] we expect that intrinsic motivation for work (finding work personally rewarding) may mitigate against the corrosive (burnout-causing) effects of high workload (Fig. 1).[47,48] For example, a study among PCPs and psychiatrists found that those with a sense of calling appear to be more resistant to burnout.[36] However, it is noteworthy that career and life satisfaction did not increase even further once a person reported ≥7.5 personally rewarding hours per day. This finding implies that excessive work hours may have a negative association with well-being, even when those hours are perceived as personally rewarding.

Physician career commitment is one of the most important policy issues in health care provision in the US.[5,49–51] In the early 2000s, the estimated cost of replacing a physician who left a practice was $250,000, and faculty turnover costs accounted for 5% of the annual budget in one academic health center.[50,51] Furthermore, the Council on Graduate Medical Education predicted a substantial shortfall of physicians by 2020.[52] Our study suggests that career commitment might be improved by cultivating a sense of vocational identity (e.g., a sense of calling) while promoting a work environment in which physicians experience their work as being personally rewarding.

Despite ongoing efforts to enhance professionalism and humanistic approaches among medical students,[53–55] less attention has been paid to the intrinsic motivators that sustain practicing physicians.[24,25] Perhaps few medical practitioners or policymakers recognize the significant existing relationship between intrinsic factors and career outcomes.[6,7,24,25] Alternatively, practitioners and policymakers may assume that intrinsic motivators are immutable personal factors that influence vocational development, but not vice versa.[30] Importantly, however, studies performed among medical students suggest that vocational development during the first 2 years of medical school could enhance students' sense of calling,[30] indicating that intrinsic motivators are not immutable, and changes in them might contribute to physician well-being in the long-term.[28]

This study has important limitations. First, there might be response bias as older, PCPs, and US born were more likely to respond to our survey. However, we constructed probability weight and applied survey design analysis to adjust for potential bias. Second, we did not collect data on some extrinsic factors (e.g., practice size) and other critical factors influencing both work and life satisfaction (e.g., flexibility of schedule, opportunity for upward mobility in career, personal factors related to family life). We did, however, control for some extrinsic factors such as

working in an academic medical center, recognizing that academic physicians have more variability in the proportion of their efforts devoted to clinical care. Future research should examine practice size, ownership, and composition of working hours between clinical and non-clinical services. Third, because the data is cross-sectional, results reflect associations between intrinsic factors and physician well-being, but causality cannot be determined. Furthermore, in a cross-sectional study, we cannot tell how physician well-being as an outcome would reinforce or modify the motivators of vocational development.

In conclusion, our national survey of US physicians raises important questions about how intrinsic motivators might influence physician well-being, which have ramifications for medical education and practice. Further studies should examine this dynamic process shaped by the interplay between internal and external motivating factors over the course of physicians' professional development. Understanding the effects of intrinsic motivating factors may help inform efforts to support physician well-being.

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