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Association of intrinsic and extrinsic motivating factors with physician burnout and job satisfaction: a nationwide cross-sectional survey in Taiwan

Yu-Chi Tung ,[1] Ying-Yi Chou,[1] Yu-Hsuan Chang,[2,3] Kuo-Piao Chung[1]

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[1]Institute of Health Policy and Management, College of Public Health, National Taiwan University, Taipei, Taiwan
[2]Planning Division, National Health Insurance Administration, Taipei, Taiwan
[3]Department of Gerontological Health Care, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan

Correspondence to
Professor Kuo-Piao Chung;
kpchung@ntu.edu.tw

ABSTRACT

Objective The aim of this study was to systematically and simultaneously examine the association of intrinsic and extrinsic motivating factors with physician burnout and job dissatisfaction.

Design A nationally representative survey was fielded from September to November 2017.

Setting Hospitals and clinics throughout Taiwan.

Participants A total of 6674 physicians.

Main exposure measure The main exposure measures were intrinsic motivators (sense of calling, personally rewarding hours per day and meaningful, long-term relationships with patients) and extrinsic motivators (income, work hours, autonomy, and pay-for-performance (P4P) and bundled payment initiatives).

Main outcome measures The main outcome measures were physician burnout and job dissatisfaction.

Results A total of 1152 physicians returned the surveys. More sense of calling and personally rewarding hours per day were associated with less physician burnout (OR 0.16, 95% CI 0.10 to 0.26 and OR 0.25, 95% CI 0.13 to 0.47, respectively) and job dissatisfaction (OR 0.35, 95% CI 0.21 to 0.57 and OR 0.46, 95% CI 0.26 to 0.83, respectively). Longer work hours were associated with more physician burnout (OR 2.67, 95% CI 1.54 to 4.63) and job dissatisfaction (OR 1.71, 95% CI 1.05 to 2.79). Not receiving P4P bonuses from their organisations was associated with more physician burnout (OR 1.56, 95% CI 1.02 to 2.38). Not sharing the losses from caring for patients included in the bundled payment system was associated with less physician burnout (OR 0.59, 95% CI 0.36 to 0.97).

Conclusions Fostering a healthcare work environment that supports intrinsic motivation and improves work hours may reduce physician burnout and job dissatisfaction. Rewarding physicians fairly and equitably may prevent them from feeling burned out. Value-based care delivery and payment model innovations, such as bundled payments, may encourage healthcare professionals to coordinate care through the standardisation of care to decrease burnout.

Strengths and limitations of this study

- This study used a nationwide physician survey to examine the association of intrinsic motivators (sense of calling, personally rewarding hours per day and meaningful, long-term relationships with patients) and extrinsic motivators (income, work hours, autonomy, and pay-for-performance and bundled payment initiatives) with physician burnout and job dissatisfaction.
- Case sampling weights were calculated from relevant physician characteristics in the final data set to adjust for non-response bias.
- The data were cross sectional, so the results reflect the association of intrinsic and extrinsic motivating factors with physician burnout and job satisfaction, but causality could not be determined.

INTRODUCTION

The Triple Aim of improving the health of the population, enhancing the patient experience of care and reducing the per capita cost of healthcare is widely accepted as a compass by which to optimise health system performance.[1] Nevertheless, physicians report burnout and dissatisfaction. Physician burnout is a growing concern around the world, such as in the USA and other countries in the Organisation for Economic Cooperation and Development and in Taiwan.[2 3] Based on national surveys, the burnout rate in a 2011 US national physician sample was 45.5%,[4] and that in a 2011 Japan national neurosurgeon and neurologist survey was 21.6%.[5] In Taiwan, there has been no national survey, but one study found that the physician burnout rate in 2012 in a Taiwan regional hospital was 38.6%.[6]

Recent studies have suggested that the Triple Aim be expanded to the Quadruple Aim by adding the goal of improving the work life (burnout and dissatisfaction) of physicians and other healthcare workers.[7–10] Physician burnout is associated with self-reported medical errors or suboptimal care

quality.[10] Physician job dissatisfaction is associated with less patient satisfaction.[11] Understanding the factors that affect physician burnout and job satisfaction is important for developing effective initiatives to improve physician work life. To the best of our knowledge, few studies have used a nationwide physician survey to systematically and simultaneously examine the association of intrinsic and extrinsic motivating factors with physician burnout and job dissatisfaction.

The organismic integration theory of behavioural science proposes that individuals are intrinsically motivated and integrate intrinsic and extrinsic motivating factors while they pursue well-being.[4 12 13] Intrinsic motivation refers to doing something because it is inherently interesting or enjoyable, and extrinsic motivation refers to doing something because it leads to a dividable outcome. Extrinsic motivation is further divided into four regulatory styles, called external regulation, introjection, identification and integration.[12] One previous study using subjective measures of intrinsic and extrinsic motivation found that intrinsic motivation and extrinsic motivation (integrated regulation and introjected regulation) were associated with physician burnout and job satisfaction.[14] Another prior study found that intrinsic motivators (sense of calling and personally rewarding hours per day) and extrinsic motivators (income) were associated with physician job satisfaction.[4] Prior studies that did not adjust for intrinsic motivators found that long work hours were associated with physician job dissatisfaction,[15] and that value-based payments were associated with less physician burnout.[16] However, thus far, no research has simultaneously examined the association of intrinsic motivators and extrinsic motivators (income, work hours and value-based payments) with physician burnout and job satisfaction.

Taiwan's National Health Insurance (NHI) system has been implemented since March 1995. The National Health Insurance Administration (NHIA) is the sole insurer. Each enrollee pays a premium to enjoy comprehensive benefits and a low copayment that enable them to go freely to any hospital or clinic, with lower copayments for visits with a referral. Almost all providers have contracts with the NHIA. Physicians are classified as being either hospital physicians or clinic physicians. Hospital physicians are employed by hospitals and treat both outpatients and inpatients. Clinic physicians are owners or employees of the clinics and only treat outpatients. Physician salaries that are paid by their employers include fixed and variable components to encourage physicians to strive for higher levels of performance.[17] The NHIA reimburses providers mainly on a fee-for-service basis, and partially implements value-based payments, including pay-for-performance (P4P) for several diseases and bundled payments for several inpatient medical conditions. Some clinics/hospitals treating P4P patients do not pay their individual physician bonuses from the P4P programme. Most hospitals adopt clinical pathways and gainsharing plans in response to bundled payments.[17] Regarding gainsharing plans, some hospitals require physicians to share the losses incurred in the bundled payment system. Therefore, their physicians might think their performance and efforts are not rewarded fairly and equitably, and this may cause them to feel burned out and dissatisfied based on the organismic integration theory.[12] On the other hand, if hospitals do not require physicians to share the losses, physicians might report less burnout because the clinical pathways are effective interventions for improving teamwork and increasing the organisational level of care processes, which then decreases the risk of physician burnout.[18]

This study uses data from a nationally representative survey of Taiwanese physicians to systematically investigate the association of intrinsic motivators and extrinsic motivators (income, work hours and value-based payments) with physician burnout and job dissatisfaction.

METHODS

Data source

An anonymous, self-administered questionnaire was mailed to 6674 practising physicians who were randomly sampled from the physician population (n=43 969) practising under the NHI system. To achieve a 95% confidence level and a 3% margin of error (ie, generally accepted levels for a random population study), the minimum required survey respondents were calculated to be 1042 using the standard formula: $\frac{Z^2p(1-p)N}{Z^2p(1-p)+(N-1)e^2}$, where Z is the statistical Z-score that corresponds to the confidence level, p is 0.5, N is the population size and e is margin of error.[19–22] The survey was conducted between September and November 2017.

A total of 1152 physicians returned the surveys, for a response rate of 17.3%. Based on the physician population, the results are confident to ±2.85% margin of error at the 95% confidence level. Case sampling weights were calculated from relevant physician characteristics in the final data set to adjust for non-response bias.[4 23] The respondent sample was weighted to the physician population in terms of gender, age, practice region and practice site. These variables were chosen because national data on their joint distribution in the study population were available. After the weighting, a comparison of the respondent characteristics (gender, age, practice region and practice site) with those of the study population showed no significant difference.

The survey questionnaire was used to examine the association of intrinsic and extrinsic motivators with physician burnout and job dissatisfaction, after adjusting for attitudes towards the NHI and sociodemographic characteristics. The content validity was based on results from a review of the literature,[4 15 24–34] an expert panel examination and feedback, and pilot testing.

Variables

Dependent variables

The dependent variables were physician burnout and job satisfaction. Physician burnout was assessed with a validated short form of the Maslach Burnout Inventory

(MBI), using the following two questions answered on a seven-point Likert scale[4 30 31 33]: “I feel burned out from my work” (MBI emotional exhaustion) and “I have become more callous toward people since I took this job” (MBI depersonalisation). 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 times a week, every day). Overall burnout was defined as high burnout, defined as a yes answer for one or both of the items documented by other studies in the literature.[2 4 30 31 33 35 36] Although the current standard for burnout assessment is the MBI, a well-validated instrument consisting of 22 items answered on a seven-point Likert scale, the full length of the MBI limits the feasibility of its use in large physician surveys addressing multiple content areas within space constraints.[30 31 33] Therefore, large physician surveys have used single-item burnout assessment tools.[4 31] Job satisfaction was measured with an item measuring overall satisfaction that has been used in previous studies.[4 15 25 27 34] This instrument uses a five-point Likert scale that ranges from ‘very dissatisfied’ to ‘very satisfied.’

Independent variables

The independent variables were intrinsic and extrinsic motivating factors. The intrinsic motivators included sense of calling, personally rewarding hours per day and having meaningful, long-term relationships with patients.[4] A sense of calling was measured through a single-item measure that has been used in previous studies: “For me, the practice of medicine is a calling.”[4 32] This instrument uses a five-point Likert scale that ranges from ‘strongly agree’ to ‘strongly disagree.’ Personally rewarding hours per day was estimated in response to the following prompt: “Please estimate how many hours you spend in a typical day at work on activities that you find personally rewarding.”[4] The responses were divided into <2.5, 2.5–5.0, 5.0–7.5 and ≥7.5 hours. The frequency of long-term relationships with patients was assessed with the following question: “With respect to your patients, with how many do you have a meaningful, long-term relationship?”[4] Responses included none, a few, many and most.

The extrinsic motivators included monthly income (<New Taiwan (NT)$200 000, NT$200 000–299 999, ≥NT$300 000 (NT$32=US$1)), number of work hours a week (≤40, 41–59, ≥60), professional autonomy and value-based payments. Physicians’ autonomy was measured by the perceptions of their ability to provide needed outpatient/inpatient services to their patients.[25 27] The instrument used a five-point Likert scale that ranged from strongly agree to strongly disagree. The value-based payments included P4P and bundled payments. The P4P exposure was measured as whether the respondents treated P4P patients and whether the respondents who reported that they treated P4P patients received bonuses. The exposure to bundled payments was measured as whether the respondents cared for patients included in the bundled payment system and whether the respondents who reported that they cared for patients included in the bundled payment system were required to share the losses.

Covariates

The covariates were attitudes toward the NHI and demographic characteristics. The attitudes toward the NHI included attitudes toward community value as identified regulation and personal benefit as integrated regulation. The identified regulation under NHI was measured with the following question: “The NHI is necessary for public health”; the integrated regulation was measured with the following question: “The NHI is a favorable system to me.”[29] The instrument used a five-point Likert scale that ranged from strongly agree to strongly disagree. Based on the organismic integration theory, the identified regulation and integrated regulation are subtypes of extrinsic motivation. A form of extrinsic motivation is regulation through identification. Integration occurs when identified regulations have been fully assimilated to the self. This occurs through self-examination and bringing new regulations into congruence with one’s other values and needs.[12] The demographic characteristics included gender, age, education level, practice site, specialty, years in practice and practice location.

Statistical analysis

Multivariate binary logistic regression was used to analyse the association of intrinsic motivators and extrinsic motivators with physician burnout and job dissatisfaction, after adjusting for attitudes towards the NHI and demographic characteristics. A small amount of missing data (0.2%–3.2% of each survey item) was imputed using multiple imputation methods.[4 37] For physician burnout, the responses were dichotomised by treating burnout as one group (coded 1) and non-burnout as the other group (coded 0). For job dissatisfaction, the responses were dichotomised by treating ‘very dissatisfied and dissatisfied’ as one group (coded 1) and the remaining responses as the other group (coded 0). SAS software, V.9.4 (SAS Institute), was adopted for the analysis. All statistical tests were two-tailed and used a type I error rate of 0.05.

Patient and public involvement

No patients were involved in this study. The public has not been involved in the development of the research or in the study design. The study results will be disseminated to respondents via newsletters and publications.

RESULTS

Table 1 presents the physicians’ demographics, job characteristics, burnout and job satisfaction. More than half (79.4%) of the physicians were male, 63.3% were 40 years old or above, 34.8% worked at clinics, 21.8% had an internal medicine certificate and 45.1% had at least 20 years in practice. Medical practice was perceived to be a calling by 71.3% of the physicians, and 89.8% of the

Table 1 Physician characteristics, burnout and job satisfaction (n=1152)

Variables	n	%
Demographic characteristics		
Gender		
Male	915	79.4
Female	237	20.6
Age, years		
<30	97	8.4
30–39	326	28.3
40–49	274	23.8
50–59	255	22.1
≥60	200	17.4
Practice site		
Clinic	401	34.8
District hospital	121	10.5
Regional hospital	274	23.8
Academic medical centre	356	30.9
Specialties		
Internal medicine	251	21.8
Surgery	131	11.4
Obstetrics and gynaecology	77	6.7
Paediatrics	127	11.0
Years in practice		
<10	308	26.7
10–19	325	28.2
≥20	519	45.1
Practice location		
Taipei	432	37.5
Northern	140	12.1
Central	217	18.8
Southern	147	12.8
Kao-Ping	191	16.6
Eastern	25	2.2
Attitudes towards the NHI		
The NHI is necessary for public health		
Strongly agree or agree	817	70.9
Neutral	204	17.7
Strongly disagree or disagree	131	11.4
The NHI is a favourable system to me		
Strongly agree or agree	622	54.0
Neutral	329	28.6
Strongly disagree or disagree	201	17.4
Intrinsic motivators		
Practice of medicine is a calling		
Strongly agree or agree	822	71.3
Neutral	206	17.9
Strongly disagree or disagree	124	10.8
Personally rewarding hours per day		
<2.5	117	10.2
2.5–5.0	447	38.8
5.0–7.5	394	34.2
≥7.5	194	16.8
Meaningful, long-term relationships with patients		
Most	69	6.0
Many	437	37.9
A few	512	44.5
None	134	11.6
Extrinsic motivators		
Monthly income, NT$		
<200 000	568	49.3
200 000–299 999	321	27.9
≥300 000	263	22.8
Work hours a week		
≤40	209	18.1
41–59	501	43.5
≥60	442	38.4
Am able to provide needed outpatient services		
Strongly agree or agree	999	86.7
Neutral	131	11.4
Strongly disagree or disagree	22	1.9
Am able to provide needed inpatient services		
Strongly agree or agree	609	52.9
Neutral	93	8.1
Strongly disagree or disagree	20	1.7
Not applicable	430	37.3
Under pay-for-performance		
No	841	73.0
Yes	311	27.0
Receive bonus	123	39.5
Do not receive bonus	175	56.3
Missing	13	4.2
Under bundled payments		
No	861	74.7
Yes	291	25.3
Am required to share losses	123	42.3
Am not required to share losses	168	57.7
Burnout		
Yes	330	28.6
No	822	71.4
Job dissatisfaction		
Yes	414	35.9
No	738	64.1

NT$32 equaled $1 in 2017.
NHI, National Health Insurance; NT, New Taiwan.

Table 2 Physician burnout and job dissatisfaction by physician characteristics (n=1152)

Variables	Burnout Yes %	Burnout No %	Job dissatisfaction Yes %	Job dissatisfaction No %
Demographic characteristics				
Gender				
Male	27.3	72.7	35.1	64.9
Female	29.0	71.0	36.1	63.9
Age, years				
<30	36.1	63.9***	32.7	67.3*
30–39	37.3	62.7	40.8	59.2
40–49	30.9	69.1	40.7	59.3
50–59	23.7	76.3	30.0	70.0
≥60	14.2	85.8	30.5	69.5
Practice site				
Clinic	27.4	72.6	36.5	63.5
District hospital	31.7	68.3	40.8	59.2
Regional hospital	34.1	65.9	38.5	61.5
Academic medical centre	24.7	75.3	31.6	68.4
Specialties				
Internal medicine				
No	28.7	71.3	36.9	63.1
Yes	28.5	71.5	32.5	67.5
Surgery				
No	29.9	70.1*	36.3	63.7
Yes	19.2	80.8	33.0	67.0
Obstetrics and gynaecology				
No	28.3	71.7	34.8	65.2**
Yes	33.1	66.9	51.7	48.3
Paediatrics				
No	29.6	70.4*	37.0	63.0*
Yes	20.8	79.2	27.1	72.9
Years in practice				
<10	34.1	65.9***	35.6	64.4**
10–19	36.1	63.9	42.5	57.5
≥20	20.7	79.3	32.0	68.0
Practice location				
Taipei	28.8	71.2	38.3	61.7
Northern	27.1	72.9	35.9	64.1
Central	25.2	74.8	27.7	72.3
Southern	30.9	69.1	38.6	61.4
Kao-Ping	32.0	68.0	39.0	61.0
Eastern	24.4	75.6	26.8	73.2
Attitudes towards the NHI				
The NHI is necessary for public health				
Strongly agree or agree	23.5	76.5***	26.9	73.1***
Neutral	31.5	68.5	47.9	52.1
Strongly disagree or disagree	56.2	43.8	73.6	26.4
The NHI is a favourable system to me				
Strongly agree or agree	21.3	78.7***	22.1	77.9***
Neutral	30.2	69.8	44.3	55.7
Strongly disagree or disagree	48.7	51.3	65.1	34.9
Intrinsic motivators				
Practice of medicine is a calling				
Strongly agree or agree	18.8	81.2***	29.1	70.9***
Neutral	41.6	58.4	43.4	56.6
Strongly disagree or disagree	72.0	28.0	68.6	31.4
Personally rewarding hours per day				
<2.5	55.1	44.9***	58.8	41.2***
2.5–5.0	33.6	66.4	39.6	60.4
5.0–7.5	20.7	79.3	27.7	72.3
≥7.5	17.5	82.5	30.4	69.6
Meaningful, long-term relationships with patients				
Most	29.7	70.3***	36.1	63.9
Many	23.9	76.1	34.5	65.5
A few	28.5	71.5	35.6	64.4
None	44.3	55.7	41.5	58.5
Extrinsic motivators				
Monthly income, NT$				
<200 000	31.9	68.1*	39.3	60.7*
200 000–299 999	28.5	71.5	35.7	64.3
≥300 000	21.8	78.2	28.9	71.1
Work hours a week				
≤40	17.4	82.6***	27.8	72.2*
41–59	28.7	71.3	36.8	63.2
≥60	33.9	66.1	38.8	61.2
Am able to provide needed outpatient services				
Strongly agree or agree	27.8	72.2	36.6	63.4
Neutral	33.4	66.6	29.4	70.6
Strongly disagree or disagree	39.8	60.2	44.4	55.6
Am able to provide needed inpatient services				

Continued

Table 2 Continued

Variables	Burnout		Job dissatisfaction	
	Yes	No	Yes	No
	%	%	%	%
Strongly agree or agree	27.2	72.8	34.5	65.5
Neutral	39.5	60.5	36.7	63.3
Strongly disagree or disagree	31.3	68.7	51.5	48.5
Not applicable	28.2	71.8	37.1	62.9
Under pay-for-performance				
No	28.4	71.6*	37.0	63.0
Yes, receive bonus	21.9	78.1	27.9	72.1
Yes, do not receive bonus	35.3	64.7	35.7	64.3
Yes, missing	17.0	83.0	45.9	54.1
Under bundled payments				
No	30.4	69.6	36.1	63.9
Yes, be required to share losses	24.5	75.5	40.9	59.1
Yes, be not required to share losses	22.9	77.1	31.6	68.5

NT$32 equaled $1 in 2017.
*p<0.05; **p<0.01; ***p<0.001.
NHI, National Health Insurance; NT, New Taiwan.

physicians experienced at least 2.5 personally rewarding hours a day. Eighty-eight per cent (88.4%) of the physicians had meaningful, long-term relationships with at least a few patients. Approximately half (50.7%) of the physicians earned a monthly income of at least NT$200 000, and 38.4% worked at least 60 hours a week. Twenty-seven per cent (27.0%) of the physicians indicated that they treated P4P patients. Among the physicians who treated P4P patients, 56.3% did not receive bonuses. Approximately 25.3% of the physicians indicated that they cared for patients included in the bundled payment system. Among the physicians who cared for patients included in the bundled payment system, 42.3% were required to share the losses. Twenty-nine per cent (28.6%) of the physicians reported feeling burned out. Thirty-six per cent (35.9%) of the physicians were very dissatisfied or dissatisfied with their job.

In the univariable analysis (table 2), a χ^2 analysis showed a significant association of intrinsic and extrinsic motivators with physician burnout and job satisfaction ($p<0.05$). Sense of calling, personally rewarding hours per day, long-term relationships with patients, income, work hours and P4P payments were associated with physician burnout. Sense of calling, personally rewarding hours per day, income and work hours were associated with physician job dissatisfaction.

Table 3 presents the results of multivariate binary logistic regression analyses of physician burnout and job dissatisfaction. After adjusting for attitudes towards the NHI and demographic characteristics, there were significant associations of intrinsic and extrinsic motivators with physician burnout and job dissatisfaction. The physicians with a strong sense of calling were more likely to report less burnout (OR 0.16, 95% CI 0.10 to 0.26) and job dissatisfaction (OR 0.35, 95% CI 0.21 to 0.57). Having 5–7.5 or ≥7.5 personally rewarding hours each day was strongly associated with less physician burnout (OR 0.34, 95% CI 0.20 to 0.58 and OR 0.25, 95% CI 0.13 to 0.47, respectively) and job dissatisfaction (OR 0.41, 95% CI 0.24 to 0.68 and OR 0.46, 95% CI 0.26 to 0.83, respectively).

The physicians with more than 60 work hours per week were most likely to report burnout (OR 2.67, 95% CI 1.54 to 4.63) and job dissatisfaction (OR 1.71, 95% CI 1.05 to 2.79). The physicians treating P4P patients and not receiving bonuses had 56% higher odds of burnout compared with those not treating P4P patients (OR 1.56, 95% CI 1.02 to 2.38). The physicians caring for patients included in the bundled payment system and not sharing the losses had 41% lower odds of burnout compared with those not caring for the patients (OR 0.59, 95% CI 0.36 to 0.97). The physicians with a monthly income of less than NT$200 000 were more likely to report job dissatisfaction (OR 1.72, 95% CI 1.14 to 2.61).

DISCUSSION

This national survey of physicians investigated the association of intrinsic and extrinsic motivators with physician burnout and job dissatisfaction. We found an association of intrinsic motivators (more sense of calling and personally rewarding hours per day) and extrinsic motivators (more normal work hours) with less physician burnout and job dissatisfaction. P4P and bundled payments were associated with physician burnout. Not receiving P4P bonuses from their organisations was associated with more physician burnout. Not sharing the losses from caring for patients included in the bundled payment system was associated with less physician burnout. Physicians with lower income levels were more likely to report job dissatisfaction.

The finding of the association of intrinsic motivators (more sense of calling and personally rewarding hours per day) with less physician burnout and job dissatisfaction was consistent with the results of Moller *et al*[14] and Tak *et al*.[4] Our study confirms the organismic integration theory. Intrinsic motivation is an important construct to reflect the natural human propensity to learn and assimilate, and to allow the satisfaction of the basic human need for autonomy, competence and relatedness as a human is exposed to new ideas and performs new skills.[12] Therefore, physicians who view the practice of medicine as a calling to help patients in need are less likely to feel burned out and dissatisfied with their work. In addition, a work environment that does not adequately support

Table 3 Factors associated with physician burnout and job dissatisfaction (n=1152)

	Burnout	Job dissatisfaction
	OR (95% CI)	OR (95% CI)
Intrinsic motivators		
Practice of medicine is a calling (ref: disagree)		
Agree	0.16 (0.10 to 0.26)***	0.35 (0.21 to 0.57)***
Neutral	0.39 (0.23 to 0.68)***	0.52 (0.30 to 0.90)*
Personally rewarding hours per day (ref: <2.5)		
2.5–5.0	0.59 (0.36 to 0.99)*	0.67 (0.41 to 1.10)
5.0–7.5	0.34 (0.20 to 0.58)***	0.41 (0.24 to 0.68)***
≥7.5	0.25 (0.13 to 0.47)***	0.46 (0.26 to 0.83)*
Meaningful, long-term relationships with patients (ref: most)		
Many	0.62 (0.32 to 1.22)	1.01 (0.54 to 1.89)
A few	0.55 (0.28 to 1.08)	0.87 (0.46 to 1.62)
None	0.79 (0.37 to 1.71)	0.80 (0.38 to 1.68)
Extrinsic motivators		
Monthly income, NT$ (ref: ≥300 000)		
<200 000	1.21 (0.77 to 1.91)	1.72 (1.14 to 2.61)*
200 000–299 999	1.20 (0.76 to 1.88)	1.43 (0.95 to 2.17)
Work hours a week (ref: ≤40)		
41–59	2.12 (1.30 to 3.47)**	1.57 (1.02 to 2.40)*
60+	2.67 (1.54 to 4.63)***	1.71 (1.05 to 2.79)*
Am able to provide needed outpatient services (ref: disagree)		
Agree	0.89 (0.29 to 2.71)	1.22 (0.40 to 3.76)
Neutral	0.74 (0.23 to 2.39)	0.54 (0.16 to 1.75)
Am able to provide needed inpatient services (ref: disagree)		
Agree	1.18 (0.34 to 4.15)	0.36 (0.13 to 1.02)
Neutral	1.15 (0.31 to 4.35)	0.42 (0.13 to 1.32)
Not applicable	2.08 (0.46 to 9.35)	0.55 (0.15 to 2.01)
Pay-for-performance (ref: no)		
Yes, receive bonus	1.00 (0.58 to 1.71)	0.85 (0.52 to 1.39)
Yes, do not receive bonus	1.56 (1.02 to 2.38)*	0.98 (0.65 to 1.48)
Yes, missing	0.76 (0.12 to 4.92)	1.96 (0.52 to 7.43)
Bundled payments (ref: no)		
Yes, be required to share losses	0.59 (0.33 to 1.05)	0.96 (0.58 to 1.61)
Yes, be not required to share losses	0.59 (0.36 to 0.97)*	0.78 (0.49 to 1.23)
Attitudes towards the NHI		
The NHI is necessary for public health (ref: disagree)		
Agree	0.53 (0.31 to 0.91)*	0.29 (0.17 to 0.50)***
Neutral	0.42 (0.23 to 0.76)**	0.41 (0.23 to 0.74)**
The NHI is a favourable system to me (ref: disagree)		
Agree	0.60 (0.37 to 0.97)*	0.29 (0.19 to 0.46)***
Neutral	0.72 (0.45 to 1.15)	0.61 (0.39 to 0.95)*
Likelihood ratio test for model: x^2	290.11***	283.69 ***
C index	0.80	0.78
Hosmer and Lemeshow test: x^2	7.61	10.89

Regressions adjusted for physician gender, age, practice site, specialties, years in practice and practice location. NT$32 equaled $1 in 2017.
*p<0.05; **p<0.01; ***p<0.001.
NHI, National Health Insurance; NT, New Taiwan.

physicians' professional values might lead to physician burnout and job dissatisfaction when the physicians spend more time doing non-professional work such as medical documentation and insurance paperwork.[14] The finding of the association between low-income levels and physician job dissatisfaction is consistent with those of previous studies.[4 27 38 39] Moreover, and more importantly, we found that income was not associated with physician burnout. The organismic integration theory is, compared with the motivation-hygiene theory, also known as Herzberg's two-factor theory or Herzberg's dual-factor theory.[40] Intrinsic motivators are similar to motivating factors, while extrinsic motivators are similar to hygiene factors. Motivating factors can increase job satisfaction. Poor hygiene factors such as low income can lead to job dissatisfaction, while better hygiene factors cannot lead to higher job satisfaction.

The finding of the association between longer work hours and physician job dissatisfaction is consistent with the results of Landon *et al*[27] and Christopher *et al*[41] using nationally representative physician samples, and those of Leigh *et al*[15] using a nationally representative specialist sample. Moreover, and most importantly, the finding of the association between longer work hours and physician burnout is consistent with the result of Keeton *et al*[42] using a nationally representative sample of five specialists. Physicians with more than 60 work hours a week were most likely to report burnout and job dissatisfaction.[15 27] Physicians with longer work hours feel burned out through their perceived overload.[43]

This study found that the physicians who did not receive P4P bonuses from their organisations were more likely to feel burned out compared with those not treating P4P patients. This finding is consistent with those of Smets *et al*.[44] One possible explanation is that the physicians think their performance is not rewarded properly, and this may cause them to feel burned out based on the organismic integration theory.[12] Moreover, the perceived inequity in their relationship with the organisation can also contribute to burnout. In return for their investments, physicians may expect reasonable financial compensation from their organisations. If these rewards are not provided, physicians may develop a negative attitude towards their organisations, ultimately leading to burnout.[44 45] The physicians who treat P4P patients make an effort to help them receive continuity of care; thus, the physicians expect that they will receive adequate rewards from their organisations.

This study found that the physicians who were not required to share the losses under bundled payments by their organisations were more likely to not feel burned out compared with those not treating bundled payment patients. The finding is similar to those of Reid *et al*[16] regarding patient-centred medical homes. Patient-centred medical homes embrace a health professional team orientation grounded in evidence-based medicine and quality improvement, therefore leading to less burnout.[16] The implementation of bundled payments encourages hospitals and physicians to use evidenced-based clinical pathways.[17 46] Prior research found that the adoption of clinical pathways decreased burnout[18] because the primary focus of clinical pathways lies in redesigning work processes, reducing unnecessary variation and improving task-oriented coordination through the standardisation of care.[47 48] Therefore, clinical pathways seem to be most effective for improving team-level taskwork and creating essential job resources that buffer the impact of increasing job demands in the current healthcare environment.[18]

There are two limitations of the present study. First, because the data are cross sectional, the results reflect the association of intrinsic and extrinsic motivating factors with physician burnout and job satisfaction, but causality could not be determined. The cross-sectional nature of this study requires future confirmation to better establish causality and to test strategies to reduce physician burnout and job dissatisfaction. Second, in alignment with the response rates of other national physician surveys (17.0%–23.2%),[23 49 50] the response rate in this study was only 17.3%. However, non-response bias is less of a concern in surveys of physicians than it is in general population surveys, perhaps because physicians as a group are more homogeneous than are the general public in terms of demographics, knowledge and attitudinal characteristics.[51 52] Another factor contributing to the stability of the estimates may be the effectiveness of the non-response adjustment weightings for the sample of physician respondents.[53] We constructed probability weights to adjust for potential bias.[23 50 53]

Our national physician survey showed the association of intrinsic and extrinsic motivators with physician burnout and job satisfaction. Better intrinsic motivators (sense of calling and personally rewarding hours per day) are associated with not only decreased physician job dissatisfaction but also decreased burnout. Longer work hours are associated with physician burnout and job dissatisfaction. Not receiving P4P bonuses from their organisations is associated with more burnout. Not being required to share the losses under bundled payments is associated with less burnout. Fostering a healthcare work environment that supports intrinsic motivation and improves work hours may reduce physician burnout and job dissatisfaction, and benefit their patients. Additionally, healthcare delivery organisations that improve workflow processes and enhance the direct engagement with patients may contribute to less physician burnout and job dissatisfaction. Rewarding physicians fairly and equitably may prevent them from feeling burned out. Value-based care delivery and payment model innovations, such as bundled payments, may encourage healthcare professionals to coordinate care through the standardisation of care to decrease burnout.

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and K-PC were responsible for the critical revision of the manuscript for important intellectual content. Y-CT and Y-YC were responsible for the statistical analysis. Y-CT was responsible for obtained funding. Y-CT and K-PC were responsible for the administrative, technical and material support. K-PC carried out the study supervision. All the authors read and approved the final manuscript.

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ORCID iD

Yu-Chi Tung http://orcid.org/0000-0001-9031-8749

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