Validation of the care providers version of the Rainbow Model of Integrated Care-Measurement Tool in Chinese primary care systems

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Abstract

**Background:** The original Rainbow Model of Integrated Care Measurement Tool (RMIC-MT) is based on the Rainbow Model of Integrated Care, which provides a comprehensive theoretical framework for integrated care. To translate and adapt the original care provider version of the Rainbow Model of Integrated Care-Measurement Tool and evaluate its psychometric properties by a pilot study in Chinese primary care systems.

**Methods:** The translation and adaptation process were performed in four steps, forward and back-translation, expert review and pre-testing. We conducted a cross-sectional study with 1610 community care professionals in all 79 community health stations in the Nanshan district. We analyzed the distribution of responses to each item to study the psychometric sensitivity. Exploratory factor analysis with principal axis extraction method and promax rotation was used to assess the construct validity. Pearson’s correlation was used to assess concurrent validity. Cronbach’s alpha was utilized to ascertain the internal consistency reliability. Lastly, confirmation factor analysis was used to evaluate the exploratory factor analysis model fit.

**Results:** During the translation and adaptation process, all 55 items were retained with some detailed modifications. No item was found to have psychometric sensitivity problems. Eight factors were determined by exploratory factor analysis, accounting for 66.41% of the total variance. According to exploratory factor analysis and discussion with all authors, the original ten dimensions were adjusted to nine dimensions in the Chinese version. A standard Cronbach’s alpha of 0.960 and significant correlation among all items in the scale (>0.4) showed good internal
consistency reliability of the tool. And, the model passed the majority of goodness-to-fit test by confirmation factor analysis

**Conclusions:** The results showed initial satisfactory psychometric properties for the validation of the RMIC-MT care provider version. Its application in China will promote the development of people-centered integrated primary care. However, further psychometric testing is needed in multiple primary care settings with both public and private community institutes.

**Background**

Health systems in some low- and middle-income countries, as well as in most high-income countries, face the challenges of aging populations and rising chronic disease prevalence [1, 2]. These growing challenges call for more integrated approaches instead of the current single-disease and acute-care-focused health care systems. The World Health Organization (WHO) acknowledges integrated care in its vision and global strategy for health care delivery [3]. There has been a proliferation of integrated care initiatives in many different countries and settings [4]. Furthermore, some researches have demonstrated that integrated care contributes to improved population health and individual experiences of care, thus reducing costs of per capita care, commonly referred to as the Triple Aim [5–7]. While the aims are promising, integrated care remains a complex health intervention involving multiple levels of organizations with multiple care providers, multiple interventions, and multiple contextual factors that can influence processes and outcomes of care delivery [8, 9]. Measuring care providers’ experience and behavior in a consistent way is critical for evaluation of the implementation of integration interventions and advancement of the success of health care integration.
[10], since multiple care providers are the final driver of providing integrated care. Several instruments have been developed for the assessment of integrated care [11-13]. For example, Suter et al, identified 114 instruments, over half of which were self-reporting questionnaires that measured care coordination and patient and family involvement, by a knowledge synthesis of indicators and measurement tools for health system integration [12]. Bautista et al conducted a comprehensive systematic review based on the Rainbow Model of Integrated Care (RMIC) [11]. They also confirmed that patient-focused dimensions, such as patient-centered care and care integration, were the most common measuring constructs in majority of studies. Furthermore, they found that less than half of the instrument validation studies were of good quality for the measurement of properties. Only a few research reports assessed integrated care from the perspective of healthcare professionals [14-16]. Stephenson et al, performed a rapid review of all quantitative surveys and qualitative research studies to assess healthcare professionals’ experiences with integrated care [14]. They reported that the common dimensions of existing quantitative surveys were communication, agreement on clear roles and responsibilities, facilities, information systems, coordination of care and access, which missed some deeper aspects affecting teamwork such as trust between and among providers, and management in the institutes [17]. In summary, there are three deficiencies of the existing instruments. First, it remains an area for potential validated instruments to assess integrated care from the perspective of multiple care providers. Second, organizational & system integration dimensions and normative enabling factors are not addressed in current instruments. Third, weak psychometric validity and reliability measurement of current instruments. The RMIC was developed as a result of literature reviews in primary care settings,
and was validated by a series of Delphi panels and a panel of international experts [18]. Subsequently, the Triple Aim framework was synthesized into the model by Delphi studies with an interdisciplinary panel of experts [19]. The RMIC distinguishes four integrated care dimensions (clinical integration, professional integration, organizational integration, system integration), two enablers (functional integration, and normative integration) at micro-, meso- and macro-levels, two guiding principles of integration (person-focused care and population-based care), and the three interrelated outcome dimensions (population health, experience of care and cost). The RMIC provides a comprehensive framework for integrated care from the perspectives of both patients and care providers, combining the implementation and outcome measurement of integrated care. Based on the RMIC and more than 300 integrated care instruments for healthcare providers and patients, the RMIC-MT (measurement tool) was developed. In addition to micro-level measurements in previous quantitative surveys, RMIC-MT care provider version adopted items at meso- and macro-levels, such as regional healthcare context and performance management, which may more deeply influence the implementation of healthcare integration [20].

The RMIC-MT was developed in the Dutch language and validated in the Netherlands [21]. It has been translated into English and cross-culturally adapted for use in Singapore [22]. In the last year, pre-testing, field-testing and validation studies for psychometric properties testing of the RMIC-MT have been conducted in 19 countries, and the publication will come out soon [23]. This study aimed to validate the Chinese RMIC-MT care provider version in the context of the implementation of integrated primary care [18]. Application of this tool could promote regular evaluation of integrated care and further implementation of integrated health
Methods

The original English RMIC-MT care provider version was received from the developer [24], and permission was obtained for its validation in Chinese primary health systems. The validation was conducted in two phases, the translation and adaptation process, and the assessment of psychometric properties.

The structure and scoring of the original RMIC-MT care provider version

Based on the dimensions in the Rainbow Model, The original RMIC-MT care provider version consists of 55 items grouped into nine dimensions: (1) Person-centeredness (5 items), (2) Community-centeredness (4 items), (3) Care Integration (7 items), (4) Organizational Integration (7 items), (5) Organizational Adaptive Reverse (7 items), (6) System Integration (partnership, 4 items), (7) System Integration (laws and regulations, 3 items), (8) Functional Integration (internal, 6 items), (9) Functional Integration (external, 4 items), (10) Normative Integration (8 items). With review of integrated care instruments and pilot testing, the developer (P.V.) added the tenth dimension “Adaptive Reserve” with 7 items. Items in dimensions 1, 2, 5, 6, and 10 are answered on a 5-point Likert scale ranging from “strongly disagree” to “strongly agree”, with rating scores from 1 to 5. Items in the dimensions 3, 7, 8, and 9 are answered on a 5-point Likert scale ranging from “never” to “always”, with rating scores from 1 to 5. There are five reverse questions (items 17, 18, 19, 22, 23) in the dimension “Care Integration”, which are also answered on a 5-point Likert scale ranging from “never” to “always” with rating scores from 5 to 1. The total RMIC-MT care provider score is computed by summing the scores on each item, with a maximum score of 275 points.
The translation and adaptation process

According to Harkness and Streiner [25,26], we utilized a four-step systematic approach for the translation and adaptation process: forward translation, back-translation, expert reviews, and pre-testing of content validity.

1. **Forward translation**

Two postgraduate students with Chinese as their first language, and majoring in Health Economics and Policy (HEP), independently translated the RMIC-MT-Staff into Chinese independently. By comparing the two forward translated versions, the author (X.W.) reviewed the differences and discussed them with the two translators until they all agreed on a reconciled Chinese version 1.0 (CV1.0).

2. **Back-translation**

The CV1.0 was translated back into English by two PhD candidates majoring in HEP, who had never read the original English version. Both translators are bilingual translators with English as their first language. The back-translated and original English versions were compared and discussed with the author (X.W.) and the two translators with the aim of reaching satisfactory equivalence between CV2.0 and EV1.0.

3. **Expert review**

Semi-structured interviews were conducted independently with four Chinese experts working on integrated care or primary care to obtain their reflections on the suitability of the CV2.0 of the RMIC-MT care provider version for use and the reasons underpinning the responses. The CV3.0 was obtained based on the experts’ reflections.

4. **Pre-testing for assessment of face and content validity**

Pre-testing was conducted with two policy makers and 12 community care
professionals (CCPs). Through a face-to-face interview, each participant was asked to review each item on the CV3.0, and comment on wording, the length of the survey, and the relevance of the items in the Chinese setting. The relevant items were rated as 1 and the unnecessary items rated as 0, and a content validation index was calculated to test content validity of the CV3.0. After the pre-testing phase, two researchers (X.W. and P.V.) discussed the final modification.

The pilot test of the RMIC-MT care provider version

Sampling and data collection

After the translation and adaptation process, the final version was used in a pilot study that launched the establishment of a medical consortium. In April 2017, the General Office of the State Council issued a guideline for constructing medical consortia [27], making them a main means for achieving people-centered integrated care. As a response to the new policy, policymakers in Nanshan began construction of a medical consortium with the purpose of strengthening cooperation between hospital care and community care, especially enhancing community care. There are 79 community health stations (CHSs) in the Nanshan district under the unified management of the medical consortium. In these 79 stations are 1784 working CCPs, including general practitioners (GP), nurses, public health physicians and the others, who were invited to complete the survey. Data were collected by using an online data collection tool “SO JUMP [28]”. In July 2018, links to the online questionnaire were sent to all potential participants’ mailboxes through an automatic office system. Once the online questionnaire was completed, it was re-submitted to “SO JUMP”. After logging in, authors could immediately download all original data.

Data analysis
Scales with more than 30% missing data were excluded from the analysis. After the cleaned data were entered, psychometric sensitivity, construct validity, concurrent validity and internal consistency were analyzed for the assessment of psychometric properties of the RMIC-MT care provider version by SPSS 20 and Amos.

1. Psychometric sensitivity

Distribution of responses to each item was analyzed for the study of psychometric sensitivity. Items with skewness value > 3 and kurtosis value > 7 [29], or items with a floor or ceiling effects of >75% of respondents, were considered for deleting as sensitivity problems [30].

2. Validity

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett’s test of sphericity were used first to determine if exploratory factor analysis (EFA) could be conducted [31,32]. With a KMO value over 0.8 and a significant Bartlett’s test, EFA analysis could be conducted to assess construct validity [33]. EFA with principal axis factoring extraction method and promax rotation were used to assess the underlying structure. EFA and promax rotation in this study followed the description by Brown [34,35]. The number of factors was determined by consideration of the eigenvalue (>1), scree plot, and interpretability of the factor. More importantly, the factors retained had to be guided theoretically. Items that cross-loaded on more than one factors were placed with the factor that was most closely related conceptually. Items with poor factor loading (<0.4) were removed from the questionnaires.

In addition to construct validity, concurrent validity was assessed by the calculation of Pearson’s correlations between the scale scores and two overall perceived coordination questions within the questionnaires. The two questions were,” how do
you rate coordination among CCPs inside and outside your CHS?” Respondents rated the questions with scores of 1-10, from extremely bad (1 score) to extremely good (10 score). Moderately positive associations (0.4) between the score of the scale and these correlations would indicate good concurrent validity [36].

3. Internal consistency reliability
Based on potential modification in the above two phases, internal consistency reliability was assessed by items-total correlations and Cronbach’s alpha. Items-total correlations coefficients between items within a scale should be 0.4 [37]. If Cronbach’s alpha ranged between 0.70 and 0.95, the scale was considered reliable for use in the sample population [38]. Moreover, Pearson correlation coefficients were calculated to assess whether each item was correlated the highest on an assigned subscale by correlation of items with the subscale means. If no correlation was achieved, the item would be eliminated [39].

4. Goodness to fit factor model
Confirmation factor analysis was used to evaluate the explorative factor analysis model fit by using the standard fit indices: root-mean-square error of approximation RMSEA (≤0.06), standardized root-mean-square residual (SRMR) (≤0.08), comparative fit index (CFI) (≥0.80), Tucker-Lewis index (TLI) (≥0.80).

Results
The translation and adaptation process
The back-translation and the original version were basically identical. Only a few words were modified because it was difficult to find words in Chinese conveying the same meaning. For example, the word “coordinate” was replaced by “borrow or rent” in item 26, and by “expert consultation” in item 27. ‘Coordinate’ is a word not
commonly used in daily life and has general meaning in Chinese. The distinction between “discipline” and “professional” is not familiar in Chinese. During the expert review, four experts gave some suggestions fitting Chinese primary care systems. For example, they suggested taking GPs and public health physicians as members of a multidisciplinary team, rather than psychologist and dietitian in item 15 of the original version. They suggested deleting “transfer” in item 11, since it is not the health institutes’ responsibility to transfer patients except in an emergency. Additionally, the experts suggested reordering the ten dimensions in the original version, to make it more easily understood for completion by Chinese-speaking individuals. In the pre-testing, the content validity analysis showed a content validation index of 0.84, which is slightly higher than the recommended level of 0.80. Some of the 14 participants in the pre-testing replied that they had difficulty in imagining the specific scenario described in the question, so they suggested more detailed examples, such as a specific action or regulation. After discussions with the developer (P.V.) of the original RMIC-MT care providers version, the author (X.W.) kept all 55 items and made some detailed modifications (Table 1).

Psychometric results

Among all 1784 CCPs in 79 CHSs of Nanshan district, 1610 (90.4%) replied to our invitation. Table 2 summarizes the characteristics of the participants.

1. Psychometric sensitivity

Distribution analysis of responses to each item showed that there was no item with a skewness value >3 or kurtosis > 7, and there was no item with a floor or ceiling effect of >75%. No item was deleted because of psychometric sensitivity.

2. Validity

Construct validity was assessed by EFA. The KMO value of 0.963 and significant
Bartlett’s test met the requirements for factor analysis. In the EFA, eight factors were determined by eigenvalues (>1), accounting for 66.41% of the total variance (Table 3).

Items in three dimensions of the original version, Functional Integration (internal and external) and Normative Integration, were also determined by three factors in the EFA. Items in Person-centeredness and Community-centeredness dimensions and items 24/25/26 in the Adaptive Reserve dimension of the original version shared the same factor. According to the RMIC, both Person-centeredness and Community-centeredness are guiding principles of integration. Compared with the rest of the items in the Adaptive Reserve dimension tested from the perspective of health organization, items 24/25/26 were tested from the perspective of care providers. The three items dealt with whether staff could adapt based on the needs of patients. Therefore, we believe that it was reasonable to combine them and name the factor “person-centeredness”. The Adaptive Reserve dimension with the remaining items was renamed “Organizational Adaptive Reverse”. All items in the dimensions “Care Integration, System Integration (partnership), System Integration (laws and regulations)” shared a factor. Interviews with two GPs and two nurses provided a potential reason. All CHSs we surveyed are public CHSs, under the unified management of the medical consortium, sharing the same regional regulations of internal care coordination. All CHSs also obey the same regulations about regional partnership. Answers to items in the three dimensions are highly homogeneous. Extrapolating its application to other Chinese primary care systems, we decided to combine System Integration (partnership) and System Integration (laws and regulations) (named “System integration”) and keep “Care Integration” independently. Two factors were extracted from the dimension Organizational
Integration in the original tool in the EFA. Items 33/34 shared a factor, and the others shared another factor. Items 33/34 address coordination between two outside CHSs, while the other items address coordination between the surveyed CHS and an outside CHS. We believe that it is reasonable to rename items 33/34 “Organizational Integration (external)” and rename items related to organizational coordination with other organizations as “Organizational integration (internal)”. Table 4 shows the new nine dimensions with 55 items.

Pearson’s correlations between the RMIC-MT-Staff care provider version total score and two overall perceived coordination questions showed good concurrent validity. The correlation coefficient between total score and the question “How do you rate coordination among CCPs inside your CHS?” was 0.491 (p<0.01), while that between total score and the question “How do you rate coordination among CCPs outside your CHS?” was 0.532 (p<0.01).

3. **Internal consistency reliability**

Internal consistency reliability of the RMIC-MT care provider version was excellent, with a standard Cronbach’s alpha of 0.960. Correlation coefficients between/among all items in the scale were >0.4. Pearson correlation between/among items with the nine dimensions demonstrated that all items correlated the highest on the assigned dimensions.

4. **Goodness to fit factor model**

A structural equation model with maximum likelihood evaluated he proposal model fit with RMSEA 0.061, SRMR 0.075, CFI 0.868, TLI 0.860. The model passed the majority of goodness-to-fit test by confirmation factor analysis.

Discussion
Integrated care can be achieved only by changing the behaviors of health professions. Given this, it is essential for researchers and policy-makers to measure and evaluate the implementation of integrated care from the perspective of care providers. This study provides the first assessment of the validity and reliability of the Chinese RMIC-MT care provider version. It was used to measure integrated primary care from the perspective of CCPs.

The translation and adaptation methodology used in this study, including forward and back-translation, expert reviews, and pre-testing, has been proved to be a reliable method for adapting measures for cross-cultural research [40]. The cultural adaptation was conducted throughout expert reviews and pre-testing. Extensive discussions with Chinese experts working on integrated primary care and the developer of the original RMIC-MT not only adapted the instrument adapted to Chinese primary care systems but also maintained the essential dimensions of Rainbow Model.

Distribution analysis indicated no psychometric sensitivity problems for all 55 items. Few missing values indicated that the instrument was easy to complete. The validity of the RMIC-MT care provider version was assessed by two methods, considering internal and external evidence. First, we performed EFA to provide evidence by principal components analysis. Although eight components were extracted, which differed from the ten dimensions in the original instrument, none of the ten components was eliminated. Person-centeredness and community-centeredness were combined into person-centeredness, while regional partnership and regional healthcare laws and regulations were combined into system integration. Therefore, the RMIC-MT care provider version demonstrated the factor structure of the original instruments and the framework of the Rainbow Model. However, it also illustrated
some differences of health system contexts. Respondents in Chinese primary care systems might have no clear understanding of person-centeredness and community-centeredness [41]. In 2016, the report “Deepening health reform in China”, published by the WHO, the World Bank, and the Chinese Government, proposed that providers not acting in the patient’s interest had eroded citizen trust in the system [10]. Moreover, most health institutes in China are public, sharing the same regional health regulations and the same regulations about partnership [42]. The reasons were confirmed by interviews with health professionals in the pilot study. To assess concurrent validity of the instrument, we explored the association between total score of the instrument with two overall perceived coordination questions. Significant correlations (p < 0.01) suggested satisfactory concurrent validity. Internal consistency reliability of the instrument was excellent with a standard Cronbach’s alpha of 0.96 and significant overall items-total correlations.

Strengths of the tool and limitations of the study

This study reports the first validation of the Chinese RMIC-MT care provider version. In summary, this instrument has three highlights. First, based on the Rainbow Model, it is not only easy to use but also focuses on comprehensive dimensions comparing with previous international integrated care instruments. A recent systematic review found that none of the instruments for measuring integrated care assessed system or normative integration [11]. The RMIC-MT care provider version filled this measurement gap. Second, it measures integrated care from the perspective of care providers, different from traditional patient’s perspective. Third, as the first Chinese instrument to measure integrated care, it shows good psychometrics properties in Chinese primary care settings. It may be useful as a tool to monitor the degree of integrated care in a region over time, providing
evidence of strategy adjustment.

However, the study had some limitations. First, while the number of respondents met the requirement (over 10 times the item number) and the response rate was very high, but only stakeholders from the public CHSs in a single district were presented. As mentioned, high homogeneity of the sampled CHSs might influence the validity assessment. Future studies in larger samples crossing regions would be needed to further test the psychometric properties for the Chinese primary care context. Second, this was a computer-based assessment. Evidence suggests that a model of administration (such as computer-based vs pencil version) has little impact on psychometric properties of measures [43]. But authors do lose the chance to explore reasons for the answers of respondents when the data are collected by computers rather than collected by paper questionnaire face-to-face. Therefore, we conducted six interviews with CCPs in six CHSs after data collection by computer, including two GPs, two nurses, a public health physician, and an internist, to find the influencing factors of professionals’ experiences with integrated care and potential effective collaboration mechanisms. It is necessary to have more communication with CCPs in further psychometric assessments of the RMIC-MT care provider version.

Conclusions

Value-based integrated health systems with strong primary care are being built in the whole of China. Primary integrated care has the potential to achieve triple aims, but implementation determines the final practical results. The Chinese RMIC-MT care provider version initially validated in this study exhibits good psychometric properties in Chinese primary context. Its application in China could contribute to
the measurement of different dimensions of integrated primary care from the perspective of health professions, revealing problems during the implementation of related reforms, and then promoting the building of high-performing health systems. Moreover, its validation and application in European countries may help in establishing international compassion for integrated primary care.

Abbreviations

WHO: World Health Organization; RMIC: Rainbow Model of Integrated Care; RMIC-MT: Rainbow Model of Integrated Care-Measurement Tool; HEP: Health Economics and Policy; CCP: community care professional; CHS: community health stations; GP: general practitioner; KMO: Kaiser-Meyer-Olkin; EFA: exploratory factor analysis; SRMR: standardized root-mean-square residual; CFI: comparative fit index; TLI: Tucker-Lewis index

Declarations

Ethics approval and consent to participate

The protocol for the research project has been approved by Ethics Committee of School of Public Health, SUN Yat-Sen University (ref 2019 No.073). All participants gave written informed consent before recruited into the study.

Consent for publication

Not applicable.

Availability of data and materials

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

Competing Interests
The authors declare that they have no competing interests.

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**Authors’ contribution**

XW and PV conceptualized this study. PZ and LC collected and analyzed the data. YH and XW wrote the first draft of the manuscript. YH, PV and XW critically commented the paper. The final version submitted for publication was read and approved by all authors.

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Tables

Table 1 Detailed modifications in the translation and adaptation process

| No | Original version | Modification |
|----|------------------|--------------|
| 1  | Change orders of the ten dimensions | Person-centeredness (items 1-5) Community-centeredness (items 6-9) Care Integration (items 10-16) System integration (partnership, items 17-20) System integration (laws and regulations, items 21-23) Adaptive Reserve (items 24-30) Organizational Integration (items 31-37) Functional Integration (internal, items 38-43) Functional Integration (external, items 44-47) Normative Integration (items 48-55) Make the questions more easily asked, understood, and completed by Chinese. |
| 2  | Item 6: Within this clinic, it is important to work with community-based service organizations to improve delivery of care. | Insert “e.g. neighborhood committee” at the end of “community-based service organizations”. |
| 3  | Item 10: Within this clinic, written plans and schedules are used to coordinate care for patients. | Insert “(e.g. patient referrals and expert consultation)” at the end of the question. |
| 4  | Item 11: Within this clinic, written plans and schedules are used for patient referrals, transfers, and follow-up with care providers outside the clinic (e.g. hospital, cardiologist, etc.). | Delete “transfers”. |
| 5  | Item 15: Within this clinic, there is a multidisciplinary team (e.g. psychologist, dietitian etc.). | Delete “psychologist, dietitian” and insert “general practitioners and public health physicians”. |
| 6  | Item 25: This clinic coordinates with other organizations in the region to eliminate unnecessary duplication of administrative services. | Insert “(e.g. repeated registration)” at the end of the question. |
| 7  | Item 26: This clinic coordinates the use of its technology and equipment with other organizations in the region to provide better care for patients. | Insert “(e.g. borrow or rent)” at the end of “coordinates”. |
| 8  | Item 27: This clinic coordinates the use of its staff/personnel with other organizations in the region to provide better care for patients. | Insert “(e.g. expert consultation)” at the end of “coordinates”. |
| 9  | Items 28/29/30 | Insert one most recent specific health regulation for each item. |

Table 2 Characteristics of participants
| Characteristics                                      | Number (n=1610) | Percent |
|------------------------------------------------------|-----------------|---------|
| **Gender**                                           |                 |         |
| Male                                                 | 448             | 27.83%  |
| Female                                               | 1,162           | 72.17%  |
| **Age (years)**                                      |                 |         |
| < 30                                                 | 441             | 27.39%  |
| 30-49                                                | 1,098           | 68.20%  |
| ≥ 50                                                 | 71              | 4.41%   |
| **Marital status**                                   |                 |         |
| Married                                              | 1,271           | 78.94%  |
| Others                                               | 339             | 21.06%  |
| **Level of education**                               |                 |         |
| Junior technical college                             | 92              | 5.71%   |
| Senior technical college                             | 532             | 33.04%  |
| Undergraduate and graduate-university                 | 986             | 61.24%  |
| **Years of work experience**                         |                 |         |
| < 5                                                  | 337             | 20.93%  |
| 5-10                                                 | 327             | 20.31%  |
| < 10                                                 | 946             | 58.76%  |
| **Position**                                         |                 |         |
| GP                                                   | 517             | 32.11%  |
| Specialist                                           | 61              | 3.79%   |
| Public health physician                              | 55              | 3.42%   |
| Traditional Chinese medicine physician               | 87              | 5.40%   |
| Nurse                                                | 676             | 41.99%  |
| Pharmacist                                           | 76              | 4.72%   |
| Laboratory workers                                   | 58              | 3.60%   |
| Chemist                                              | 1               | 0.06%   |
| Practitioner of traditional Chinese medicine         | 16              | 0.99%   |
| Health manager                                       | 10              | 0.62%   |
| Administrative staff                                 | 53              | 3.29%   |
| **Income (¥/month)**                                 |                 |         |
| < 3000                                               | 112             | 6.96%   |
| 3,000-4,999                                          | 575             | 35.71%  |
| 5,000-7,999                                          | 642             | 39.88%  |
| 8,000-11,999                                         | 234             | 14.53%  |
| ≥ 12,000                                             | 42              | 2.61%   |
Table 3 Eigenvalue and variance contribution rate of each factor

| Factor | Total | % of variance | Cumulative % | Extraction sums of squared loadings | Rotation sums of squared loadings |
|--------|-------|---------------|--------------|-----------------------------------|----------------------------------|
| 1      | 18.88 | 34.33         | 34.33        | 18.88                             | 36.63                            |
| 2      | 5.48  | 9.96          | 44.29        | 5.10                              | 42.90                            |
| 3      | 3.71  | 6.75          | 51.04        | 3.35                              | 49.00                            |
| 4      | 2.72  | 4.94          | 55.97        | 2.33                              | 53.24                            |
| 5      | 2.08  | 3.78          | 59.75        | 1.72                              | 56.37                            |
| 6      | 1.36  | 2.48          | 62.23        | 1.01                              | 58.20                            |
| 7      | 1.20  | 2.18          | 64.41        | 0.82                              | 59.70                            |
| 8      | 1.10  | 2.00          | 66.41        | 0.77                              | 61.09                            |

Extraction method: Principle Axis Factoring.

Table 4 Nine dimensions of the RMIC-MT-Staff-C produced by EFA

| No. | Dimension                          | Items                           |
|-----|------------------------------------|---------------------------------|
| A   | Person-centered care               | 1,2,3,4,5,6,7,8,9,24,25,26      |
| B   | Care integration                   | 10,11,12,13,14,15,16            |
| C   | System integration                 | 17,18,19,20,21,22,23            |
| D   | Organizational adaptive reserve    | 27,28,29,30                     |
| E   | Organizational integration (internal) | 31,32,35,36,37                 |
| F   | Organizational integration (external) | 33,34                           |
| G   | Functional integration (internal)  | 38,39,40,41,42,43               |
| H   | Functional integration (external)  | 44,45,46,47                     |
| I   | Normative integration              | 48,49,50,51,52,53,54,55         |