

# The work competence of Shanghai's GPs: a cross-sectional study based on self-assessment

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## Research Article

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# Abstract

**Background:** General practitioners(GPs) have taken new challenges as requested in a new model introduced in China recently. Unlike some countries where general medicine are well developed, there is a lack of a standard in China that can be generalized to assess GPs' work competence. The aim of the study was to investigate work competence of GPs in Shanghai's community health services(CHS) in China by self-assessment, providing evidences for effectiveness of GPs' post-education and training.

**Methods:** A stratified and proportional cluster sampling method was adopted in this cross-sectional study from 116 CHS in Shanghai.(n=2954). We collected data on GPs demographic variables and work competence which was separated as patient care ability, teaching ability, communication skill and coordination ability, using a self-designed questionnaire.

**Results:** The mean score of patient care ability, teaching ability, communication skill and coordination ability were  $76.93\pm 12.55$ ,  $63.47\pm 28.97$ , and  $76.31\pm 20.25$  on a scale of 100, respectively. GPs who were 30-39 years old, worked in urban CHSs, and participated in GP trainer's training or had teaching experience got higher scores in patient care ability. Those GPs who worked for 5-20 years in CHS, especially in training CHSs which is involved in post-graduate GPs training program, and participated in GP trainer's training program had higher scores in teaching ability. As for communication skill and coordination ability, GPs who were older than 30-39 years old and with a senior professional title, worked in training CHSs, participated in GP trainer's training and had teaching experiences in CHS can got higher scores.

**Conclusions:** There is a large space to improve the patient care ability, teaching ability, communication skill and coordination ability for GPs in Shanghai's CHS ,especially in teaching ability.

## Introduction

GPs play a crucial role in a new medical model(1) recently introduced in China. With the exception of provision of patient care, GPs have taken new challenges as requested in the model including team organization management, communication and teaching in their daily works(2) In the countries where general practice is well developed, the requirement for GPs' competence has been well-documented and implemented appropriately in medical practice(3) (4). There are some well-known standards abroad, such as the WONCA Tree model(5), the 13 competency model put forward by the Membership of the Royal College of General Practitioners(MRCGP) in England(6), and the ACGME Program Requirements for Graduate Medical Education in Family Medicine in the United States(7). The above standards and assessment systems, do not simply emphasize medical care, and they have begun to underline the non-clinical contents such as management, leading power, and referral or cooperation with specialists(8) (9). Nevertheless, it is generally considered that there is a lack of a standard in China that can be generalized to assess GPs' work competence. Some scholars designed questionnaires through Dephi expert consultation method and literature review, and carried out empirical studies(10–13). The indexes cited in

these study have obtained good reliability and validity, however, there are some inherent limitations including small and convenience samples, incomplete contents or less representative objects in the studies.

To assess GP's work competence in Shanghai's community health services(CHS) in China, a cross-sectional study was conducted by using a self-designed questionnaires. On the basis of previous researches on ability evaluation of GPs(14), the questionnaires were generated and has since been considered informative and pragmatic.

## Materials And Methods

### Sample

A stratified and proportional cluster sampling was used in the cross-sectional study during Jan,2016 through Feb,2016 in CHSs of Shanghai, China.

There were 16 districts and 245 CHSs in Shanghai in 2016,seven urban districts with 75 CHSs and nine rural districts with 170 CHSs, Sampling was stratified by location of CHS and CHS type (CHS was classified as training CHS and non-training CHS, training CHS means the one which was qualified to afford the teaching affairs of GP standardized training by Shanghai Health and Family Planning Commission. Until 2016 ,57 CHS was qualified as training CHS ).In this study, all of the training CHSs were chosen, and non-training CHSs were selected in a ratio of 1 to 1 with the training ones. Because the number of training CHS in each districts was different, The number of non-training CHS sampled in each district(N) was calculated as follow formula:

$$N = \frac{\text{The number of non-training CHS in each district}}{\text{The number of non-training CHS in Shanghai}} \times \text{The total number of non-training CHS needed.}$$

Finally, a total of 116 CHSs was sampled. Among them, 75 CHSs are located in the urban area including 36 training CHSs and 39 non-training CHSs; the remaining 41 CHSs are located in the rural areas including 21 training CHSs and 20 non-training CHSs. All GPs working in the sampled CHS were invited to take part in the investigation. A distribution of the sampled CHS by location and CHS type was shown in

**Fig. 1.**

### Design Of Questionnaire

The questionnaire was designed on the basis of indicator system to evaluate basic capacities of general practitioners trainer constructed by Zhang Yuan. The GP's work competence was characterized in the questionnaires as follow: patient care ability, teaching ability and communication skill and coordination ability. The questionnaire consisted of the following 4 sectors:

(1)demographic variables including age, sex, education background, professional title, whether accepted GP standardized training(Yes/No), working in an urban or rural CHS, whether accepted GP trainer'

Loading [MathJax]/jax/output/CommonHTML/jax.js teaching experiences.

(2)patient care ability containing 16 indexes, measured within the following 3 fields—basic public health service, diagnosis and treatment of community common diseases and community clinical skills.

(3)teaching ability mainly examining the teaching knowledge and skills, containing 10 indexes.

(4)communication skill and coordination ability, containing 4 indexes.

For each question, there were 5 various answers, which represented 5 tiers of level, i.e. worse ,poor, fair, good and excellent in an ability tested. The above tiers were converted into 1,2,3,4 and 5 points respectively.

The reliability(Cronbach  $\alpha$ ) of the questionnaire was 0.826.

## Data Collection

The questionnaire was used to investigate the participants' demographic data and work competence. Administrator in each CHS was responsible for issuing and collecting questionnaires. Ineligible ones were deleted. All scores were converted into percentage system.

## Statistical analysis

Data were presented by percentage, means, and standard deviation. The chi-square test, Fisher exact test, Mann-Whitney U test and Kolmogorov-Smirnov test were used to compare the work competence in different population. Multiple liner regression was conducted to explore the effect of demographic characteristics on the 3 categories of ability.

Data was analyzed using SPSS Statistics software, version25.0(SPSS Inc. Chicago).P values < 0.05 were considered statistically significant.

# Results

## General condition

A total of 2594 GPs were sent a questionnaire, and 2592 eligible pieces were returned, where the respond rate was 99.9%. The demographic data of the 2592 GPs was presented in Table 1. Based on the data received, more females(1526, 58.9%) participated in the study than males(746, 28.8%). Mean age of the GP population was  $39.41 \pm 7.92$  years old. Of the 2592 GPs, 1956(75.5%) worked in urban CHS, and 1562(60.3%) received GP trainer' training. In additions, less than half(1138, 43.9%) of the GPs had teaching experiences in CHS.

Table 1  
Demographic variables of all the 2592 GPs

<b>Variables</b>	<b>N(%)</b>
Num. of CHS	116(100.0)
Num. of GPs	2592(100.0)
Sex	746(28.8)
Male	1526(58.9)
Female	320(12.3)
Missing	
Age(y)	186(7.2)
< 30	1276(49.2)
30–39	793(30.6)
40–49	286(11.0)
≥ 50	51(2.0)
Missing	
Educational level	32(1.2)
Technical secondary school	265(10.2)
college	2052(79.2)
university	241(9.3)
postgraduate and above	2(0.1)
Missing	
Professional title	420(16.2)
primary	1848(71.3)
intermediate	190(7.3)
senior	134(5.2)
Missing	

<b>Variables</b>	<b>N(%)</b>
Years of working(y)	458(17.7)
< 5	605(23.3)
5–9	934(36.0)
10–19	583(22.5)
≥ 20	12(0.5)
Missing	
Did you receive GP standardized training	1384(53.4)
yes	1204(46.5)
no	4(0.2)
Missing	
Did you worked in training CHS	1296(50.0)
yes	1296(50.0)
no	
CHS location	1956(75.5)
Urban area	628(24.2)
Rural area	8(0.3)
Missing	
Did you receive general teaching training	1562(60.3)
yes	1018(39.3)
no	12(0.5)
Missing	
Did you have teaching experience in CHS	1138(43.9)
yes	1417(54.7)
no	37(1.4)
Missing	

## GPs' Patient Care Ability

The mean score of patient care ability for GPs were  $76.93 \pm 12.55$ , respectively. The index “up on the chronic management approaches”, “knowing the latest guidelines well” and “indwelling gastric tube or urethral catheter” had the lowest score in each of the 3 fields (Basic public health service, Diagnosis and treatment of community common diseases and Community clinical skills), which were  $3.82 \pm 0.923$ ,  $3.94 \pm 0.774$  and  $3.66 \pm 1.070$ , respectively (Table 2).

Table 2  
GPs' patient care ability

Second index	$\bar{x} \pm s$	Third index	$\bar{x} \pm s$
Basic public health service	18.91 $\pm 5.62$	Establishment of individual and family healthy record	3.98 $\pm$ 0.941
		Healthy education	4.09 $\pm$ 0.855
		Family visit	3.97 $\pm$ 0.926
		Chronic disease rehabilitation	3.93 $\pm$ 0.864
		<b>up on the chronic management approaches</b>	<b>3.82 <math>\pm</math> 0.923</b>
Diagnosis and treatment of community common diseases	20.06 $\pm 5.31$	Screening of community common diseases	4.21 $\pm$ 0.748
		Diagnosis of community common diseases	4.31 $\pm$ 0.708
		<b>Familiar with the latest guidelines</b>	<b>3.94 <math>\pm</math> 0.774</b>
		Suitable prescribing	4.27 $\pm$ 0.726
		Familiar with referral indications	4.22 $\pm$ 0.748
Community clinical skills	22.07 $\pm 6.58$	EKG skills	3.84 $\pm$ 0.854
		X-ray judging	3.79 $\pm$ 0.841
		Debridement and dressing changing	3.84 $\pm$ 0.894
		<b>Indwelling gastric tube or urethral catheter</b>	<b>3.66 <math>\pm</math> 1.070</b>
		Explaining laboratory inspection reports	4.14 $\pm$ 0.748
		CPR	4.07 $\pm$ 0.791

Through the multiple liner regression, GPs who were 30 to 39 years old( $78.12 \pm 18.61$ ; OR = 5.491, P = Loading [MathJax]/jax/output/CommonHTML/jax.js OR = 2.451, P = 0.024), participated in GP trainer'

training( $77.65 \pm 20.32$ ; OR = 2.332, P = 0.024) or had teaching experiences( $79.00 \pm 19.21$ ; OR = 3.628, P < 0.001) got a higher score in the patient care ability. (Fig. 2).

### GPs' Teaching Ability

The assessment of GPs' teaching ability was done within those GPs with teaching experiences. Mean score in this sector was  $63.47 \pm 28.97$ . Only 75% GPs were willing to spend time in teaching. The index "interesting in teaching" got the lowest score, which was  $3.46 \pm 0.800$ . In teaching skills, the index "applying of various teaching methods" was the lowest, which was  $3.78 \pm 0.720$  points (Table 3). Multiple liner regression indicated that GPs who have worked for 5 to 20 years( $65.72 \pm 27.56$ ; OR = 7.159, P = 0.003 and  $65.61 \pm 27.28$ ; OR = 5.135, P = 0.013), worked in a training CHS( $69.24 \pm 24.71$ ; OR = 13.379, P < 0.001), or participated in GP trainer's training( $67.74 \pm 25.81$ ; OR = 18.092, P < 0.001) got a higher score in teaching ability. (Fig. 3).

Table 3  
GPs' teaching ability

Index	Mean $\pm$ SD/proportion(%)
Willing to spend time in teaching	75.1
Willing to accept related training	75.8
Encourage student in teaching	81.0
Giving timely feedback	80.8
Evaluating students every month	78.9
Interests in teaching	<b>3.46 <math>\pm</math> 0.800</b>
Familiar with medical service in CHS	4.12 $\pm$ 0.687
Integration teaching resources	3.91 $\pm$ 0.688
Familiar with GP teaching requirement and contents in CHS	3.85 $\pm$ 0.692
Finishing the teaching plans set and carried out suitable for students	3.82 $\pm$ 0.674
Adjusting teaching contents and progress according to students' learning	3.81 $\pm$ 0.679
<b>applying of various teaching methods</b>	<b>3.78 <math>\pm</math> 0.720</b>
Clinic teaching	3.84 $\pm$ 0.678
Teaching ward round	3.75 $\pm$ 0.775
Case discussion	3.76 $\pm$ 0.775
Lecture	3.75 $\pm$ 0.784

## GPs' Communication Skill And Coordination Ability

Mean score in this sector was  $76.31 \pm 20.25$ . The index "organization and management ability" got the lowest score,  $3.52 \pm 0.774$ . (Table 4) Multiple liner regression indicated that GPs who were older than 30–39 years old ( $78.91 \pm 13.62$ ; OR = -2.224, P = 0.033), in senior professional title ( $82.08 \pm 13.11$ ; OR = -3.578; P = 0.008), worked in training CHS ( $78.32 \pm 12.16$ ; OR = 1.148, P = 0.038), participated in GP trainer' training ( $78.46 \pm 12.70$ ; OR = 1.484, P = 0.014), or had teaching experiences in CHS ( $80.44 \pm 12.18$ ; OR = 5.174, P < 0.001) got a higher score. GPs who received GP standardized training got a lower score ( $76.27 \pm 12.39$ ; OR = -1.858, P = 0.001). (Fig. 4).

Table 4  
GPs' communication skill and coordination ability

Index	Mean $\pm$ SD
Interpersonal communication skill	$3.75 \pm 0.765$
Patient communication skill	$3.99 \pm 0.677$
Team collaboration	$4.05 \pm 0.677$
<b>Organization and management</b>	<b><math>3.52 \pm 0.774</math></b>

## Discussion

### Summary

Our study showed that the mean score of GPs' patient care ability, teaching ability and communication skill and coordination ability were  $76.93 \pm 12.55$ ,  $63.47 \pm 28.97$ , and  $76.31 \pm 20.25$ , respectively. There was still a large space for improvement, especially in teaching ability. GPs who were 30–39 years old, worked in urban CHSs, and participated in GP trainer's training or had teaching experience got higher scores in patient care ability. Those GPs who worked for 5–20 years in CHS, worked in training CHSs, and participated in GP trainer's training program had higher scores in teaching ability. As for communication skill and coordination ability, GPs who were older than 30–39 years old, with a senior professional title, worked in training CHSs, participated in GP trainer's training and had teaching experiences in CHS can get higher scores

### Strengthens And Limitations

Firstly, this study had the largest sample of 2592 GPs among the published analogous studies in China. there were only 5000 registered general practitioners in Shanghai until 2016 (15), and the sample population accounted for about 1/2 of the total number of general practitioners. Because of the scientific

sampling, the population was almost representative of GPs in Shanghai. Secondly, though the questionnaire we used was self-designed, we had referred to existing ones. It had good reliability, with completed content and reasonable structure, thus, the results and conclusions should be reliable.

But there were still some limitations. The main limitation was inherent for cross-sectional study. Secondly, measurement and recall bias were inevitable, because the data we used were collected from GPs' self-assessment. Some objective ways should be adapted into GP's work competence assessment in the future. Finally, The conclusion may not be suitable completely to other areas. because general practice in Shanghai developed earlier and faster, whose number of GP per 10 thousand people (16) was far more than that of most other areas in China, and the development gap of general practice are recognized in different areas of China, especially between eastern and western area.

## **Comparison With Existing Literature**

### **Patient care ability**

GPs' mean score of patient care ability was  $76.93 \pm 12.55$ , it was proved that such ability of GPs in Shanghai could meet the daily working requirement(17). Some analogous studies in China showed the similar results as our study in GPs' patient care ability(18). Patient care ability is the basic ability of GPs(19), and was put firstly in both domestic and abroad assessment of GP(20). It was also one of the reasons that many GPs hoped to participate in postgraduation training(21) (22). In past GP training, the phenomenon of concerning theory but ignoring practical skills was common(23). Pan Xiaoyan and et al(24) discovered that the operating score of GPs in Guangxi Province of China was only 63 points. Such problem was also easy to be seen among GPs in England and Germany(25) (26) (27).

### **Teaching ability**

GPs' mean score of teaching ability was  $63.47 \pm 28.97$ . A perfect admitted criteria were established and used to select eligible GP teachers in many developed countries. In UK, an investigation for specialists in both general practice and education showed that to be a qualified GP, 18 competencies were necessary, among which 6 items were related to teaching(28). In GMC in 2013, doctors are required that "you must be competence in all areas of your work, including... teaching"(p.6)", "You should be prepared to contribute to teaching and training doctors and students"(p.14)"(29). Administration as NHS, MRCGP and AMRC were reminded of GPs' teaching ability(30). In China, expert group suggested that teaching ability was one of three first-class indicators of the criteria for GP teachers(31).

### **Communication skill and Coordination ability**

No matter domestic or abroad, communication and coordination ability were shortcomings of GPs, though in this study they got  $76.31 \pm 20.25$ . Some countries have already paid attention to the training and assessment of such abilities(32). For example, the workplace based assessment(WPBA) in MRCGP is aimed to evaluate a doctor's performance across 13 areas of professional competence in the

## Implications For Research And Practice

Our study also discovered that GPs who aged from 30 to 39 years old, worked in an urban CHS, participated in GP trainer' training or had teaching experience got a higher score in patient care ability. Most younger GPs had finished the GP standardized training were the main force in CHS, and were much more eager to learning, and they preferred to choose urban CHS because of low standard of living. But The majority of older GPs were transformed through on-the-job training program before 2010(34), who were less-educated and less interested in learning. In addition ,teaching was a proof for better medical care work competence, GPs who were competent in daily work would be selected to participate in trainer' training on behalf of their CHS.

It is urgent and vital to improve GPs' teaching ability, in order to ensure the quality of standardized training of general practice and optimize the overall quality of GP training. However, failure in teaching was a big problem, similar to our study(35). Some GP teachers even have not accepted any forms of general practice education in china, and their own ability was far away from the standard(36). Interests was the basic of teaching ability, Our study discovered that nearly 25% GPs were “ unwilling to spend time in teaching or accept related training”. One of the reason may be that GPs were busy in work, and the reward of teaching was so little that GPs were not willing to spend time and energy on teaching. Another lack of teaching ability was that GPs were unable to skillfully apply various teaching methods. In community training activities, students hoped to get more practical skill, exploring the way of how to offer superior medical service in CHS. But most of time, GP teachers could not apply teaching methods appropriately, so as to fail to achieve the expected effect. The cultivation of excellent GPs needed excellent GP teachers who need enough training time and grasp various teaching methods(37). In the way of improving GPs' teaching ability, what we need to do first is to inspire their interests, establish the teaching performance appraisal system and reward mechanism(38). Upper hospitals and medical colleges could found a GP teacher training center, holding training lectures regularly(39), infiltrating advanced educational theories and methods into CHS.

Teaching score showed a positive correlation with GPs' working period. And GPs who worked in training CHS, accepted GP trainer' training showed a higher teaching ability. This result was consistent with the reality. From 2012, Shanghai began the construction of teaching CHS. In 2016, there were 57 training CHSs, 36 in urban areas and 21 in rural areas. Compared with the non-training CHS, the training CHS must be better in both facility configuration and GPs' teaching ability. GP trainer' training was an on-job training especially for improving teaching ability and popularizing advanced methods. Usually, it would introduce teaching theory, methods, share experiences, spread some latest medical information and hold academic lectures. After training, GPs would do better in teaching.

In addition, communication skill and coordination ability is one of the necessary ability for GP to get residents' trust and to improve the understand and cooperation with team. A good GP should not only know every detail of their clinical job, but also be active in the management of their team. Coordination is

to solve residents' healthy problem in a easiest way in community condition(40), which was also an important work of GPs.

The study showed that GPs who worked in teaching CHS, accepted in GP trainer' training or had teaching experiences got a higher score in communication skill and coordination ability. And it was surprising that GPs who accepted GP standardized training got a lower score in communication skill and coordination ability. Firstly, the standardized training of general practice in China does not pay enough attention to the communication skill training today. Secondly, most of the GPs who receive the standardized training are relatively young and lack of medical and management experience. So we should strengthen communication skill training in standardized training of general practice and continue medical education in the future.

## Conclusion

There is a large space to improve the patient care ability, teaching ability, communication skill and coordination ability for GPs in Shanghai's CHSs ,especially in teaching ability. At present the most urgent task was to improve the teaching ability of GPs by strengthening the training, inspiring their teaching enthusiasm and making full use of teaching resources. Meanwhile, the deficiency in communication skill and coordination ability also need to be made up.

## List Of Abbreviations

ACGME Accreditation Council for Graduate Medical Education; AMRC The Association of Medical Research Charities; CFPC The College of Family Physicians of Canada; CHS community health service center; GP general practitioner; MRCGP Membership of the Royal College of General Practitioners; NHS National Health Service; WONCA the World Organization of National Colleges, Academies and Academic Association of General Practitioners/Family Physicians; WPBA The workplace based assessment.

## Declarations

### Ethics approval and consent to participate

Documentation of informed consent was secured at the beginning of the survey, all GPS having read and agreed to the Informed Consent agreement. All methods were performed in accordance with the relevant guidelines and regulations (Declaration of Helsinki). The confidentiality of all GPs was guaranteed, and the study protocol was approved by The Medical Ethics Committee of Zhongshan Hospital of Fudan University

### Consent for publication

Not applicable.

## Availability of data and materials

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

## Competing interests

The authors declare that they do not have any conflicts of interests.

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## Author's contributions

PZG is responsible for the design and funding of the research. WTH, ZY, ZXJ, GJ and LLM designed the questionnaire. WTH, RXY,ZY and GJ carried out the data collection, PZG supervised the project. RXY , WTH and GJL analyzed the data ,RXY and WTH drafted the first manuscript and responsible for revision. All authors participated in the critical revision of the manuscript and approved the final version.

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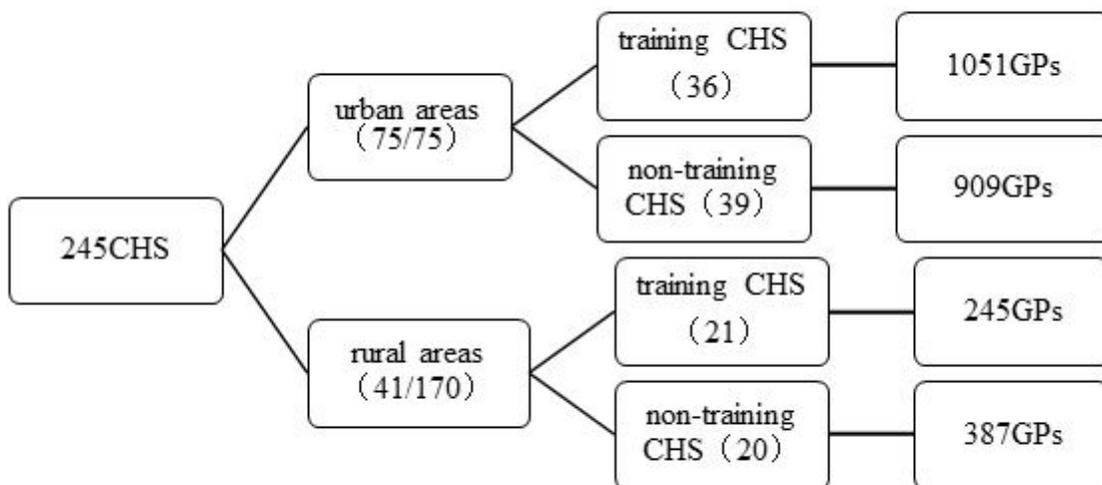
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## Figures



**Figure 1**

A distribution of the sampled CHS by training and location

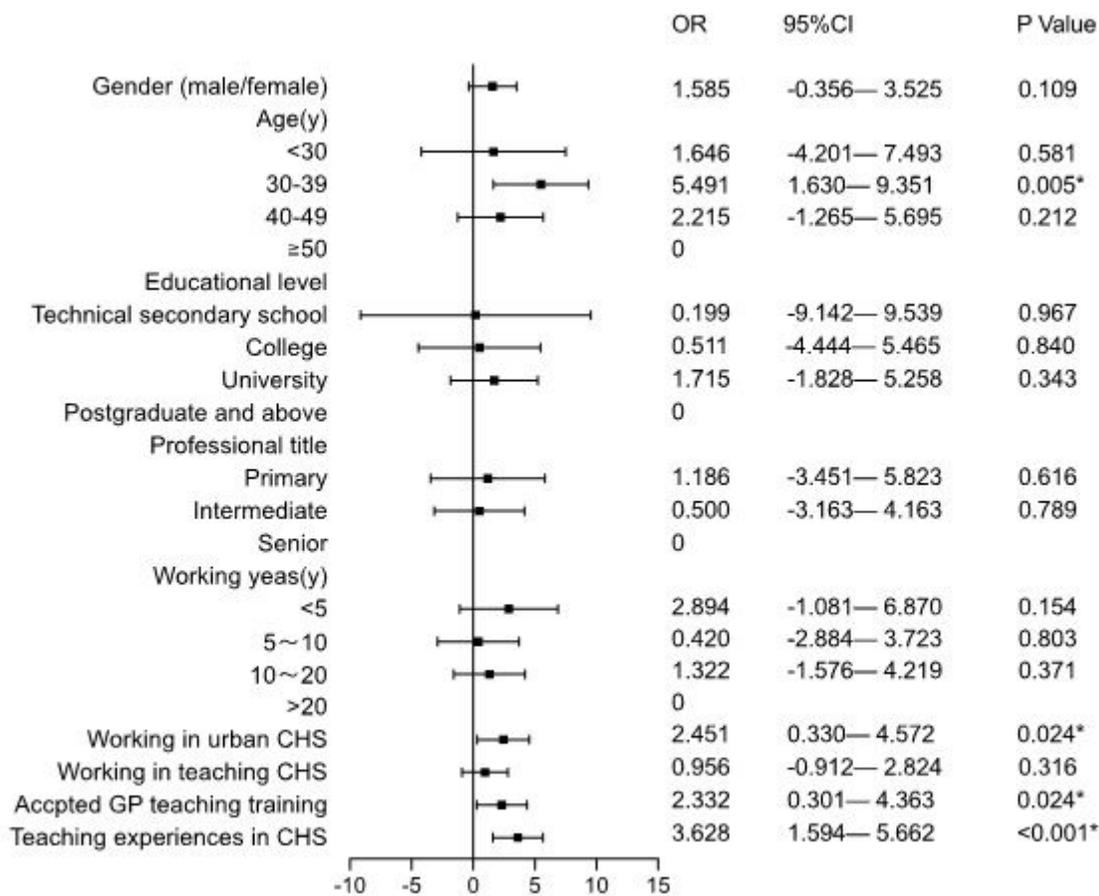


Figure 2

Liner regression analysis for patient care ability

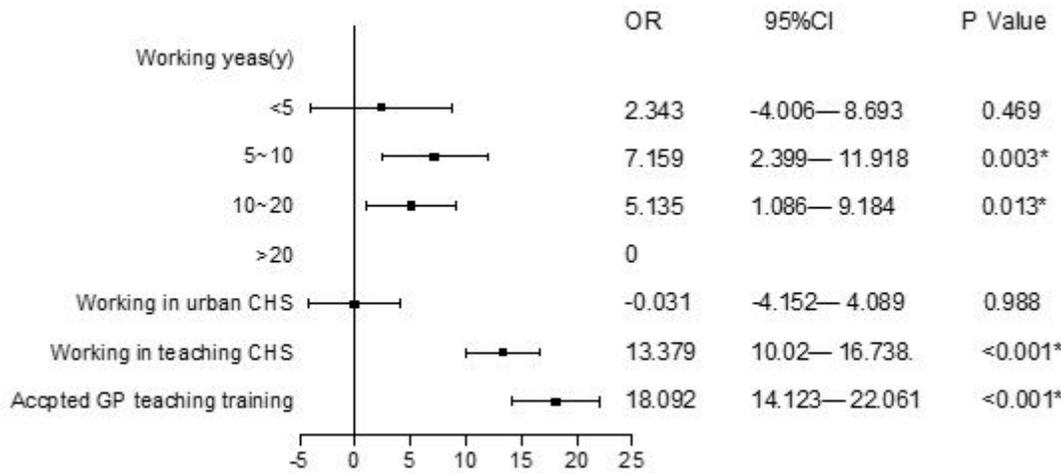
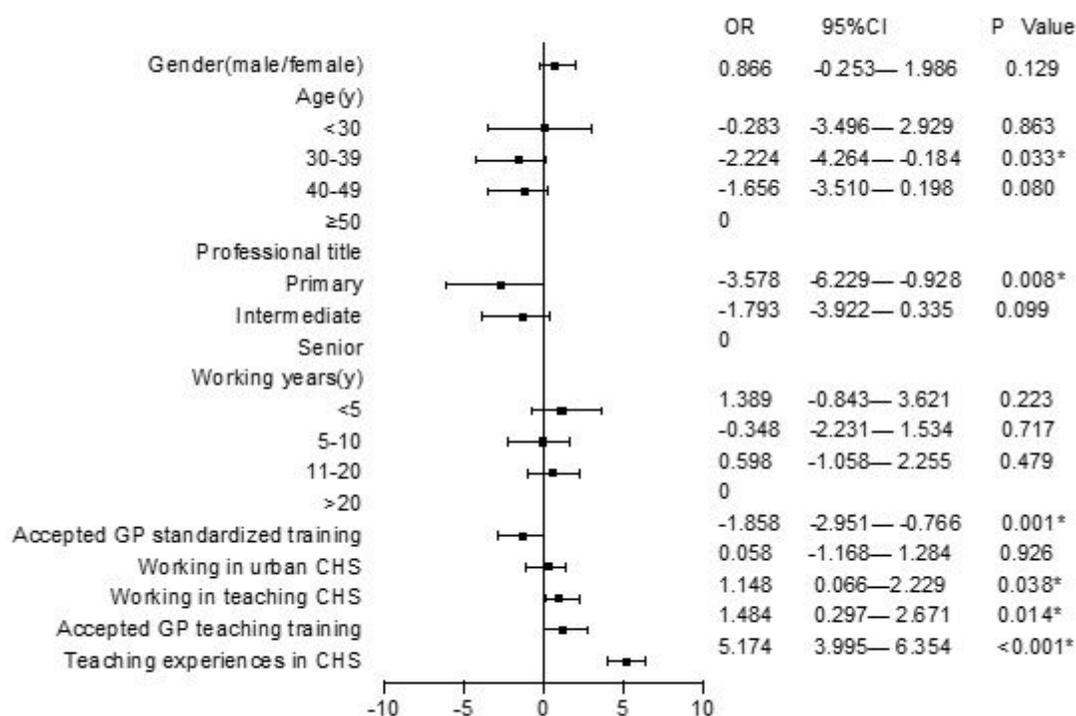


Figure 3



**Figure 4**

Liner regression analysis for Communication skill and Coordination ability

## Supplementary Files

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