



ORIGINAL RESEARCH

Rural self-efficacy measuring intent for rural practice among Japanese medical students

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ETHICS APPROVAL: The study was approved by the ethics committee of the Ehime University Graduate School of Medicine, and informed consent was obtained from all subjects.

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ABSTRACT:

Introduction: In Japan, the community medicine clerkship was introduced in order to foster positive attitudes towards rural practice and encourage rural recruitment. The purpose of the present research was to elucidate self-efficacy for rural practice.

Method: Medical students comprised 166 women aged 22 ± 2 (mean \pm standard deviation) (range 19–34) years and 243 men aged 23 ± 3 (range 18–41) years. The participants were from academic years 1–3 (60.9%) and 4–6 (39.1%). The authors conducted a cross-sectional survey to identify questionnaire items that measure self-efficacy of intent for rural practice based on the portfolio of students who experienced community medicine clerkships.

Results: Using factor analysis, a rural self-efficacy scale of four factors consisting of 15 items was identified. The factors extracted were work preferences, evaluation of rural practice, evaluation of rural living and personal character. The Cronbach's alpha coefficient for the questionnaire was 0.849, acceptable for newly developed scales. The scree plot indicated for factors explained

46.8% of the total variance. The average score was 43 ± 6 for women and 44 ± 6 for men, and was significantly increased with stronger intent for rural practice in each gender. The factors of work preferences, evaluation of rural practice and evaluation of rural living showed a significant and independently positive correlation with the intent for rural practice. Moreover, multiple linear regression analysis using rural self-efficacy score as an objective variable, adjusted for confounding factors as explanatory variables, showed that the following were also significantly and independently associated with rural self-efficacy score: encounter with a doctor as a role model and general medicine orientation, for both men and women; and lower grade academic year, graduation from public high school and not failed entrance exam, for men.

Conclusions: The present study suggests that medical schools might recruit medical students with higher rural self-efficacy score and have to foster their rural-oriented attitudes in order to provide physicians to rural areas.

Keywords:

intent, Japan, medical student, rural practice, rural self-efficacy.

FULL ARTICLE:

Introduction

In Japan, the absolute and relative shortage in the number of physicians has become a serious social problem. The number of doctors ranks in the lowest group in the OECD – 2.3 doctors per 10 000 population – and shows a shortage of about 140 000 doctors as compared with the OECD average¹. In addition, many doctors are concentrating on convenient urban areas, and the shortage of doctors working in rural areas is more serious. This problem has been an important social and political issue for several decades in Japan. Other western countries, such as Australia and USA, have similar problems and much research is being done to develop the recruitment and retention of rural practitioners².

According to findings that community-based education is very effective in fostering health personnel who respond to community needs^{3,4}, the community-based clerkship has been started in many medical schools around the world⁵⁻⁷. In Japan, in 2007, the model core curriculum was revised by the Ministry of Education, Culture, Sports, Science, and Technology⁸ and, in 2016, the revised model core curriculum was proposed again. It was shown that 'acquiring the ability to contribute to community healthcare by understanding the way of community healthcare and regional hygiene, current situation and problems' and 'learning the necessity and importance of community-based integrated and regional comprehensive care system through activities such as hygiene, medical, welfare, nursing etc.' is done through community-based medical training⁹. However, the study only investigated the change in participant views before and after the clerkship¹⁰; few studies focus specifically on exploring the characteristics of medical students that will predict their intention

for rural practice¹¹⁻¹⁴. In western countries some studies have been done to explore rural-oriented attitudes among medical students^{15,16}. Thus, identification of these relationships between various characteristics and their intent for rural practice will assist Japanese medical schools to effectively recruit and foster future rural physicians.

This study involved a cross-sectional survey among medical students in Japan to develop questionnaire items that measure self-efficacy of intent for rural practice based on the portfolio of the students who experienced community medicine clerkships.

Methods

Participants

This study was designed as a cross-sectional survey. The authors conducted a survey of 1st–6th year medical students from one Japanese regional university school of medicine. Every May, a five-page entry questionnaire was administered in a class within the first 4 weeks of the start of medical school. (In Japan, the academic year begins in April.)

Questionnaire development

The authors extracted candidate items that measure self-efficacy of intent for rural practice based on the portfolio of Ehime University School of Medicine 5th year students who experienced community medicine clerkships. They experienced 1-week community medicine clerkships by interprofessional cooperation in two rural areas. They were obligated to record their clerkship experiences on a daily reflection sheet. All reflection sheets were analyzed to understand how the students learned during their clerkships. The authors extracted all points considered to be examples of learning

from the students' descriptions, and classified them by content, and also extracted examples of learning about rural practice¹⁷. Also examined was deepening of levels in community medicine to present 'expressing experience', 'impressions', 'general experience' and 'future specific actions'. In addition, the authors referred to variables used in studies by Takeda et al.¹⁸⁻²⁰ proposing a model of self-efficacy measuring intent for rural practice. Finally, 32 items were selected that included family and personal issues, professional issues, interprofessional practice, community and social issues, and learning skills (see Appendix A).

Questionnaire content

A self-administered questionnaire was used, enquiring about background factors and intent for rural practice. Sociodemographic questions regarding gender, age, academic year (1-3, 4-6), admission from hometown, graduation from public high school, combined junior high and high school graduation, have failed entrance exam, experience in admission to another university, parents as doctors, encounter with a doctor as a role model, scholarship for regional duty (*chiiki-waku*), admission by school recommendation, size of hometown of residence until age 18 years (eg capital city, regional, rural) and general medicine orientation were included. Influence of the responses to the candidate item extracted by the pilot survey was rated on a four-point Likert scale (4='extremely well', 3='fairly well', 2='not particularly', 1='not at all'). Participants were asked whether they were willing to practice in a rural area (1='positively motivated', 2='willing to work for a certain period of time', 3='would rather avoid it', 4='never', 5='other').

Statistical analyses

Statistical analysis was performed using the Statistical Package for the Social Sciences v21 (IBM; <http://www.spss.com>). Results were shown by gender because Japanese medical students have dichotomized some motivations for their practice preference based on gender²¹. Data are presented as mean±standard deviation (SD) unless otherwise specified, and in the cases of parameters with non-normal distributions the data have been log-transformed for analysis. Differences were analyzed by student *t*-test or χ^2 test. From 32 candidate items measuring self-efficacy of intent for rural practice (Appendix A), items were selected that were significantly related to intent for rural practice in the future. The factor analysis was conducted with SPSS using a maximum likelihood method and promax rotation. In each item, mean±SD

was calculated, and items showing a ceiling effect (≥ 3.2) or floor effect (< 1.2) were excluded from the analysis. In order to decide the number of factors, a scree plot, which shows the eigenvalues on the *y*-axis and the number of factors on the *x*-axis, was generated, and a cut-off of eigenvalue was set to be greater than 1. Item retention was based on coefficient values (factor loadings ≥ 0.35), and those showing a similar factor loading in more than two factors were excluded, then the factor analysis was repeated. Cronbach's α coefficient was calculated for each factor to determine its scale reliability, as well as a mean score and SD. Logistic regression analysis (backward elimination method) was used to evaluate the contribution of each confounding factor for the participants' intent for rural practice. In addition, multiple linear regression analysis using rural self-efficacy score as an objective variable, adjusted for confounding factors as explanatory variables, was performed. A value of $p < 0.05$ was considered significant.

Ethics approval

The study was approved by the ethics committee of the Ehime University Graduate School of Medicine (IRB1507004), and informed consent was obtained from all subjects.

Results

Characteristics of medical students

Table 1 shows characteristics of medical students who participated in the study. The subjects comprised 166 women aged 22±2 (range 19-34) years and 243 men aged 23±3 (range 18-41) years. The participants were from academic years 1-3 (60.9%) and 4-6 (39.1%). In male participants, prevalence of the following factors was significantly higher than for women: academic years 1-3, from hometown, graduation from public high school, have failed entrance exam, experience in admission to another university and scholarship for regional duty. Combined junior high and high school graduation and admission by school recommendation were significantly lower. There were no gender differences regarding age, prevalence of doctors in parents, encounter with a doctor as a role model, hometown size until 18 years or general medicine orientation.

Figure 1 shows the prevalence of intent for rural practice by gender. A total of 83.5% of participants had positive intent for rural practice. There was no difference in gender with and without intent for rural practice.

Table 1: Characteristics of medical student study participants by gender

Characteristic (n=409)	Total (n (%)) (n=409)	Women (n (%)) (n=166)	Men (n (%)) (n=243)	p-value
Academic year 1-3 4-6	249 (60.9) 160 (39.1)	85 (51.2) 81 (48.8)	164 (67.5) 79 (32.5)	0.001**
Admission from hometown Yes No	218 (53.3) 191 (46.7)	72 (43.4) 94 (56.6)	146 (60.1) 97 (39.9)	0.001**
Graduation from public high school Yes No	208 (50.9) 201 (49.1)	68 (41.0) 98 (59.0)	140 (57.6) 103 (42.4)	0.001**
Combined junior high and high school graduation Yes No	202 (49.4) 207 (50.6)	93 (56.0) 73 (44.0)	109 (44.9) 134 (55.1)	0.027*
Have failed entrance exam Yes No	196 (47.9) 213 (52.1)	68 (41.0) 98 (59.0)	128 (52.7) 115 (47.3)	0.021*
Experience in admission to another university Yes No	42 (10.3) 367 (89.7)	9 (5.4) 157 (94.6)	33 (13.6) 210 (86.4)	0.008**
Doctor in parents Yes No	126 (30.8) 283 (69.2)	50 (30.1) 116 (69.9)	76 (31.3) 167 (68.7)	0.828
Encounter with a doctor as a role model Yes No	169 (41.3) 240 (58.7)	68 (41.0) 98 (59.0)	101 (41.6) 142 (58.4)	0.919
Scholarship for regional duty Yes No	110 (26.9) 299 (73.1)	33 (19.9) 133 (80.1)	77 (31.7) 166 (68.3)	0.009**
Admission by school recommendation Yes No	112 (27.4) 297 (72.6)	58 (34.9) 108 (65.1)	54 (22.2) 189 (77.8)	0.007**
Size of hometown until age 18 years <50 000 people (rural) 100 000~50 000 (regional) ≥100 000 (capital city)	52 (12.7) 70 (17.1) 287 (70.2)	16 (9.6) 29 (17.5) 121 (72.9)	36 (14.8) 41 (16.9) 166 (68.3)	0.302
General medicine oriented Yes No	267 (65.3) 142 (34.7)	103 (62.0) 63 (38.0)	164 (67.5) 79 (32.5)	0.290

*p<0.05, **p<0.01

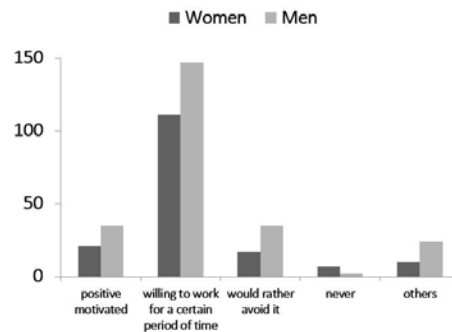


Figure 1: Prevalence of intention for rural practice by gender.

Factor analysis of rural self-efficacy items

Factor analysis yielded four factors that included 15 of the 32 items listed (Table 2); two items were excluded due to the ceiling effect; 15 items were excluded because of low loading factors (<0.35). The following four factors were defined based on the types of items that grouped together (Table 2).

- work preferences
- evaluation of rural practice
- evaluation of rural living
- personal character.

The four factors and the items that load on these factors are illustrated (Table 2). There were good factor loadings on all factors (0.424 to 0.890). This four factor (15 items) solution explained 46.8% of variance in responses. Cronbach's α coefficients demonstrated internal consistency: 0.813 for work preferences, 0.731 for evaluation of rural practice, 0.702 for evaluation of rural living and 0.747 for personal character. Overall score was 0.849, which is considered acceptable for newly developed scales. The lowest score was 27 points and the highest was 59 points, with higher scores indicating stronger intent for rural practice. The intercorrelations between the four factors are shown in Table 2; all interfactor correlations were significantly positive.

Table 2: Factor analysis of rural self-efficacy items

Item	Factor			
	Work preferences	Evaluation of rural practice	Evaluation of rural living	Personal character
Work preferences (Chronbach's $\alpha=0.813$)				
9. I would like to be concerned with a patient's life through treatment.	0.890*	-0.083	0.008	-0.102
10. I would like to support the patient also in the field of welfare.	0.747*	0.057	-0.011	-0.021
13. I want to be a doctor who walks with the patient and thinks of the patient's problems together.	0.684*	0.062	-0.072	0.018
11. I would like to care the patient continuously from the early stage.	0.557*	0.007	0.049	0.077
15. I am interested in patients (eg children and elderly people) themselves.	0.495*	-0.026	-0.012	0.165
Evaluation of rural practice (Chronbach's $\alpha=0.731$)				
31. There are many opportunities in rural areas leading to their career improvement.	-0.001	0.747*	-0.073	-0.003
25. Working in a rural area provides more opportunity to practice a variety of skills.	-0.120	0.696*	-0.036	0.089
18. Possibilities are felt for the community medicine in rural areas.	-0.017	0.467*	0.231	-0.104
32. I am interested in research activities with rural field as a field.	0.161	0.459*	0.007	0.026
29. Rural practice provides greater opportunity of autonomy in work practice.	0.218	0.424*	0.080	-0.045
Evaluation of rural living (Chronbach's $\alpha=0.702$)				
5. Living in rural areas does not bother me.	0.062	-0.124	0.793*	-0.019
7. I would like to bring up a child in a rural area.	-0.039	0.093	0.608*	-0.059
27. There are things I enjoy doing in rural areas.	-0.082	0.094	0.588*	0.105
Personal character (Chronbach's $\alpha=0.747$)				
23. I like to talk with people.	-0.025	0.040	-0.088	0.758*
24. I like to talk with co-medical workers (nurses etc.).	0.133	-0.035	0.097	0.720*
Contribution ratio (%)	29.6	8.3	4.6	4.2
Cumulative contribution ratio (%)	29.6	37.9	42.5	46.8
Interfactor correlation				
Work preferences	1.000			
Evaluation of rural practice	0.470	1.000		
Evaluation of rural living	0.427	0.532	1.000	
Personal character	0.560	0.415	0.374	1.000

* $p<0.05$

Items 6 and 30 excluded from factor analysis because of ceiling effect. Items 1-4, 8, 12, 14, 16, 17, 19, 20, 21, 22, 26, 28 excluded because of low factor loading (<0.35).

Score distribution of rural self-efficacy items by gender

Table 3 illustrates score distribution of various items constituting the rural self-efficacy scale. 'I would like to be concerned with a patient's life through treatment', 'I want to be a doctor who walks

with the patient and thinks of the patient's problems together', and 'I am interested in patients (e.g. children and elderly people) themselves' were significantly higher for women than for men, but 'living in rural areas does not bother me' and 'there are things I enjoy doing in rural areas' were significantly higher for men.

Table 3: Score distribution of rural self-efficacy items by gender

Item	Total (mean±SD) (n=409)	Women (mean±SD) (n=166)	Men (mean±SD) (n=243)	p-value
Work preferences	15.3±2.5	15.7±2.6	15.0±2.4	0.008**
9. I would like to be concerned with a patient's life through treatment.	3.0±0.7	3.1±0.7	2.9±0.7	0.041*
10. I would like to support the patient also in the field of welfare.	3.0±0.7	3.0±0.7	2.9±0.6	0.137
13. I want to be a doctor who walks with the patient and thinks of the patient's problems together.	3.3±0.6	3.4±0.6	3.3±0.6	0.004**
11. I would like to care the patient continuously from the early stage.	3.1±0.6	3.1±0.6	3.1±0.6	0.352
15. I am interested in patients (eg children and elderly people) themselves.	2.9±0.7	3.0±0.8	2.8±0.7	0.009**
Evaluation of rural practice	14.1±2.3	14.1±2.3	14.0±2.3	0.915
31. There are many opportunities in rural areas leading to their career improvement.	2.8±0.7	2.7±0.8	2.8±0.6	0.744
25. Working in a rural area provides more opportunity to practice a variety of skills.	3.0±0.6	3.0±0.6	3.0±0.6	0.457
18. Possibilities are felt for the community medicine in rural areas.	2.8±0.7	2.8±0.7	2.8±0.7	0.595
32. I am interested in research activities with rural field as a field.	2.4±0.8	2.4±0.7	2.4±0.8	0.702
29. Rural practice provides greater opportunity of autonomy in work practice.	3.1±0.6	3.1±0.6	3.1±0.6	0.963
Rural living	8.3±1.8	8.0±1.9	8.5±1.8	0.006**
5. Living in rural areas does not bother me.	2.9±0.8	2.8±0.8	3.0±0.8	0.007**
7. I would like to bring up a child in a rural area.	2.7±0.8	2.7±0.7	2.7±0.8	0.547
27. There are things I enjoy doing in rural areas.	2.7±0.7	2.6±0.7	2.8±0.7	0.001**
Personal character	5.9±1.1	5.9±1.3	6.0±1.0	0.391
23. I like to talk with people.	2.9±0.7	2.9±0.7	3.0±0.6	0.329
24. I like to talk with co-medical workers (nurses etc.).	3.0±0.6	3.0±0.7	3.0±0.6	0.587
Total	43.6±5.9	43.6±6.3	43.6±5.5	0.869

* $p<0.05$, ** $p<0.01$
SD, standard deviation

Relationship between intent for rural practice and rural self-efficacy score by gender

The relationship between the intent for rural practice and rural self-efficacy score by gender is shown in Figure 2. The average

score was 43±6 in women and 44±6 in men. There was no difference for gender. A relationship between rural self-efficacy score was significantly increased with stronger intent for rural practice in both men and women.

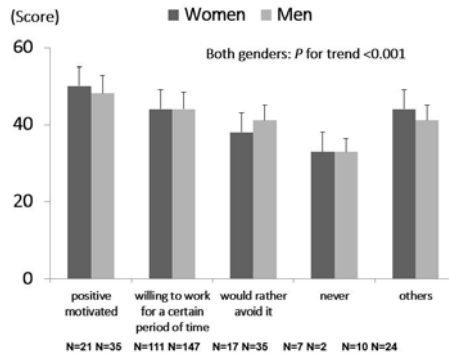


Figure 2: Intention for rural practice and rural self-efficacy score by gender.

Simple relationship between rural self-efficacy score and the intent for rural practice by gender

factors of the rural self-efficacy score by simple logistic regression analysis. All factors were significantly associated with positive intent for rural practice in both men and women.

Table 4 illustrates the odds ratios for the total and each of four

Table 4: Simple relationship between rural self-efficacy score and intent for rural practice by gender

Factor	Characteristic (total) (n=409)		Characteristic (women) (n=166)		Characteristic (men) (n=243)	
	Positive motivated + willing for certain period [†] (OR (95%CI))	Positive motivated [‡] (OR (95%CI))	Positive motivated + willing for certain period [†] (OR (95%CI))	Positive motivated [‡] (OR (95%CI))	Positive motivated + willing for certain period [†] (OR (95%CI))	Positive motivated [‡] OR (95%CI)
Total	1.24 (1.16–1.32)*	1.21 (1.14–1.29)*	1.39 (1.22–1.59)*	1.24 (1.13–1.37)*	1.18 (1.09–1.27)*	1.20 (1.11–1.29)*
Individual						
Work preferences	1.34 (1.19–1.51)*	1.31 (1.16–1.49)*	1.49 (1.23–1.82)*	1.50 (1.20–1.87)*	1.23 (1.06–1.44)*	1.24 (1.05–1.46)*
Evaluation of rural practice	1.50 (1.30–1.74)*	1.38 (1.21–1.58)*	1.79 (1.36–2.36)*	1.52 (1.22–1.90)*	1.38 (1.17–1.64)*	1.31 (1.10–1.54)*
Rural living	1.75 (1.47–2.08)*	2.06 (1.65–2.56)*	2.17 (1.60–2.95)*	2.15 (1.49–3.11)*	1.59 (1.27–1.98)*	2.02 (1.53–2.66)*
Personal character	1.51 (1.19–1.91)*	1.80 (1.35–2.40)*	1.93 (1.33–2.79)*	1.92 (1.24–2.97)*	1.24 (0.89–1.73)	1.72 (1.17–2.53)*

*p<0.05
[†] Versus 'rather avoid' or 'never'.
[‡] Versus 'willing for certain period', 'rather avoid' or 'never'.
 CI, confidence interval. OR, odds ratio.

Characteristics of participants and rural self-efficacy score by gender

medicine orientation, for both men and women; and academic years 1–3, graduation from public high school and regional to rural hometown in men. Male students with combined junior high and high school graduation had significantly lower scores than other students. There were no relationship between the score and other characteristics.

A relationship between characteristics and rural self-efficacy is shown in Table 5. Significantly higher rural self-efficacy scores were shown in for encounter with a doctor as a role model and general

Table 5: Characteristics of participants and rural self-efficacy score by gender

Characteristic (n=409)	Women (n=166)			Men (n=243)		
	n	Mean±SD	p-value	n	Mean±SD	p-value
Academic year						
1-3	85	43.9±6.0	0.586	164	44.2±5.6	0.010*
4-6	81	43.4±6.7		79	42.2±5.1	
Admission from hometown						
Yes	72	43.2±6.2	0.422	146	44.0±5.3	0.149
No	94	44.0±6.4		97	42.9±5.9	
Graduation from public high school						
Yes	68	43.1±5.9	0.332	140	44.5±5.1	0.003**
No	98	44.0±6.6		103	42.3±5.9	
Combined junior high and high school graduation						
Yes	93	43.6±6.2	0.962	109	42.4±5.8	0.003**
No	73	43.7±6.4		134	44.5±5.2	
Student who have failed entrance exam						
Yes	68	43.6±6.8	0.964	128	43.2±5.1	0.319
No	98	43.7±6.0		115	43.9±6.0	
Experience in admission to another university						
Yes	9	47.0±8.4	0.101	33	42.6±6.2	0.280
No	157	43.5±6.1		210	43.7±5.4	
Doctor in parents						
Yes	50	43.5±5.3	0.868	76	43.5±6.0	0.929
No	116	43.7±6.7		167	43.6±5.3	
Encounter with a doctor as a role model						
Yes	68	45.0±6.2	0.022*	101	45.6±5.6	<0.001***
No	98	42.7±6.3		142	42.1±5.1	
Scholarship for regional duty						
Yes	33	43.6±6.9	0.944	77	44.1±5.5	0.276
No	133	43.7±6.2		166	43.3±5.5	
Admission by school recommendation						
Yes	58	43.9±6.1	0.746	54	44.8±4.5	0.053
No	108	43.5±6.4		189	43.2±5.8	
Size of hometown until age 18 years						
≥100 000 (capital city)	121	43.7±6.3	0.766	166	42.9±5.5	0.012*
100 000~50 000 (regional)	29	43.9±6.2		41	44.0±5.4	
<50 000 people (rural)	16	42.6±6.8		38	45.9±5.3	
General medicine oriented						
Yes	103	44.6±5.8	0.016*	164	44.4±5.4	<0.001***
No	83	42.1±6.9		79	41.7±5.3	

*p<0.05, **p<0.01, ***p<0.001
SD, standard deviation.

Multivariate-adjusted relationship between rural self-efficacy score and intent for rural practice by gender

Table 6 illustrates the odds ratios for the four factors of rural self-efficacy by multivariate logistic regression analysis using the intent

for rural practice, adjusted for all confounding factors. The overall rural self-efficacy score and the scores for work preferences, evaluation of rural practice and evaluation of rural living showed a significant and independently positive association with the intent for rural practice.

Table 6: Multivariate-adjusted relationship between confounding factors including rural self-efficacy score and intent for rural practice by gender

Factor	Characteristic (total) (n=409)		Characteristic (women) (n=166)		Characteristic (men) (n=243)	
	Positive motivated + willing for certain period ¹ (OR (95%CI))	Positive motivated ² (OR (95%CI))	Positive motivated + willing for certain period ¹ (OR (95%CI))	Positive motivated ² (OR (95%CI))	Positive motivated + willing for certain period ¹ (OR (95%CI))	Positive motivated ² (OR (95%CI))
Total ³	1.24 (1.16-1.32)*	1.21 (1.14-1.29)*	1.43 (1.24-1.64)*	1.27 (1.15-1.41)*	1.17 (1.08-1.26)*	1.21 (1.10-1.32)*
Individual ³						
Work preferences	1.17 (1.03-1.34)*	-	1.53 (1.16-2.01)*	-	-	-
Evaluation of rural practice	1.25 (1.06-1.47)*	1.20 (1.04-1.39)*	-	1.32 (1.03-1.70)*	1.23 (1.02-1.49)*	-
Rural living	1.52 (1.25-1.84)*	1.93 (1.53-2.43)*	2.16 (1.50-3.12)*	1.99 (1.33-2.98)*	1.47 (1.15-1.87)*	2.09 (1.56-2.79)*
Personal character	-	-	-	-	-	-

⁰p<0.05

¹ Versus 'rather avoid' or 'never'.

² Versus 'willing for certain period', 'rather avoid' or 'never'.

³ Adjusted for all confounding factors in Table 1.

CI, confidence interval. OR, odds ratio. -, not retained in final model by logistic regression analysis (backward elimination method).

Multivariate-adjusted relationship between confounding factors and rural self-efficacy score by gender

In Table 7, multiple linear regression analysis using rural self-efficacy score as an objective variable, adjusted for confounding factors as explanatory variables, showed that, for women,

encounter with a doctor as a role model and general medicine orientation and, for men, lower grade academic year, graduation from public high school and not failed entrance exam were also significantly and independently associated with rural self-efficacy score.

Table 7: Multivariate-adjusted relationship between confounding factors and rural self-efficacy score by gender

Characteristic (n=409)	Women (n=166)		Men (n=243)	
	β	p-value	β	p-value
Academic year (1–3=1, 4–6=2)	–	–	–0.146	0.033*
Graduation from public high school (Yes=1, No=0)	–	–	0.206	0.001**
Have failed entrance exam (Yes=1, No=0)	–	–	–0.125	0.033*
Encounter with a doctor as a role model (Yes=1, No=0)	0.179	0.019*	0.319	<0.001***
General medicine oriented (Yes=1, No=0)	0.188	0.014*	0.198	0.001**
R2	0.067	0.004**	0.215	<0.001***

*p<0.05, **p<0.01, ***p<0.001

β , standardized coefficients. –, not retained in final model by multiple linear regression analysis (stepwise method).

Discussion

In this current study, the authors developed a questionnaire that measures self-efficacy beliefs for intent for rural practice among Japanese medical students, and verified reliability and validity of the questionnaire. Four factors were identified as being associated with rural self-efficacy for rural practice: work preferences, evaluation of rural practice, evaluation of rural living, and personal character. Cronbach's α coefficient for the questionnaire was 0.849, which is acceptable for newly developed scales. The present study suggests that medical schools might recruit medical students with higher rural self-efficacy scores and have to foster their rural-oriented attitudes in order to provide physicians to rural areas.

Many studies have focused specifically on exploring characteristics and identifiers of medical students that will predict their intent for rural practice. However, few studies have explored important components of medical students' attitudes to future rural practice. Silagy and Piterman identified the factors that determine students' choices of training location as education and training (20% of variance), personal and social (12% of variance), view of spouse and partner (8% of variance); and the factors that determine students' choices of practice locations as professional (26% of variance), family (12% of variance) and community (9% of variance)²². Adams et al. identified four factors associated with student attitudes to living and working in rural areas: friendliness and support in rural areas (32% of variance), isolation and socialization problems associated with living and working in rural areas (14% of variance), enjoyable aspects of living in a rural area (9% of variance) and opportunities that working in a rural area provides (6% of variance)¹⁶. MacAuliffe and Barnett found that the influential factors identified in students considering rural employment included the rural location of their close family and friends, the overall occupational therapy program, good fieldwork experience and an inspiring fieldwork supervisor²³. Henry et al. demonstrated that the most significant influencing factors for rural careers are professional support at national, state and local levels; career pathway opportunities; contentedness of the practitioner's spouse in rural communities; preparedness to adopt a rural lifestyle; educational opportunities for children; and proximity to extended family and social circle²⁴. In this study for Japanese medical students, four factors – work preference, evaluation of rural practice, evaluation of rural living and personal character in a rural area – were identified, and these factors were very similar to previous tools.

The four identified factors reflect the experience of living and working in rural area, demonstrating personal issues, professional issues, social issues and community issues. The other studies clearly support that these factors exist in rural practice and are interrelated, and the resulting factors provide a more integrated reflection of the rural experience^{16,25}. In addition, the present study identified self-evaluation of personal character, which previous studies have not shown. Manahan et al. demonstrated that personal characteristics and experiences, as well as age and stage of life, rural background and location of family members, help shape personal values related to family, career, personal preferences and community, and that individual factors and personal preferences (eg need for adventure, wilderness and outdoor recreation) and community factors (eg people's friendliness and a slower pace) also influence practice location decision²⁶.

According to the reliability and validity findings, the rural self-efficacy score appears suitable for measuring students' attitudes. The results show potential to measure change in students' attitudes towards rural practice and life, and the authors are not aware of a similar tool in Japan. In future study, the authors need to develop the tool by re-analyzing the items to ensure new factors.

This study had some limitations. First, the cross-sectional study design does not eliminate potential causal relationships between characteristics of medical students and their intent for rural medicine. Second, this study was based on a limited number of students who belong to one regional university. Therefore, the demographics and referral source may limit generalizability. Third, the study measured students' intent for rural practice but not their actual choice of practice because students' intent was measured prior to residency. Fourth, this was a self-administered questionnaire developed for medical students in academic years 1–6, and some of the characteristics examined appeared to be suitable for upper grade students but not for lower grade students.

Conclusion

The present study identified four factors associated with rural-oriented attitudes to living and working in a rural area. Future research using longitudinal data collection will enable monitoring of the relationship between baseline rural self-efficacy score, community medicine clerkship and actual behavior.

REFERENCES:

- 1** OECD. 4.1 Consultations with doctors, number per capita. *OECD health at a glance 2013*. 2013; 85. Available: <https://www.oecd.org/els/health-systems/Health-at-a-Glance-2013.pdf> (Accessed 1 July 2018).
- 2** Margolis SA. Retaining rural medical practitioners: time for a new paradigm? *Rural and Remote Health* 2005; **5**: 393. Available: <http://www.rrh.org.au/journal/article/393> (Accessed 1 July 2018). PMID:15865482
- 3** World Health Organization. *Community-based education of health personnel. Report of a WHO study group*. World Health Organization technical report series 746. Geneva: World Health Organization, 1987.
- 4** Ezzat E. Role of the community in contemporary health professions education. *Medical Education* 1995; **29**: 44-52. <https://doi.org/10.1111/j.1365-2923.1995.tb02887.x> PMID:8992262
- 5** Habbick BF, Leeder SR. Orienting medical education to community need: a review. *Medical Education* 1996; **30**: 163-171. <https://doi.org/10.1111/j.1365-2923.1996.tb00738.x>
- 6** Murray E, Modell M. Community-based teaching: the challenges. *Journal of General Practice* 1999; **49**: 395-398.
- 7** Magzoub ME, Schmidt HG. A taxonomy of community-based medical education. *Academic Medicine* 2000; **75**: 699-707. <https://doi.org/10.1097/00001888-200007000-00011>
- 8** Coordinating Council on Revising the Model Core Curriculum. Model core curriculum in medical education, the guideline for the educational programme. 2007. Available: http://www.mext.go.jp/b_menu/shingi/chousa/koutou/033/toshin/1217987_1703.htm (Accessed 1 July 2018).
- 9** Model Core Curriculum Expert Research Committee. Model core curriculum for medical education in Japan. 2016. Available: http://www.mext.go.jp/component/a_menu/education/detail/_icsFiles/afieldfile/2018/06/18/1325989_30.pdf (Accessed 1 July 2018).
- 10** Okayama M, Kajii E. Does community-based education increase students' motivation to practice community health care? A cross sectional study. *BMC Medical Education* 2011; **11**: 19. <https://doi.org/10.1186/1472-6920-11-19> PMID:21569332
- 11** Matsumoto M, Inoue K, Kajii E. Characteristics of medical students with rural origin: implications for selective admission policies. *Health Policy* 2008; **87**: 194-202. <https://doi.org/10.1016/j.healthpol.2007.12.006> PMID:18243398
- 12** Matsumoto M, Kajii E. Medical education program with obligatory rural service: analysis of factors associated with obligation compliance. *Health Policy* 2009; **90**: 125-132. <https://doi.org/10.1016/j.healthpol.2008.09.004> PMID:18945511
- 13** Inoue K, Matsumoto M, Toyokawa S, Kobayashi Y. Transition of physician distribution (1980-2002) in Japan and factors predicting future rural practice. *Rural and Remote Health* 2009; **9**: 1070. Available: <http://www.rrh.org.au/journal/article/1070> (Accessed 1 July 2018). PMID:19463042
- 14** Matsumoto M, Inoue K, Kajii E, Takeuchi K. Retention of physicians in rural Japan: concerted efforts of the government, prefectures, municipalities and medical schools. *Rural and Remote Health* 2010; **10**: 1432. Available: <http://www.rrh.org.au/journal/article/1432> (Accessed 1 July 2018). PMID:20528090
- 15** Blue AV, Chessman AW, Geesey ME, Garr DR, Kern DH, White AW. Medical students' perceptions of rural practice following a rural clerkship. *Family Medicine* 2004; **36**: 336-340. PMID:15129380
- 16** Adams ME, Dollard J, Hollins J, Petkov J. Development of a questionnaire measuring student attitudes to working and living in rural areas. *Rural and Remote Health* 2005; **5**: 327. Available: <http://www.rrh.org.au/journal/article/327> (Accessed 1 July 2018). PMID:15865474
- 17** Kawamoto R, Abe M, Kusunoki T. Student education and health promotion activities in community medicine. *Ehime Medical Journal* 2011; **30(4)**: 201-206.
- 18** Takeda Y, Morio K, Snell L, Otaki J, Takahashi M, Kai I. Characteristic profiles among students and junior doctors with specific career preferences. *BMC Medical Education* 2013; **13**: 125. <https://doi.org/10.1186/1472-6920-13-125> PMID:24028298
- 19** Isaac V, Walters L, McLachlan CS. Association between self-efficacy, career interest and rural career intent in Australian medical students with rural clinical school experience. *BMJ Open* 2015; **5**: e009574. <https://doi.org/10.1136/bmjopen-2015-009574> PMID:26671960
- 20** Kawamoto R, Uemoto A, Ninomiya D, Hasegawa Y, Ohtsuka N, Kusunoki T, et al. Characteristics of Japanese medical students associated with their intention for rural practice. *Rural and Remote Health* 2015; **15**: 3112. Available: <http://www.rrh.org.au/journal/article/3112> (Accessed 1 July 2018). PMID:26066764
- 21** Kawamoto R, Ninomiya D, Kasai Y, Kusunoki T, Ohtsuka N, Kumagi T, et al. Gender difference in preference of specialty as a career choice among Japanese medical students. *BMC Medical Education* 2016; **16**: 288. <https://doi.org/10.1186/s12909-016-0811-1> PMID:27829461
- 22** Silagy CA, Piterman L. Attitudes of senior medical students from two Australian schools towards rural training and practice. *Academic Medicine* 1991; **66**: 417-419. <https://doi.org/10.1097/00001888-199107000-00011>
- 23** McAuliffe T, Barnett F. Perceptions towards rural and remote practice: a study of final year occupational therapy students studying in a regional university in Australia. *Australian Occupational Therapy Journal* 2010; **57**: 293-300. <https://doi.org/10.1111/j.1440-1630.2009.00838.x> PMID:20868418
- 24** Henry JA, Edwards BJ, Crotty B. Why do medical graduates choose rural careers? *Rural and Remote Health* 2009; **9**: 1083. Available: <http://www.rrh.org.au/journal/article/1083> (Accessed 1 July 2018). <https://doi.org/10.22605/RRH1083> PMID:19257797
- 25** Tolhurst H, Stewart M. It depends what you expect from life – factors which influence medical students to choose a rural career. Available: <http://www.ruralhealth.org.au/7thNRHC/Papers>

APPENDIX I:

Appendix A: Questionnaire items about family and personal issues, professional issues, interprofessional practice, community and social issues, and learning skills

Please circle what is most applicable to you for each factor. (4. Extremely, 3. Fairly well, 2. Not particular, 1. Not at all)	
1.	I am social. 4 3 2 1
2.	I have a soul of self-sacrifice. 4 3 2 1
3.	I have a strong sense of responsibility. 4 3 2 1
4.	I like elderly people. 4 3 2 1
5.	Living in rural areas does not bother me. 4 3 2 1
6.	I like my hometown where I was born and raised. 4 3 2 1
7.	I would like to bring up a child in rural areas. 4 3 2 1
8.	I would like to participate in a local event. 4 3 2 1
9.	I would like to be concerned with the patient's life through medical treatment. 4 3 2 1
10.	I would like to support the patient also in the field of welfare. 4 3 2 1
11.	I would like to care the patient continuously from the early stage. 4 3 2 1
12.	I am interested in preventive medicine. 4 3 2 1
13.	I want to be a doctor who walks with the patient and thinks of the patient's problems together. 4 3 2 1
14.	I am interested in patient work content. 4 3 2 1
15.	I am interested in patients (eg children and elderly people) themselves. 4 3 2 1
16.	I think that it is appropriate for duty in rural areas. 4 3 2 1
17.	The community medicine in rural areas is likely to be challenging. 4 3 2 1
18.	Possibilities are felt for the community medicine in rural areas. 4 3 2 1
19.	I am confident that I will be responsible for regional medical care in rural areas. 4 3 2 1
20.	I would like to become a generalist which will treat a broad domain. 4 3 2 1
21.	I would like to work at a clinic in the future. 4 3 2 1
22.	In the future, I would like to work at a regional core hospital as a life work. 4 3 2 1
23.	I like to talk with persons in rural areas. 4 3 2 1
24.	I like to talk with co-medical workers (nurses, etc.). 4 3 2 1
25.	Working in a rural area provides more opportunity to practice a variety of skills. 4 3 2 1
26.	I would like to be engaged in interprofessional work in rural areas. 4 3 2 1
27.	There are things I enjoy doing in rural areas. 4 3 2 1
28.	People in rural areas are very friendly. 4 3 2 1
29.	Rural practice provides greater opportunity of autonomy in work practice. 4 3 2 1
30.	It is not only doctor's job to cure illness. 4 3 2 1
31.	There are many opportunities in rural areas leading to their career improvement. 4 3 2 1
32.	I am interested in research activities with rural field as a field. 4 3 2 1

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