Assessing Mental Health and Physical Fitness in Young Chinese Doctors Using the Short-Form 36 Health Survey (SF-36)

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Research

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Abstract

Background Psychological and physical problems regarding the quality of life (QOL) of doctors have attracted increasing attention in recent years, especially in China. The objective of this study was to measure the mental health and physical fitness of young clinical doctors with the SF-36 and to evaluate related psychometric properties and factors.

Subjects and methods Young doctors from Guizhou Provincial People's Hospital completed the SF-36 between November 1, 2017, and February 28, 2018. The Physical Component Summary (PCS) and Mental Component Summary (MCS) were measured to represent physical and mental health conditions.

Results A total of 444 doctors aged 20–40 years, with 138 (31.08%) surgeons, 110 (24.77%) physicians, 26 (5.86%) pediatricians, 28 (6.31%) obstetricians/gynecologists and 142 (31.98%) doctors from other departments were enrolled in this study, and their data were analyzed. The mean PCS scores (71.30 ± 16.54 *vs*. 77.54 ± 15.96, $p < 0.0001$) and MCS scores (63.72 ± 18.91 *vs*. 71.29 ± 17.86, $p < 0.0001$) were significantly lower than the normative values of Chinese respondents. Pediatricians and obstetricians/gynecologists reported the lowest PCS and MCS scores. Young doctors with master's degrees and above (OR = 1.68, 95%CI: 1.03–2.75, $p < 0.05$), those who were unmarried (OR = 2.40, 95%CI: 1.40–4.08, $p < 0.01$), and those who had low family incomes (OR = 2.45, 95%CI: 1.00-6.01, $p < 0.05$) had increased odds of poor MCS scores.

Conclusions Poor mental and physical health were common in young doctors in China. Pediatricians and obstetricians/gynecologists had the poorest physical and mental health status. Having a high education level, being unmarried and having a low family income were negatively associated with mental health.

1. Introduction

According to the World Health Organization (WHO), quality of life (QOL) is defined as an "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad-ranging concept, affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, and their relationship to salient features of their environment"[1]. QOL consists of both mental and physical health.

Doctors provide human services and comprise the basis of the health care system. Stress, burnout and impairment are substantial mental problems of doctors that have attracted increasing attention in recent years [2, 3]. Burnout is an important factor affecting the QOL of young doctors and college students [4, 5]. Anxiety, depression and other mental problems are also commonly reported in doctors [6]. Previous studies have mainly reported the relatively poor psychological health state of doctors [3, 7]. A study of the QOL of young doctors in developed cities in China conducted in 2014 showed poor results [8].

In China, doctors, especially young doctors, have faced tremendous pressure in recent years. The deterioration of the doctor-patient relationship with the growing problem of violence in the hospital setting can certainly increase work pressure [9, 10]. Doctors in tertiary hospitals in China are overworked due to a lack of skilled doctors or general practitioners in primary care institutions [11]. Although young clinical doctors usually lack adequate clinical experience, they must undertake specific and intensive work [8]. In addition to dealing with a heavy clinical workload, young doctors are also faced with the pressures of producing scientific research, receiving a low income and addressing the stress of supporting a family. All these pressures may influence the mental and physical health status of young doctors.

The Short Form 36 Health Survey (SF-36) was developed by the Boston Health Research Institute in the United States for use in Rand Corporation's Health Insurance Experiment [12]. The SF-36 was constructed to survey the mental and physical health status of particular populations in clinical practice and to aid in research, health policy evaluations, and general population surveys [13]. The SF-36 is a reliable and valid tool to evaluate the general health conditions, including mental and physical problems, of doctors in China [14, 15].

We aimed to assess the mental and physical status of young clinical doctors working in tertiary hospitals by using the SF-36 and to evaluate related psychometric properties and factors affecting their mental and physical status.

2. Subjects And Methods

2.1 Study design and setting

We performed a questionnaire survey in Guizhou Provincial People's Hospital from November 1, 2017, to February 28, 2018. Guizhou Provincial People's Hospital is in the city of Guiyang, which has a population of approximately 4.6 million people and is considered the premier hospital in the region. According to the 2018 statistical yearbook issued by the National Bureau of Statistics of China (NBSC), the per capita gross domestic product (GDP) of the Guiyang region in 2017 was 74493 Chinese Yuan (CNY) and exceeded USD 10,000. The per capita GDP in this area ranked 51st in China [16]. All participants provided verbal informed consent of the survey prior to survey administration.

Two investigators were trained to distribute the questionnaires and guarantee the quality of the investigation. After the doctors agreed to participate in the investigation, the investigators briefly explained the completion methods and precautions to the doctors to ensure the authenticity and integrity of the questionnaire. Each participant completed the questionnaire independently.

2.2 Participants

The inclusion criteria were as follows: 1) clinical doctors aged 20–40 years. The exclusion criteria were as follows: 1) doctors older than 40 years at the time of the investigation; 2) nonclinical doctors; and 3)

doctors with work length of more than 15 years.

2.3 Contents of the questionnaire

2.3.1 Basic information

The basic information obtained was as follows: sex, age, nationality, place of household registration, educational level, marital status, monthly income, and per capita monthly household income. The information obtained from doctors undergoing standardized residency training included the following: type of standardized residency training, start time of standardized residency training, and direction of standardized residency training. The information obtained from non-training doctors included the department, work start time, and length of work.

2.3.2 The SF-36

The SF-36 is a generic health survey that is widely used for evaluating mental and physical health-related QOL [13]. It contains a 36-item scale that measures 8 domains of health status: physical functioning (PF); role physical (RP); bodily pain (BP); general health (GH); vitality (VT); social functioning (SF); role emotional (RE); and mental health (MH). The eight domains yield two second-order factors: the Physical Component Summary (PCS; PF, BP, RP, and GH) and the Mental Component Summary (MCS; RE, SF, MH, and VT) [17].

There is a two-step process to score the SF-36. First, numeric values are recoded based on the scoring key. Then, items in the same scale are averaged together to create the 8 scale scores. The actual score of the individual subscale is converted to the subscale scores with the following equation: subscale score (%) = (actual score − theoretical minimal score) / (theoretical maximal score − theoretical minimal primary score) × 100. The total score is the average of 8 subscale scores [13, 18]. The poor scores of young doctors were determined according to Chinese norms. The normative values were calculated and formulated according to the scores of 17,754 people from 6 randomly selected provinces in 2008. The poor PCS score was set below 61.58, and the poor MCS score was set below 53.43 [19].

2.4 Statistical analyses

All analyses were performed using Stata version 13.0 (College Station, Texas 77845 USA). Differences between continuous data were tested with Student's t-test and Wilcoxon rank-sum test. Categorical variables are presented as absolute numbers, and percentages and uncorrected chi-squared tests were used for comparisons. Multivariable logistic regression models were used to analyze whether the association between the PCS/MCS scores and the characteristics were significant. The two-tailed significance level was set at $p < 0.05$.

3. Results

3.1 Basic information of the study population

A total of 451 doctors met the inclusion criteria of this study. From November 1, 2017, to February 28, 2018, 444 young doctors aged 20–40 years were included in our study, and the response rate was 98.45%. One hundred and ninety (42.79%) young doctors were male. All of the young doctors had obtained bachelor's degrees, and 22.3% had master's degrees and above. One hundred and thirty-eight doctors were surgeons, 110 were physicians, 26 were pediatricians, 28 were obstetricians, and 142 were young doctors from other departments (general practitioners and doctors who were undecided regarding a department). Three hundred and twenty-five (73.2%) doctors had worked for less than 5 years. The monthly income ranged from < CNY 2000 (10.59%), CNY 2000–5000 (47.07%) and > CNY 5000 (42.34%). In addition, one hundred and sixty-six (37.39%) doctors reported a monthly household income > CNY 5000, followed by CNY 3000–5000 (34.23%), CNY 1000–3000 (18.47%), and < 1000 (9.91%) (Table 1).

Table 1
Basic information of Chinese young doctors

Characteristics	Frequency (N)	Percentage (%)
Age	29(26,32)	
Gender		
Male	190	42.79
Female	254	60.58
Nationality		
Han	345	77.7
Minority	99	22.3
Place of household registration		
Rural	301	67.79
Urban	143	32.21
Educational level		
Bachelor	263	59.23
Master/above	181	40.77
Marriage status		
Marital	233	52.48
Unmarried	211	47.52
Department		
Surgery	138	31.08
Physician	110	24.77
Pediatrics	26	5.86
Gynecology and obstetrics	28	6.31
Other department	142	31.98
Work length		
<1 year	75	16.89
1–3 year	148	33.33
3–5 year	102	22.97

Abbreviations: CNY = Chinese Yuan, Currently, one US dollar = 6.7 CNY

Characteristics	Frequency (N)	Percentage (%)
5–10 year	65	14.64
10–15 year	54	12.16
Monthly income		
<CNY 2000	47	10.59
CNY 2000–5000	209	47.07
>CNY 5000	188	42.34
Household income		
<CNY 1000	44	9.91
CNY 1000–3000	82	18.47
CNY 3000–5000	152	34.23
>CNY 5000	166	37.39
Abbreviations: CNY = Chinese Yuan, Currently, one US dollar = 6.7 CNY		

3.2 The SF-36 score of young Chinese doctors

The total score (PCS and MCS) and the scores of the eight subscales were significantly different from Chinese norms ($p < 0.05$) (Table 2). Although the PF scores of the young doctors were slightly higher than the Chinese norms ($p = 0.0215$), the scores of the remaining subscales [RP, BP, GH, VT, SF, RE, and MH] were much lower than the Chinese norms ($P < 0.005$ of all). Three hundred and seven (69.14%) young doctors reported a BP score that was 1 standard deviation (SD) below the norms. The mean MCS score was 1 SD below the normative values. There were 268 (60.36%) young doctors who reported PCS scores, and there were 239 (50.83%) young doctors who reported MCS scores that were 1 SD below the normative values [19].

Table 2
SF-36 Score of Chinese young doctors

	Young doctors	Norms of Chinese	P value	1 SD below norms
PF	89.55 ± 14.64	87.92 ± 16.98	0.0215	46(10.36)
RP	67.12 ± 37.44	77.50 ± 34.86	< 0.0001	121(27.25)
BP	69.5 ± 21.54	82.22 ± 16.98	< 0.0001	307(69.14)
GH	58.47 ± 18.67	62.51 ± 17.88	< 0.0001	79(17.79)
VT	61.07 ± 17.64	68.17 ± 17.63	< 0.0001	126(28.38)
SF	71.65 ± 21.39	80.67 ± 19.98	< 0.0001	119(26.8)
RE	62.39 ± 41.47	67.86 ± 39.44	0.004	103(23.20)
MH	59.77 ± 16.83	68.47 ± 16.9	< 0.0001	118(26.58)
HT	40.88 ± 21.8	/	/	
PCS	74.23 ± 17.63	77.54 ± 15.96	0.0001	268(60.36)
MCS	53.21 ± 20.08	71.29 ± 17.86	< 0.0001	239(50.83)

Abbreviations: SD = Standard deviation, PF = Physical functioning, RF = Role-physical, BP = Bodily pain, GH = General health, VT = Vitality, SF = Social functioning, RE = Role-emotional, MH = Mental health, PCS = Physical Component Summary, MCS = Mental Component Summary

3.3 Effects of socioeconomic variables on the domains and PCS / MCS

3.3.1 Sex and Nationality

The results of the independent sample t test indicated a significant difference between males and females in terms of the MH score (57.83 ± 18.15 *vs.* 61.21 ± 15.66, $p < 0.05$) and the PCS score (70.18 ± 18.05 *vs.* 71.45 ± 15.34, $p < 0.05$). Other subscales reported no significant difference between the sexes. Doctors of Han nationality appeared to have lower BP scores (68.1 ± 21.33 *vs.* 74.28 ± 21.7) and PCS scores (70.45 ± 16.99 *vs.* 74.22 ± 14.55, $p < 0.05$) than doctors of minority nationalities. Other subscales reported no significant difference between nationalities.

3.3.2 Marital status and place of household registration

Unmarried young doctors showed higher PF scores (90.05 ± 16.20 *vs.* 89.10 ± 12.76, $p < 0.05$) and GH scores (60.76 ± 18.40 *vs.* 56.39 ± 18.69, $p < 0.05$) than married doctors. However, the RE score (57.04 ± 43.03 *vs.* 67.26 ± 39.54, $p < 0.01$) was higher in married doctors than in unmarried doctors. Place of household registration was also analyzed and showed no significant effect on the scores of the nine domains.

3.3.3 Education level and work length

Young doctors with a master's and above degree reported lower PF scores (89.87 ± 13.07 *vs.* 89.09 ± 16.68, $p < 0.05$) and GH scores (60.44 ± 18.37 *vs.* 55.61 ± 18.67, $p < 0.01$) than those with a bachelor's degree. The other subscales were not significantly different between education levels. Work length significantly affected the QOL subscale scores. Young doctors who worked less than 1 year reported the highest score in the nine domains (excepted RE score) (Fig. 1). With increasing work length, a reduction was observed in most of the QOL subscale scores (PF, RP, BP, GH, VT, SF, MH, HT, PCS, and MCS). The PCS scores were significantly reduced with increasing work length ($p < 0.001$). Slight improvements in PF, BP, RE and HT were observed in doctors who worked more than ten years (Fig. 1).

3.3.4 Department

Pediatricians reported the lowest scores in the PF, RP, BP, VT, RE, MH, and HT domains. Surgeons and/or young doctors from other departments reported the highest scores in PF, RP, BP, GH, VT, SF, RE, MH, HT (Fig. 2). The scores of the physicians and obstetricians were basically in the middle. The lowest scores were reported in pediatricians, and the PCS scores (64.42 ± 15.35 *vs.* 73.30 ± 17.68, $p < 0.05$) and MCS scores (57.62 ± 16.59 *vs.* 66.60 ± 20.03, $p < 0.01$) were significantly lower in pediatricians than in surgeons.

3.3.5 Monthly income and family income

The monthly income of young doctors significantly affected the BP scores. Doctors with a monthly income below CNY 2000 reported the lowest BP scores (66 ± 21.5) compared with those in doctors with a monthly income of CNY 2000–5000 (73.15 ± 20.88) and those with a monthly income above CNY 5000 (66.34 ± 21.73) ($p < 0.01$). Household income significantly affected the MH scores ($p < 0.05$). Doctors with a household income below 1000 showed the lowest MH scores (53.82 ± 20.29).

3.4 The results of multivariate logistic regression analysis

The results of the multivariate logistic regression analysis (Table 3) showed that the nationality of young doctors was significantly associated with the PCS score. Young doctors of minority nationalities (OR = 0.55, 95%CI: 0.10–0.99, $p < 0.05$) had higher PCS scores. In addition, the results of the multivariate logistic regression analysis showed that educational level, marital status and family income were significantly associated with the MCS score. Young doctors with master's degrees and above (OR = 1.68, 95%CI: 1.03–2.75, $p < 0.05$) and unmarried doctors (OR = 2.40, 95%CI: 1.40–4.08, $p < 0.01$) had increased odds of poor MCS scores. Doctors that came from a low income family (below CNY1000) had 2.45 higher odds of poor QOL than those from a high income family ($p < 0.05$).

Table 3
The results of multivariate logistic regression analysis

	PCS			MCS		
Characteristics	p	OR	95%CI	p	OR	95%CI
Age	0.249	1.06	0.96–1.17	0.309	1.05	0.95–1.17
Gender (Male)						
Female	0.21	0.73	0.45–1.19	0.954	1.01	0.63–1.64
Nationality (Han)						
Minority	**0.045**	**0.55**	**0.10–0.99**	0.18	0.7	0.39–1.20
Place of household registration (Rural)						
Urban	0.873	1.05	0.58–1.92	0.715	0.9	0.50–1.61
Educational level (Bachelor)						
Master/above	0.438	1.22	0.74–1.99	**0.038**	**1.68**	**1.03–2.75**
Marriage status (Marital)						
Unmarried	0.358	1.28	0.75–2.19	**0.001**	**2.4**	**1.40–4.08**
Department						
Surgery	0.309	0.73	0.39–1.34	0.702	0.89	0.49–1.61
Internal medicine	0.992	1	0.54–1.83	0.822	1.07	0.59–1.95
Pediatrics	0.245	1.74	0.68–4.44	0.415	1.49	0.57–3.87
Obstetrics/Gynecology	0.132	2.02	0.81–5.03	0.33	1.57	0.63–3.93
Other department			1(omitted)			1(omitted)
Work length						
<1 year	0.057	0.26	0.07–1.04	0.277	0.48	0.13–1.79
1–3 year	0.542	0.71	0.24–2.14	0.717	0.82	0.27–2.45
3–5 year	0.505	0.74	0.30–1.81	0.319	0.63	0.25–1.57
5–10 year	0.855	1.08	0.47–2.49	0.969	0.98	0.42–2.31
10–15 year			1(omitted)			1(omitted)
Monthly income						

Abbreviations: PCS = Physical Component Summary, MCS = Mental Component Summary, OR is the prevalence odds ratio of poor group to normal group, CNY = Chinese Yuan

	PCS			MCS		
<YUAN 2000	0.572	0.77	0.30–1.93	0.865	0.93	0.38–2.27
YUAN 2000–5000	0.517	0.82	0.44–1.50	0.404	0.77	0.42–1.42
>YUAN 5000			1(omitted)			1(omitted)
Family income						
<YUAN 1000	0.102	2.18	0.86–5.53	**0.049**	**2.45**	**1.00-6.01**
YUAN 1000–3000	0.219	1.64	0.75–3.58	0.86	1.07	0.49–2.34
YUAN 3000–5000	0.571	1.17	0.68–2.01	0.195	1.42	0.83–2.43
>YUAN 5000			1(omitted)			1(omitted)
Abbreviations: PCS = Physical Component Summary, MCS = Mental Component Summary, OR is the prevalence odds ratio of poor group to normal group, CNY = Chinese Yuan						

4. Discussion

We investigated the mental health and physical fitness status of young Chinese doctors in our study using the SF-36. The poor PCS and MCS scores revealed that poor physical and mental health status was common in young doctors. Pediatricians and obstetricians/gynecologists reported the poorest physical and mental health status. Young doctors of minority nationalities had healthier physical conditions. Young doctors with master's degrees and above, those who were unmarried and those who had a lower family income were significantly associated with a poor mental health condition.

The physical health of young doctors was poorer than that of the general population in our study and was positively associated with young doctors of minority nationalities. Although the ability to perform physical activity was better than that reported in the general population, the bodily pain score was reported in 69.14% of young doctors and was 1 SD below normative values. Spending most of their time practicing office-based procedures and engaging in scientific research may cause burnout for young doctors [20]. Burnout and poor mental health conditions intensify physical problems. According to Martinez et al, regular daily physical activity may be lacking for doctors. Subjective and objective mental stress accompany the lack of habitual daily physical activity and may increase the risk of poor health condition of doctors [21]. Male students of minority nationalities reported better physical fitness, and young doctors of minority nationalities showed a positive association with physical condition [22]. Young doctors of minority nationalities may have better physical diathesis, growth level, and physiological function.

The poor mental health of young doctors was more serious than perceived. The present study showed that the mean MCS score was significantly below the normative values, and nearly 30% of young doctors reported MCS scores that were 1 SD below the normative values. The results of a previous study using a

12-item Short Form Health Survey (SF-12) also reported that the mean mental composite score was 1 SD below the normative values [23]. A survey conducted in Malta also indicated that 49.4% of young doctors faced significant psychological distress [24]. Poor mental health was independently associated with a greater risk of burnout and could affect overall health-related quality of life [23]. Mental health problems such as suicide were 1–4 times higher in physicians than in the general population in America [25]. Suicide thought was reported to be 12.0% in residents [26]. Furthermore, Becker et al found that the rate of depression was 31% for females and 48% for males in obstetrics/gynecology residents [27].

Mental health status was negatively associated with young doctors who had a master's degree and above, those who were unmarried and those who had a low family income. Young doctors with master's degrees and above may face higher scientific research pressures, which may be related to the requirements of the promotion system for publication and the strict requirements for self-fulfillment. In recent years, young doctors have been under great pressure to publish since basic scientific research is difficult and clinical research requires long-term follow-up or large case numbers, which are not easy to achieve for a young doctor [28]. Marital status was believed to be important for mental health well-being since married people generally have fewer psychological problems and are healthier than unmarried people [29, 30]. Unmarried young doctors in China face substantial economic pressure to purchase homes and get married. Low family income increases the pressure and stress of young doctors, thus influencing their mental health.

Pediatricians and obstetricians/gynecologists showed the poorest mental health status in the present study. The poor mental health status seemed more severe in pediatricians. The burnout prevalence reached 74% in junior pediatricians, and the depression rate reached 20% in a survey conducted by Fahrenkopf et al [31]. A high work stress environment, workplace violence and effort-reward imbalance in the pediatric department affected the mental health of pediatricians [32, 33]. In China, a high turnover rate in obstetrics and gynecology, rapid changes in maternal and fetal diseases, and high patient expectations can lead to frequent medical disputes. Kravitz et al also reported that 27.5% of surveyed obstetrician/gynecologists were dissatisfied with their medical careers in the United States [34].

The effect of sex did not significantly influence the mental and physical health of young doctors in our findings. Many studies found that female doctors had a lower global QOL than male doctors [35, 36]. In China, young doctors are not optimistic regarding deteriorating doctor-patient relationships, workplace violence, being overworked, scientific research pressure and other factors [9, 37]. The poor mental and physical health of young doctors can increase the number of clinical practice errors and place both doctors and patients at risk. More attention should be paid to young doctors' physical and mental health to ensure that quality medical care is provided to patients.

The present study indicated the poor mental health and poor physical health of young doctors in tertiary hospitals in China and analyzed the associated socioeconomic factors. There were some limitations of the present study. Although the sample size included more than four hundred participants, the study was

a single-center study. The study was conducted in Guizhou Provence and may not be able to represent well-developed cities in China.

5. Conclusions

In conclusion, young doctors in China reported poor mental health and poor physical health. Pediatricians and obstetricians/gynecologists had the poorest physical and mental health status. Having a high education level, being unmarried and having a low family income were associated with poor mental health. Interventions should be undertaken to reduce the mental and physical problems of young doctors.

Declarations

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Founding

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Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Conflicts of interest

We declare we have no competing interest.

Consent for publication

Not applicable.

Contributors

All authors contributed to the conception and design of the study. YL, YY and YW involved in acquisition of data. QZ, DH and YC performed analysis and interpretation of data. TW, CL and HZ drafted the article. All authors involved in revising and final approval of the article.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Guizhou Provincial People's Hospital Ethics Committee (Approval Number No.2017063).

Informed consent

Given the nature of the survey, verbal informed consent was obtained from the participants prior to survey.

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Figures

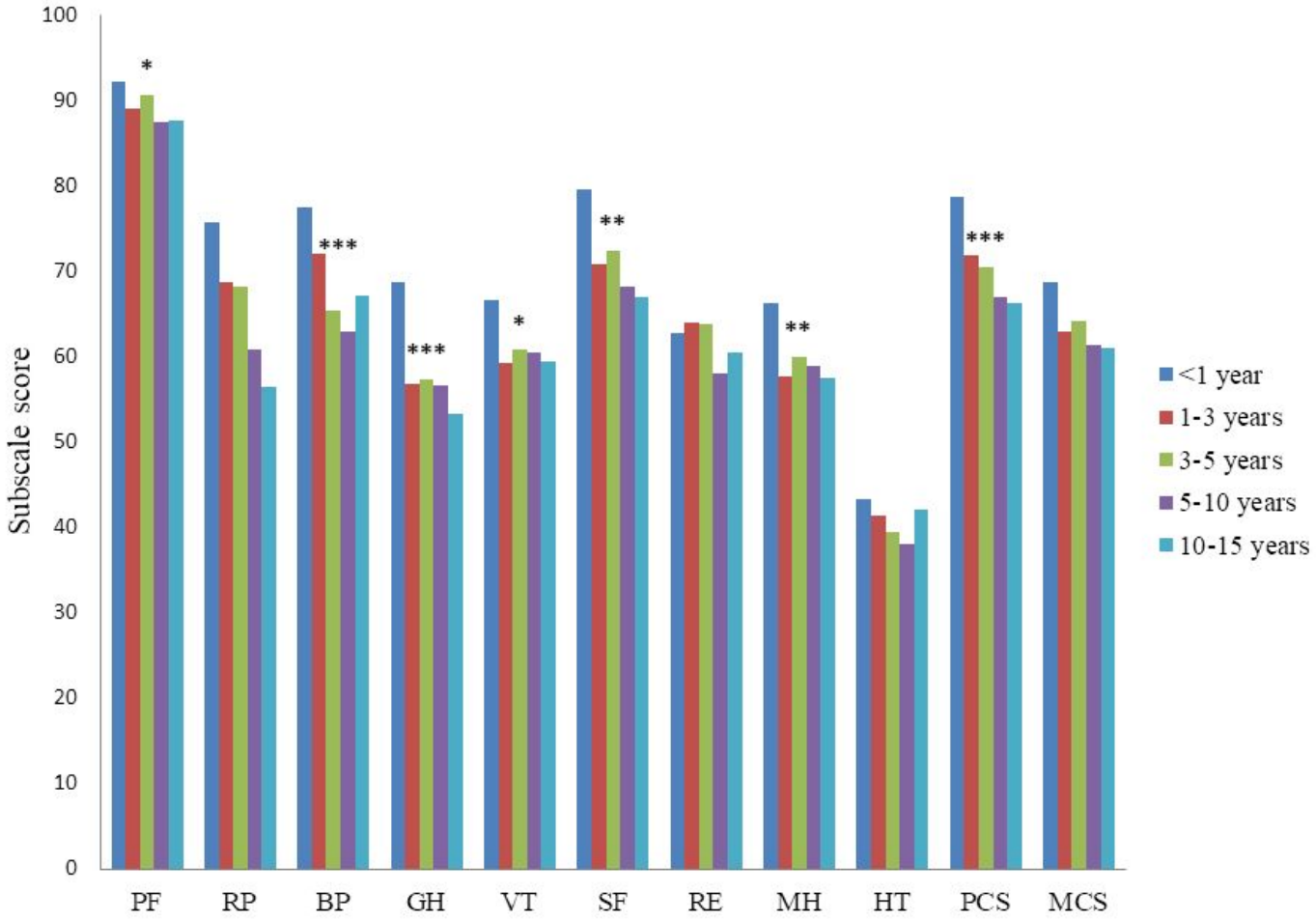

Figure 1

Subscale scores of QOL for different work lengths *p<0.05, **p<0.01, ***p<0.001

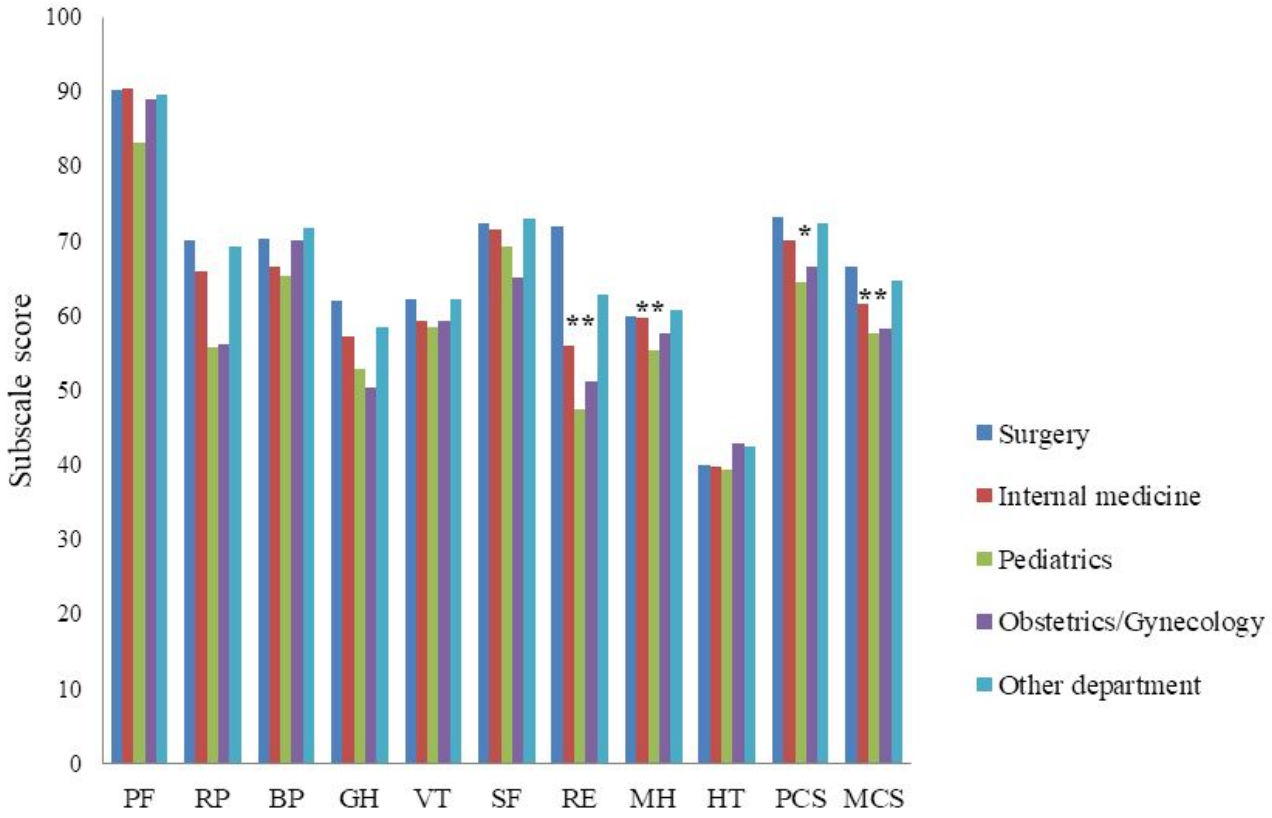

Figure 2

Subscale scores of QOL in different departments *p<0.05, **p<0.01