

# Effort-reward imbalance and depression among private practice physicians

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## Abstract

**Purpose** Current private practice physicians provide medical services in a harsh economic situation. The effort-reward imbalance (ERI) model puts its emphasis on an imbalance between high efforts spent and low rewards received in occupational life. ERI model includes three different reward factors from task to organizational levels. We examined whether ERI in terms of low organizational reward (poor prospective and job insecurity) could be the most relevant and strongly associated with depression among private practice physicians.

**Methods** This is a cross-sectional questionnaire study of 1,103 private practice physicians who were currently working in clinical settings and completed the data of exposure and outcome. The study questionnaire was mailed to all the physicians listed as members of a local branch of the Japan Medical Association ( $n = 3,441$ ) between November and December 2008. Outcomes were prevalence of depression as measured by the Center for Epidemiologic Studies Depression Scale and adjusted odds ratios (OR) of depression with respect to ERI.

**Results** Fifty-seven percent of physicians were exposed to ERI, and 18% of the physicians were depressed. Logistic regression analyses revealed that ERI was significantly associated with depression (OR and 95% confidence interval = 3.57; 2.43–5.26). ERI with regard to organizational reward was most prevalent (60%) and had the strongest association with depression (5.14; 3.36–7.92).

**Conclusion** Predominant prevalence of ERI in terms of organizational level low reward and strong associations between the ERI component and depression suggests that countermeasures from social perspective are crucial.

**Keywords** Depression · Effort-reward imbalance · Job insecurity · Physician

## Introduction

The effort-reward imbalance (ERI) model claims that stress results from a mismatch between high efforts individuals expend and the low rewards they receive at work define a stress-provoking component of the workplace. Recurrent ERI at work elicits strong negative emotions and stressful responses within the individual with adverse long-term effects on health (Siegrist et al. 2004). ERI model includes three different reward factors from task to organizational levels and can assess the impact of respective reward factors on health outcome. The three reward factors are as follows: reward on monetary (remuneration), esteem-related (respect and approval), and organizational (job security and promotion prospects) levels.

To date, studies on occupational stress have fairly been restricted to employed persons. However, self-employed or administrators who are involved in management are exposed to severe market competition and economic fluctuations. Current Japanese private practice physicians provide medical services in such a situation. For the purposes of eliminating shortage of doctors, Japanese private practice physicians used to benefit from tax incentives, and medical profession was generally very successful business. A typical career path of Japanese physicians is that they started to work as a

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hospital doctor (salaried employee) and then hold their own clinic or inherit clinic up to the ages of 40–50 to continue practicing medicine (Maeda 2009). However, as criticism of preferential policies to physicians became stronger in the 1980s, there were numerous revisions of the remuneration for medical services and the tax code. In a study of 1984 physicians who got into practice (Maeda 2009), 40% reported increased load from overtime work and over half of them reported increased psychological stress comparing with the working situations when they worked as hospital doctors. Sixty percent of physicians who run clinic reported getting difficult to keep going, and 30% suffered from deteriorated financing than previous year. Accordingly, two-thirds physicians were worried whether they could continue to run clinics, and over 80% felt uneasy about lack of compensation for their absence from work. Recently, the harsh working conditions of hospital doctors have drawn public attention (Wada et al. 2010), and medical service fees have been revised favorably for them but private practice physicians were left behind (Anonymous 2010). Considering the current secular trend, ERI assumes a relevant stressor of private practice physicians, in particular, in terms of low rewards on organizational level.

Compared with the general working population, depression is more prevalent among physicians (Aasland et al. 1997; Bazargan et al. 2009; Caplan 1994; Costa et al. 2005; Hardy et al. 1997; Ramirez et al. 1996; Schwenk et al. 2008; Wall et al. 1997). Because a consequence of this disorder of physicians can become the impairment of patient care, a high prevalence of depression evolves a social issue (Center et al. 2003; Fahrenkopf et al. 2008; Firth-Cozens 1993; Magnavita 2006, 2007). Occupational stress has also been reported to be higher among physicians than in other occupations (Arnetz 2001; Caplan et al. 1975; Cheng et al. 2000; Sundquist and Johansson 2000; Weinberg and Creed 2000; Wall et al. 1997) and lead to higher risk of psychiatric morbidities (Miller and McGowen 2000; Hem et al. 2005) as well as medical errors or loss of work productivity (Jones et al. 1988; Firth-Cozens 2001)—all of which have implications for patient care. However, a scarcity of studies has addressed the associations between adverse psychosocial working conditions and depression among private practice physicians using established occupational stress scales (Buddeberg-Fischer et al. 2008; Firth-Cozens 1998; Li et al. 2006). These types of studies can provide insight into preventive measures to address depression in this profession.

The aim of this study was to estimate the prevalence of ERI and possible impact of ERI on depression and to determine which reward component associated with depression most among private practice physicians.

## Methods

### Participant and study procedures

Potential study participants were private practice physicians listed as members of a local branch of the Japan Medical Association (Fukuoka Prefecture Medical Association) in April 2008 ( $n = 3,441$ , women = 6%, mean age = 59 years). An anonymous self-administered questionnaire was mailed to all the members. The first mailing of questionnaires was sent on November 21, 2008. A second mailing to nonrespondents was sent on December 5, 2008. The mailings included (1) a cover letter from the principal investigator explaining the purpose and significance of the study, (2) the questionnaire, (3) a self-addressed, stamped envelope to return the questionnaire, and (4) a separate postcard confirming that the respondents returned the questionnaires. Postcards were used to track respondents in preparation for the second mailing. A booklet on stress management was distributed to all respondents who filled out and returned the questionnaires.

### Instruments

A self-administered questionnaire was developed and tested by the board members of the Fukuoka Prefecture Medical Association. Survey items included demographic information (gender, age, specialty, and regional subbranch to which members belonged), respondents' present position, number of years in that position, hours worked/week at their job site, and sleeping hours/day.

Data on ERI were collected using the recently developed short version of the ERI questionnaire (Siegrist et al. 2009). The Effort scale measures relevant features of a demanding daily work environment (e.g., working overtime or time pressure; 3 items). The Reward scale consists of 7 items related to financial, esteem-related, and organizational rewards (see "Appendix" for the scale). Respondents were asked to respond to the statements on a 4-point Likert scale (strongly disagree, disagree, agree, strongly agree; sum score 3–12 for Effort and 7–28 for Reward, with higher scores indicating more effort and reward, respectively). A few items of the scale were modified for private practice physicians. The original questionnaire has been globally developed through back-translation procedures, and the basic psychometric properties have been confirmed (Siegrist et al. 2004). Based on these scales, a theoretically relevant summary measure was constructed: a ratio of the scales "Effort" and "Rewards", weighted for number of items where a value  $>1.0$  indicated the critical "high cost/low gain" condition. To examine whether which reward dimension had strongest association with depression, three subindices were constructed using each reward scale. In our

study, Cronbach's alpha coefficients were 0.78 and 0.79 for the Effort and Reward scales, respectively.

The original ERI questionnaire includes a third unidimensional scale containing six items to assess a personal component of the ERI model, overcommitment. It is assumed that employees characterized by a motivational pattern of excessive job-related commitment and a high need for approval (i.e., overcommitment) will respond with more strain reactions to an ERI, in comparison with less overcommitted people, and overcommitment has been associated with depression in several studies as well (Tsutsumi and Kawakami 2004). In this paper, however, we decided to focus on the situation-specific components "Efforts" and "Rewards" that are most relevant for structural measurements to provide a clue of countermeasures from a social perspective rather than personal perspective.

The newly developed short version of the ERI questionnaire has been validated in terms of criterion validity (prospectively associated with an increased risk of poor general self-rated health and depressive symptoms) and psychometric properties (internal consistency of scales, confirmatory factor analysis with a good model fit of the data with the theoretical structure) (Leineweber et al. 2010).

Depressive symptomatology was measured by the Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff 1977). The CES-D consists of 20 items with a four-point rating scale ranging from 0 (never or few) to 3 (usually), with scoring reversed for four specific items. The symptoms score is the sum of the 20 items. The statistical properties of this widely used self-report measure have been described elsewhere (Radloff 1977). Based on a recent validity study of the CES-D among Japanese workers, Wada et al. (2007) confirmed the high validity of the CES-D for major depressive disorder diagnosed by the Mini International Neuropsychiatric Interview in a cohort of workers ( $n = 2,219$ ). The validity was evaluated by a receiver operating characteristic (ROC) curve, and the area under the ROC curve of the CES-D was 0.96 [95% Confidence Interval (CI): 0.94–0.99]. The optimal cut-off score of major depressive disorder was 19 for screening. The cut-off score of 19 (Sensitivity = 92.7%, Specificity = 91.8%, positive predictive value = 17.6%, negative predictive value = 99.9%) exhibited the highest sum of sensitivity and specificity. Although the validity of the CES-D has not been directly examined among physicians, the cut-off point of the CES-D confirmed among apparently healthy workers could be applicable to physicians who were currently working in clinical settings. In our study, Cronbach's alpha coefficient was 0.86.

Other than the above scales, we asked about respondents' views on their working conditions and the need for improvements.

## Statistical analysis

Descriptive statistics are presented for each variable. Associations between the studied variables and depression were tested using a *chi-square* test. Subsequently, logistic regression analysis was conducted in two steps, firstly, by entering each variable separately and secondly, by including all the variables simultaneously, adjusted for each other to examine the independent effect of adverse psychosocial working conditions (ERI) on depression. Variables included in the *chi-square* tests and the logistic models were age ( $\leq 50$ , 51–60,  $\geq 61$ ), gender, practice style (numbers of physicians, beds, and staff), number of patients/day, and adverse working conditions—long working hours ( $< 60$ ,  $\geq 60$  h/week), short sleeping hours ( $< 5$ ,  $\geq 5$  h/day), and ERI. As career and career as private practice were highly correlated with age ( $r > 0.85$ ,  $P < 0.001$  for both), they were excluded from the final multiple regression model to avoid collinearity. Specialty was also excluded because of the duplication. To examine the different associations of three reward dimensions with depression, the same logistic model was constructed using each ERI index. Ordinal or discrete variables including a small amount of missing data were represented by dummy variables. All associations were inferred with alpha level of 0.05. Statistical analyses were performed using IBM SPSS Statistics version 19.

Informed consent was obtained from the respondents by including in the questionnaire a question regarding agreement to participate in the study. This study was approved by the Ethics Committee for Medical Care and Research, University of Occupational and Environmental Health, Japan.

## Results

Of the 3,441 surveys mailed, five were returned as undeliverable, resulting in a potential maximal response of 3,436. A total of 1,317 physicians responded to the survey, for a response rate of 38%. Of those, we analyzed the data of 1,103 private practice physicians who completed the CES-D and ERI questionnaires and were currently working in clinical settings, after excluding those working as administrators and not in clinical practice, those not working because of ill-health, those working at companies or related institutions as occupational health physicians, those working at nursing homes (for elderly or handicapped children), those at site management organizations or contract research organizations, or part-timers. A description of the sample is shown in Table 1. We found no significant differences in the mean age, gender proportions, and specialties of members in the regional subbranches in our study population compared with the total population of the branch.

**Table 1** Profile of the study population

	Mean	SD	n	%
Age, years ( <i>n</i> = 1,102)	58	11		
Career, years ( <i>n</i> = 1,099)	31	11		
Career as private practice, years ( <i>n</i> = 1,099)	18	12		
Gender				
Men			1,023	92.7
Women			80	7.3
Specialty*				
Internist			469	42.5
Surgeon			152	13.8
Pediatrician			143	13.0
Orthopedist			137	12.4
Dermatologist			91	8.3
Ophthalmologist			81	7.3
Obstetrician			69	6.3
Otolaryngologist			55	5.0
Psychiatrist			34	3.1
Urologist			29	2.6
Anesthetist			15	1.4
Radiologist			14	1.3
Pathologist			2	0.2
Others			84	7.6
Number of physicians				
1			905	82.0
≥2			198	18.0
Number of staff				
0–5			750	68.0
6–10			208	18.9
>10			120	10.9
Missing			25	2.3
Number of beds				
0			799	72.4
≥1			214	19.4
Missing			90	8.2
Number of patients/day				
≤29			263	23.8
30–49			267	24.2
≥50			563	51.0
Missing			10	0.9
Working hours, hours/week ( <i>n</i> = 1,096)	51	14		
Sleep hours, hours/day ( <i>n</i> = 1,096)	6	1		
Effort score	8.4	1.9		
Reward score	17.9	3.2		
Esteem-related reward score	5.4	0.9		
Organizational reward score	10.0	2.3		
Financial reward score	2.5	0.7		
Effort-reward imbalance (Effort-reward ratio > 1)			630	57.1

**Table 1** continued

	Mean	SD	n	%
Effort-reward imbalance with esteem-related reward			566	51.3
Effort-reward imbalance with organizational reward			656	59.5
Effort-reward imbalance with financial reward			494	44.8
Depression (CES-D > 19)			198	18.0

\* Total does not equal 100% due to duplication

In the present sample, 57% of physicians were exposed to ERI, and 18% of physicians were above the threshold of depression on the CES-D. They worked an average of 51 h/week (SD = 14). Fourteen percent reported working more than 60 h/week. They slept an average of 6 h/day (SD = 1), and 12% of physicians reported sleeping <5 h/day.

Younger physicians (≤50 years old) had tendency to be more likely depressive than those aged over 50, and the association was not statistically significant. Prevalence of depression among male physicians was marginally significantly higher than that of female physicians. Physicians who had bed in their clinics had significantly higher prevalence of depression than those ran clinic without beds. The more patients they see, the less depressive they are (*P* trend = 0.023). Long working hours, short sleeping hours, and ERI were strongly associated with depression (Table 2).

In Table 3, we display the unadjusted and fully adjusted odds ratios. The unadjusted models yielded significantly elevated risks among physicians who ran clinic with inpatient facility. Physicians who saw 50 or more patients/day had significantly lower risk than those saw <30 patients/day. Physicians who reported long working hours and short sleeping hours had 1.7 and 1.9 times higher risk of depression than their respective counterparts. The corresponding relative risk (odds ratio; OR) with ERI was 3.7. In the fully adjusted logistic regression model, significantly lower risks were observed among women than men and among physicians who saw 50 or more patients/day than those saw <30 patients/day. With regard to adverse working conditions, associations of depression with long working hours and short sleeping hours were no longer statistically significant. The association between ERI and depression slightly attenuated but still strong and statistically significant (Table 3). The Hosmer–Lemeshow *chi-square* test for the final warranty model yielded a *p* value of 0.740 (*Chi-square* 5.86, *df* 8) suggesting a model with good predictive value.

The prevalence of ERI with regard to respective reward subscales was 51.3% for monetary reward, 44.8% for

**Table 2** Associations between studied variables and depression: result of *chi-square* tests

Variables	CES-D ≤ 19		CES-D > 19		P value
	n	%	n	%	
Age (years)					
≤50	241	79.8	61	20.2	0.493
51–60	360	82.8	75	17.2	
≥61	303	83.0	62	17.0	
Gender					
Men	833	81.4	190	18.6	0.054
Women	72	90.0	8	10.0	
Number of physicians					
≥2	164	82.8	34	17.2	0.752
1	741	81.9	164	18.1	
Number of staff					
0–5	618	82.4	132	17.6	0.219
6–10	175	84.1	33	15.9	
>10	92	76.7	28	23.3	
Number of beds					
0	669	83.7	130	16.3	0.016
≥1	164	76.6	50	23.4	
Number of patients/day					
≤29	206	78.3	57	21.7	0.071
30–49	215	80.5	52	19.5	
≥50	476	84.5	87	15.5	
Working hours (h/w)					
<60	782	83.4	156	16.6	0.005
≥60	156	74.1	41	25.9	
Sleep hours (h/d)					
≥5	805	83.2	162	16.8	0.006
<5	97	73.5	35	26.5	
Effort-reward					
Balance	434	91.8	39	8.2	<0.001
Imbalance	471	74.8	159	25.2	

esteem-related reward, and 59.5% for organizational reward. Logistic regression analyses revealed that the component most strongly associated with depressive symptomatology was ERI with organizational reward, following by ERI with esteem-related reward and ERI with monetary reward (ORs and 95% CIs were 5.14; 3.36–7.92, 2.81; 2.00–3.95, and 2.40; 1.70–3.39, respectively).

Most respondents complained about being underpaid. Other stressful items reported were amount of paperwork/bureaucracy required, lack of personal time, and never being free mentally and/or physically from work. They also voiced their discontent with lack of appreciation for their hard work, in particular, compared with hospital doctors whose harsh working conditions have drawn Japanese public attention. Respondents' views on the remedies were

**Table 3** Associations between studied variables and depression: results of a multiple logistic regression analysis

Variables	Odds ratio (95% confidence interval)	Adjusted odds ratio (95% confidence interval)*
Age (years)		
≤50 (reference)	1.00	1.00
51–60	0.82 (0.57, 1.20)	0.71 (0.48, 1.06)
≥61	0.81 (0.55, 1.20)	0.73 (0.48, 1.13)
Gender		
Men (reference)	1.00	1.00
Women	0.49 (0.23, 1.03)	0.44 (0.20, 0.95)
Number of physicians		
≥2 (reference)	1.00	1.00
Single practice	1.07 (0.71, 1.60)	1.06 (0.68, 1.64)
Number of beds		
0 (reference)	1.00	1.00
≥1	1.57 (1.09, 2.27)	1.50 (0.93, 2.40)
Number of staff		
0–5 (reference)	1.00	1.00
6–10	0.88 (0.58, 1.34)	0.81 (0.51, 1.31)
>10	1.43 (0.90, 2.26)	0.94 (0.52, 1.70)
Number of patients/day		
≤29 (reference)	1.00	1.00
30–49	0.87 (0.57, 1.33)	0.83 (0.53, 1.29)
≥50	0.66 (0.46, 0.96)	0.59 (0.39, 0.89)
Working hours (h/w)		
<60 (reference)	1.00	1.00
≥60	1.76 (1.18, 2.61)	1.24 (0.81, 1.92)
Sleep hours (h/d)		
≥5 (reference)	1.00	1.00
<5	1.79 (1.18, 2.73)	1.41 (0.90, 2.22)
Effort-reward		
Balance (reference)	1.00	1.00
Imbalance	3.76 (2.59, 5.46)	3.57 (2.43, 5.26)

\* In the fully adjusted logistic regression model, age, gender, numbers of physicians, number of beds, number of staff, number of patients/day, long working hours, short sleeping hours, and ERI were adjusted for each other

summarized in political measures to raise remuneration for medical services.

## Discussion

We found extremely high prevalence of ERI among currently active private practice physicians and that physicians exposed to ERI were 3.6 times more likely to suffer from depression independently of potential confounding factors. High prevalence of ERI would reflect the harsh administrative situation against primary practice physicians.

The prevalence of ERI in this sample was 57%. This figure was significantly higher than the Japanese standard (Tsutsumi et al. 2002) and available data on medical doctors (Buddeberg-Fischer et al. 2010; Magnavita et al. 2008). Based on the measurement by the short version of ERI questionnaire, high ERI prevalence around 40 percent has been observed in several Japanese settings (unpublished data), and we are now undergoing validation studies. Still, observed prevalence in this study was high. As noticed in the respondents' views on their working conditions, many respondents complained about being underpaid. They also voiced their discontent with lack of appreciation for their hard work, in particular, compared with hospital doctors whose harsh working conditions have drawn Japanese public attention. Such social conditions could reflect the high prevalence of ERI among the study population. Some modification for the specific study population might have improved the sensitivity of the scale, too.

As expected, ERI in terms of low organizational reward was most relevant and most strongly associated with depression among private practice physicians. Like other self-employed, private practice physicians have to run their clinic depending on nobody. In a sense, they would suffer from much more "stress" from low organizational reward than hospital doctors. Prevalence of ERI with regard to low monetary reward was over 50%. A national policy to cap medical costs restricts the physicians' monetary gratitude no matter how hard physicians work. But the strength of association with depression was next to that of ERI with regard to low esteem reward, suggesting a relative importance that physicians hold in their working life.

Eighteen percent of the physicians were depressed based on CES-D criteria. The figure was almost doubled as that of 2,219 Japanese workers at a manufacturing company evaluated by the same instrument (Wada et al. 2007) and those of randomly selected 3,862 Japanese hospital doctors evaluated by the Quick Inventory of Depressive Symptomatology (Wada et al. 2010). The prevalence of depression in our sample is higher than previous reports from similar settings. Seven percent of licensed physicians practicing in California were clinically depressed (Bazargan et al. 2009). Twelve percent of family medicine faculty scored mildly to severely depressed according to Beck Depression Inventory II criteria (Costa et al. 2005), and 11% of general practitioners were moderately to severely depressed according to the Patient Health Questionnaire depression module criteria (Schwenk et al. 2008). Other than the different instruments used, higher prevalence of depression in our sample may be explained by above-mentioned harsh current working conditions.

It is recommended that both organizational and behavioral aspects are to be addressed in order to reduce the risk of psychosocial job characteristics (Tsutsumi and Kawakami 2004); however, with respect to these physicians' conditions, solution should be considered from the social perspective. Ground design by which physicians can look though future prospective may be necessary. The most common recommendation for improving stressful situations and patient benefit in medical facilities is to acquire more staff to handle the workload (Sexton et al. 2000; Tarnow-Mordi et al. 2000). A measure to ensure a sufficient physician workforce may include establishing monetary incentive to increase the number of those who specialize primary care and/or creating a reasonable coordinated system between clinics and hospitals based on the definite task sharing (The Japan Medical Association 2006). As for the effort aspects, too, there are several working conditions that can be addressed by structural or policy changes. The amount of paperwork/bureaucracy is an example. Recently, assignment of medical clerks has been allowed in the Japanese national health coverage system to lighten the workload of hospital doctors. Such a measure should be considered for private practice physicians in addition to simplifying the medical insurance system and/or reducing the required paperwork. Some practical ways of reducing mental stress among medical practitioners may include subcontracting someone for reviewing invoices for reimbursement of medical fees, establishing reliable system for dictating medical documents, activating cooperative local network of physicians based on clinical specialties, promoting group practice for pediatrics and obstetrics, leveling of load for voluntary social activities, and facilitating task sharing with comedicals (Ministry of Health Labour and Welfare et al. 2005; Tsuruta 2007).

Because of duplication of the category of specialties, we decided not to adjust for the variable. However, we conducted subanalyses to see whether prevalence of ERI and depression and their relations differ between specialties. First, we selected obstetricians, pediatricians, surgeons, and internists of whom working conditions have been reported severe in Japanese society (Wada et al. 2008). Prevalence of ERI and depression was higher, and associations between ERI and depression were stronger among these specialties than those in the total sample. A subanalysis with these specialties ( $n = 691$ ) revealed that prevalence of ERI and depression was 59 and 20%, respectively, and a more than fourfold increase in the risk of depressive symptomatology was found among these physicians with ERI compared with counterpart physicians (OR and 95% CI = 4.37; 2.60–7.35).

The figures among other physicians ( $n = 412$ ) were slightly lower but still significant. Prevalence of ERI and depression was 54 and 18%, and the OR for depression associated with ERI was 2.91 (95% CI: 1.59–5.35) compared with physicians without ERI.

We make some comments on the variables, which were associated depression other than ERI. Men were more depressed than women in our sample of private practice physicians (18.6 and 10.0%, respectively). Although the instruments were different, prevalence of depression of our female sample was almost the same as that of women hospital doctors observed in a study, which was conducted in the Japan Medical Association members at the same time (Wada et al. 2010), whereas the prevalence of our male sample had more than 10% higher than that of the counterpart male hospital doctors. This comparison elucidates the extremely high prevalence of depression among male private practice physicians. Organizational and financial burdens may weigh male private practice physicians who are responsible for lives of the employees and family as an employer as well as a breadwinner. Actually, male physicians employed more staffs than women (6 staffs vs. 4 staffs, respectively) in our sample. Another explanation may be related to gender difference in the specialties. Compared with women (45%), more male physicians (64%) were engaged in the above four specialties with severe working conditions. On the contrary, physicians who saw 50 or more patients/day had lower risk of depression than those saw <30 patients/day. Increased number of patients may be demanding. However, the more patients physicians see, the higher income they can earn in the Japanese health care system, which would lead to high job satisfaction (Landon et al. 2003) and prevent them from being depressed.

#### Strength and limitations

There is very limited literature on the effect of occupational stress on employer (self-employed) or administrator to date. Our study is one of the few studies, which shed light on the harsh psychosocial working condition of private practice physicians. The study sample is the largest group of Japanese private practice physicians in research of this kind. In addition, we employed, established, and validated questionnaires for the measurement of occupational stressors and outcome. However, the cross-sectional design makes it difficult to ascertain causality, and the validity of these data is limited by the survey's relatively low response rate, though it was in line with other studies of physicians (Bazargan et al.

2009; Frank and Segura 2009). The demographic profiles of respondents were not systematically different from those of the target population, but two contradictory selection biases are possible. First, it is a possibility that busy physicians did not respond; therefore, the findings were underestimated. Second, physicians who felt overworked may have responded more often than their counterparts, and the findings were overestimated. The reported working hours (a relatively objective measure) were comparable to those in previous studies. Furthermore, medical staffs appear to deny the effect of stress and fatigue on performance (Sexton et al. 2000). Thus, it is unlikely that observed findings overemphasized the adversity of physicians' current working conditions. However, we should bear in mind that we cannot rule out the possibility that depressed people exhibit a higher probability of reporting negative experience in general, including work conditions. Such a tendency of negative affectivity was shown to inflate statistical associations of stressor-strain relationships (Burke et al. 1993), although its impact should not be overstated (Jex and Spector 1996; Stansfeld et al. 1999).

#### Conclusions

The present study illustrated a picture that private practice physicians struggle to support community and family medicine without appropriate resources. The current adverse working conditions in terms of effort-reward imbalance, in particular from low organizational reward, may be associated with depression in private practice physicians. Because depression can lead to a potential threat to patient care, improving the situation is essential. Appraising physicians' workloads properly and raising medical treatment coverage are relevant measures to be taken.

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**Conflict of interest** The authors declare that they have no conflict of interest.

#### Appendix

See Table 4.

**Table 4** The short version of effort-reward imbalance questionnaire

## Effort scale

- I have constant time pressure due to a heavy work load
- I have many interruptions and disturbances while performing my job
- Over the past few years, my job has become more and more demanding

## Reward scale

- I receive the respect I deserve from my superior (incl. seniors of the medical association) or a respective relevant person<sup>#</sup>
- My job promotion (incl. financing improvement) prospects are poor<sup>†</sup>
- I have experienced or I expect to experience an undesirable change in my work situation (incl. management)<sup>†</sup>
- My job security is poor (ex. I might have to close my clinic)<sup>†</sup>
- Considering all my efforts and achievements, I receive the respect and prestige I deserve at work<sup>#</sup>
- Considering all my efforts and achievements, my job promotion prospects are adequate<sup>†</sup>
- Considering all my efforts and achievements, my salary/income is adequate<sup>‡</sup>

Some items have been adapted to the special situation of practicing physicians. Amendments and additions are indicated in the *parentheses*

<sup>#</sup> Esteem-related reward

<sup>†</sup> Organizational reward

<sup>‡</sup> Financial reward

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