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DECLARATIONS

Interest conflict
Luciana Bellido-Boza and Edward Mezones-Holguin worked in the Superintendencia Nacional de Salud (SUSALUD) when the survey was developed, and coordinated the design on behalf of ENSUSALUD.

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Ethics approval and consent to participate
Not apply.

Consent for publication
Not apply.

Availability of data and materials
The ENSUSALUD database is publicly available on web (http://portal.susalud.gob.pe/blog/base-de-datos-2016).

Authors' contributions
David Villarreal-Zegarra: Conceptualization, Formal Analysis, Methodology, Visualization, Writing – Original Draft Preparation.
Roberto Torres-Puente: Formal Analysis, Writing – Original Draft Preparation.
Ronald Castillo-Blanco: Supervision, Formal Analysis, Methodology, Writing – Review & Editing.
Baltica Cabieses: Supervision, Validation, Writing – Review & Editing.
Luciana Bellido-Boza: Validation, Writing – Review & Editing.
Edward Mezones-Holguin: Conceptualization, Supervision, Validation, Writing – Review & Editing.

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ABSTRACT
To assess the evidences of validity and reliability of a set of scales on different areas of job satisfaction (general professional activity, health services management, and working conditions) in Peruvian physicians based on data from the National Survey of Satisfaction of Users in Health (ENSUSALUD). Participants were selected from a two-stage probabilistic national representative sampling stratified by political region. We included 2,137 participants in the analysis. General professional activity scale with 6 items (CFI=0.946; RMSEA=0.071) and the health services management scale with 8 items (CFI=0.972; RMSEA=0.081) showed good measurement properties for the one-dimensional model. The scale of working conditions presented adequate measurement properties with a two-dimensional model (CFI=0.914; RMSEA=0.080): individual conditions (8 items) and infrastructural conditions (3 items). The invariance analysis presented that comparisons can be made between sex, age, civil status, medical specialty, working in other institutions, work-related illness, chronic disease, and time working in health care center. All scales had adequate internal consistency (ω and α between 0.70 and 0.90). Based on our findings, these instruments are suitable for measuring job satisfaction among outpatient physicians throughout Peru, as our data is representative at the country level.
Keywords: Job Satisfaction, Physicians, Psychometrics, Health Services Research, Peru.

Elaboración de un set de escalas para evaluar la satisfacción laboral de los médicos en Perú: evaluación de la validez y la fiabilidad

RESUMEN
Evaluar las evidencias de validez y fiabilidad de un set de escalas en diferentes áreas de la satisfacción laboral (actividad profesional general, gestión de servicios de salud y condiciones de trabajo) en los médicos peruanos a partir de los datos de la Encuesta Nacional de Satisfacción de Usuarios en Salud (ENSUSALUD). Los participantes se seleccionaron a partir de un muestreo representativo a nivel nacional y probabilístico con dos etapas, estratificado por región geográfica. Incluimos 2.137 participantes en el análisis. La escala de actividad profesional general con 6 ítems (CFI=0,946; RMSEA=0,071) y la escala de gestión de servicios de salud con 8 ítems (CFI=0,972; RMSEA=0,081) mostraron buenas propiedades de medición para el modelo unidimensional. La escala de condiciones de trabajo presentó adecuadas propiedades de medición con un modelo bidimensional (CFI=0,914; RMSEA=0,080): condiciones individuales (8 ítems) y condiciones infraestructurales (3 ítems). El análisis de invariancia presentó que se pueden hacer comparaciones entre sexo, edad, estado civil, especialidad médica, trabajo en otras instituciones, enfermedades relacionadas con el trabajo, enfermedades crónicas y tiempo de trabajo en un centro de salud. Todas las escalas tuvieron una adecuada consistencia interna (ω y α entre 0,70 y 0,90). En base a nuestros hallazgos, estos instrumentos son adecuados para medir la satisfacción laboral entre los médicos ambulatorios en todo el Perú, ya que nuestros datos son representativos a nivel de país.
Palabras clave: Satisfacción laboral, Médicos, Psicometría, Investigación de Servicios de Salud, Perú.

BACKGROUND

Job satisfaction is defined as an emotional state or attitude towards a job, based on positive or negative experiences and on the values or expectations of worker (1). International evidence suggests that health workers with a higher ranked employment are more likely to be psychologically engaged with work (2). Job satisfaction is a critical concern to improve health policies because it can positively affect health workers´ performance and patient satisfaction (3). However, when there are low levels of job satisfaction among health workers, detrimental results appear in the form of burnout, employee turnover, job change, and poor working performance (4-6). These deficient functioning and quality outcomes worsen accountability and resilience of healthcare systems, contributing to pervasive health gaps between and within socioeconomic groups (4-6). Therefore, the evaluation of health workers job satisfaction, including physician who often lead healthcare teams, is a significant dimension to consider in the global public health agenda.

Assessing of physician´s job satisfaction in low- and middle-income countries is urgently required, since they struggle more often with complex labor dynamics like limited financial compensation, lack of opportunities for career development, workload and poor legal safety compared to their peers who work in high-income developed countries (7). In many developing countries, job dissatisfaction may lead to the migration of health workers overseas, causing specialists shortages (8-10). Although assessing the satisfaction of physicians in their workplaces is highly relevant, their measurement constitutes a great challenge. It needs the evaluation of various factors and dimensions of the working environment, which go far beyond the physician´s knowledge and experience. There is evidence that job satisfaction is associated with the doctor-patient relationship, workload, relationship with colleagues, financial conditions, and autonomy in clinical decision-making (11, 12). It should be noted that many of these factors associated with job satisfaction are modifiable, which brings the attention to the development of adequate measurement tools in such complex scenarios. Particularly, there are many scales for assessing job satisfaction, but many of these instruments have not been adapted to low- and medium-income contexts, let alone considering the peculiarities of each of these healthcare systems (12, 13). Thus, it is necessary to have instruments that are contextualized to the characteristics of each healthcare system to prevent the risk of measurement biases.

Peru is a middle-income country in Latin America that has suffered historical and structural difficulties and deficiencies in the public health arena including financial crises and an unfavorable political climate. Due to these limitations, job satisfaction of the healthcare personnel has received scarce attention (14). In addition, Peru has an underdeveloped healthcare system that lacks of sufficient human resources and financial support, which contributes directly to the reproduction of inequities in healthcare (15, 16). There are several situations that could be influencing health workers and physicians' job satisfaction in Peru; nevertheless, to our knowledge no valid and reliable instrument has been developed to adequately assess them at national level. The lack of a robust measure of physicians´ job satisfaction could obscure the diagnosis and monitoring in this topic in this country, and also have an impact on health policy planning and human resources sustainability. In 2016, the National Health Authority (SUSALUD, from the Spanish acronym) carried out the National Survey of Satisfaction of Users in Health (ENSUSALUD, from Spanish acronym) to evaluate the User Satisfaction of Universal

Health Insurance on six different populations in Peruvian Health System. One section was performed in doctors working in healthcare centers. ENSUSALUD included questions related to job satisfaction of these professionals; nonetheless, no formal analysis was carried out to evaluate the validity and reliability of these instruments.

Based on the above-mentioned, our objective was to evaluate the evidence of validity and reliability of a set of scales on different areas of job satisfaction (general professional activity, health services management, and working conditions) in Peruvian physicians based on data from the National Survey of Satisfaction of Users in Health (ENSUSALUD). Our results could contribute to measurement improvement in relation to physician´s job satisfaction in Peru. It could also serve as baseline information for the development of public policies in the area of human resources in healthcare.

METHODS

Design and data source

The ENSUSALUD database is publicly available on web (http://portal.susalud.gob.pe/blog/base-de-datos-2016). We carried out a psychometric study based on secondary data analysis of Questionnaire 2 of ENSUSALUD-2016. This section was filled out by physicians and nurses working in health care centers, our analysis was carried out specifically in doctors.

ENSUSALUD 2016 was developed by the Peruvian National Institute of Statistics in collaborative work with SUSALUD. This survey was performed in 185 healthcare centers in all 25 regions of Peru (17). Professionals who had worked for a minimum of 12 months in healthcare centers and were assigned to the public subsector were included: Ministry of Health (MINSA, from the Spanish acronym), Social Security (EsSalud, from the Spanish acronym), Armed Forces and Police Health Services, and private subsector.

Participants

Participants were selected from a complex two-stage probabilistic national representative sampling stratified by political region. Primary sampling unit was the healthcare centers and secondary sampling unit were professionals. Physicians over 65 years were excluded (retirement age in Peru).

Generation and development

Prior to ENSUSALUD 2016, there were two first attempts to develop a job satisfaction scale for healthcare workers in the country, in 2014 and 2015. The process of developing these instruments was two-folded:

First phase: Development of the first two versions of ENSUSALUD

During the first half of 2014, a multidisciplinary technical team (from Health Services Quality Directorate of the Ministry of Health, Research and Development Intendance of SUSALUD, and Peruvian National Institute of Statistics) proposed 53 preliminary scales to assess different aspects of the work of health professionals (physicians and nurses) with additional sociodemographic data (18). These preliminary scales were based on a review of the literature and operational tools previously used by Ministry of Health the country. Each preliminary scale had from 1 to 22 items and they were all included in the first version of ENSUSALUD 2014 (one national survey). The preliminary scales were groups

of items based on instruments already designed or designed ad hoc to evaluate the Peruvian health system (in this case, the measurement properties had not been evaluated). Subsequently, in ENSUSALUD 2015 the same technical team reused the 53 preliminary scales used in the first version of ENSUSALUD 2014, added some preliminary scales, and modified the wording of some items based on previous experience (19).

Second phase: Validation of ENSUSALUD 2016
In 2016, SUSALUD convened representatives of the Social Security, Armed forces and police Health Services, officials of the Comprehensive Health Insurance, and four universities in Lima, Peru. Modifications to the existing questionnaires were discussed, existing items were maintained in ENSUSALUD 2015 and 29 new preliminary scales were added.

In relation to the job satisfaction, they decided to keep all the questions and items from the previous version, but with certain modifications. Therefore, a total of 30 items in three groups of items (three preliminary scales) were available on different aspects of job satisfaction and were evaluated in questionnaire 2 of ENSUSALUD 2016.

Procedures
The evaluation is done through an individual interview between the evaluator and the physician. The data was filled in on a Tablet that sent the information in real-time into a database. The Peruvian National Institute of Statistics was in charge of collecting the data and the process was supervised by SUSALUD.
In order to take care of the quality of the data, there was constant monitoring, through a network of supervisors who were distributed as follows. The evaluators were under the responsibility of a coordinator from each team and the teams were in turn under the supervision of a regional supervisor.

Measuring instruments
The 30-items job satisfaction questionnaire of ENSUSALUD evaluates different job-related aspects and is divided into three different scales: general professional activity (6 items), Health Services Management (8 items), and working conditions of the health center (16 items). Each of these items is Likert type and has five answer options (5 = very satisfied; 4 = satisfied; 3 = neither satisfied nor dissatisfied; 2 = dissatisfied; 1 = very dissatisfied). The scale appears in supplement 1. A preliminary English version of the items is also presented for comparison purposes, which were not evaluated in this study (see Supplement 2).

Satisfaction scale on general professional activity: to explore several general aspects of the professional labor. Its items evaluate the satisfaction of the doctor-patient relationship, achievements associated with the profession, work availability, perception of occupational risk, and expectations in meeting the needs of the patient. Within ENSUSALUD the items in Spanish of this instrument are in question 82 with codes from c2p82_1 to c2p82_6 (see supplement 1).

Health Services Management Satisfaction Scale: To assess facility's management team runs and organizes the healthcare facility. The items included in this scale are satisfaction with resource management (economic and human), drug management, shift scheduling, and work capacity. In ENSUSALUD, the items of this instrument are in question 83 with codes from c2p83_1 to c2p83_8 (see supplement 1).

Satisfaction scale on the working conditions of the health center: To evaluate the working conditions perceived by the health professional. The indicators of the scale are satisfied with the possibility of promotion, organization of the health center, workload, schedules, salary, opportunities, infrastructure and equipment, relationship with superiors, administrative procedures, and hygiene of the health center. In ENSUSALUD, the items of this instrument are in question 81 with codes from c2p81_1 to c2p81_16 (see supplement 1).

In addition, we include demographic, professional and economic information in our analysis. Sex, age and marital status (whether they are currently living with a couple) were the demographic variables. We also evaluated additional professional information, such as having a specialty (yes, in process, or no), whether they worked in other institutions (yes / no), self-reported work-related illness (yes / no), type of organization where they work (Ministry of Health, EsSalud, Armed forces and national police, or Private clinics), and time spent working. Additionally, self-reported monthly income was evaluated and categorized according the minimum wage (less than four, four to ten, and more than ten). Minimum wage was 750 Peruvian soles (PEN) or US$222.5 (considered to be an exchange rate of 3.37 soles per US dollar).

Statistical Analysis

Descriptive analysis

We presented general characteristics of the participants using weighted frequencies and percentages.

Exploratory factor analysis (EFA)

A random subset from the total sample (split-half method) (20, 21) was analyzed. Polychoric matrices were used (22) and the estimator was weighted using least squares means and variance adjusted (WLSMV) (23), since it best fitted the ordinal nature of our items. We used quartimin rotation, parallel analysis test and Kaiser analysis to evaluate the most appropriate number of dimensions (24). Different models were obtained and evaluated to identify the one with the best measurement properties. This decision was made since theoretical models suggest that job satisfaction is a multidimensional construct. Before performing exploratory factorial analysis, the value of the Kaiser-Meyer-Olkin (KMO) was estimated. This is an index of sample adequacy, which allows identifying whether there is enough power or sample size to perform the analysis. Adequate KMO values higher than 0.90 are adequate (22).

To evaluate the factor structures we used three different criteria. First, items factor loadings should be equal to or greater than 0.40 (20). Second, if a scale has more than one dimension, each dimension must have at least three items to be considered stable (25). Third, if an item loads in more than one dimension and the difference of loading between them is lower than 0.020, the item will be deleted. However, if the difference in loadings is equal to or greater than 0.20, then the item will be included in the dimension that has the highest factor load (20).

Confirmatory factor analysis (CFA)

For confirmatory factor analysis, the models previously obtained in the exploratory factor analysis were evaluated. All the analysis were performed considering the complex characteristics of the sampling strategy (complex multistage sampling), for which the

lavaan.survey command was used. The estimator used was WLSMV (23), and polychoric matrices were used (22).

The adjustment of the different models for the three scales was evaluated in three steps. First, a set of the goodness-of-fit indices was estimated. We used the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI), both with optimal values ≥0.95; Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA) with a confidence interval of 90%, both with values adequate if <0.08 (26, 27). Second and last step, if a scale had two or more dimensions, the correlation between the dimensions was evaluated, in order to test whether dimensions could overlap. Clear differentiation between the two dimensions can be considered when the correlation is less than 0.80 (23).

Measurement Invariance

Multiple models of the CFA measurement invariance were evaluated through groups defined by relevant variables (sex, age group, marital status, if they have a medical specialty, if they work in other institution, individual income per month, self-reported work-related illness and self-reported chronic disease). Thus, four measurement models with progressive restrictions were compared between categories of these groups (e.g. between females and males) (28, 29). Change in the CFI (ΔCFI) was used as the main criterion for comparing models with more restrictions against models with fewer restrictions. Simulation evidence suggests that ΔCFI <.01 between successively more restricted models provides evidence for measurement invariance (29). Models first assumed configural invariance (i.e. similar factor structure across groups) as the baseline model, progressing then to metric invariance (i.e. similar factor loadings and factor structure across groups), strong invariance (i.e. similar thresholds, factor loadings and factor structure across groups), and strict invariance (i.e. similar residual item variances, thresholds, factor loadings and factor structure across groups). The ΔCFI was examined between each model to establish if the more restricted model was appropriate than the previous less restricted one. We preferred ΔCFI over χ^2 comparisons, since it is not sensitive to big sample sizes (28, 29).

Reliability

We evaluate reliability by internal consistency method taking as the optimal value a McDonald's omega coefficient (ω) and the alpha coefficient (α). In both cases, appropriate values are considered to be those that are > 0.70 (30-33).

We performed analysis according complex sampling in R Studio ®, specifically with the packages “lavaan” (34), “lavaan.survey” (35), “semTools” (36), and “semPlot” (37).

Ethic topics

The survey was anonymous and there was no information in the database that could lead to participants identification. Hence, conducting this analysis did not represent an ethical hazard since there was no access to confidential data. Two authors (LBB and EMH) participated in the design process of the three scales at the time the survey was being designed.

RESULTS

Descriptive Analysis

We included 2,137 participants were included in the study. The majority of the participants were men (69.0%), living with a couple (married or cohabiting), more than half of them had a specialty, 65% had a monthly income of four to ten minimum wages ($890 to $2,225), one in four had a work-related illness, and one in three self-reported a chronic disease. Age was 44.7 years (SD: 10.8) and the average time worked in the organization was 9.4 years (SD: 9.2). The sociodemographic characteristics of physicians are displayed in Table 1.

Exploratory factor analysis

Satisfaction scale on general professional activity

KMO value was greater than 0.90, suggesting an adequate sample size to perform the exploratory factor analysis. Parallel analysis identified two possible dimensions and Kaiser's analysis identified a single dimension. Due to this heterogeneity in our findings, one and two-dimensions models were evaluated at this stage. The one-dimensional model showed adequate factor loads (λ>0.4; see Table 2), but the two-dimension model did not meet the criteria of having at least three items for each dimension. Therefore, this two-dimension model was not considered for additional analyses.

Health Services Management Satisfaction Scale

KMO value was greater than 0.90, suggesting a good proportion of variance among variables that might be common variance. Parallel analysis identified three possible dimensions and Kaiser's analysis identified two dimensions. Due to the heterogeneity, one, two and three-dimensions models were evaluated. The one-dimensional and two-dimensional models presented adequate factor loads for physicians (λ>0.4) and met the condition of having at least three items in each dimension (see Table 2). On the other hand, the structure of the three-dimensional model was very heterogeneous. Its dimensions were not stable since they had very few items (less than three items per dimension). Therefore, this model was not considered in subsequent analyzes.

Satisfaction scale on the working conditions of the health center

KMO value was greater than 0.90, suggesting an adequate sample size to perform the exploratory factor analysis. Parallel analysis identified a two-dimensional model and Kaiser's analysis identified a three-dimensional model. Consequently, two and three-dimensional models were evaluated (see table 2). In the model with two dimensions, the item “order in the health service and labor organization” (variable c2p81_2 in the dataset) presented factor complexity, since there was no marked difference between factor loadings in the first and second dimensions. That was why this item was removed from analysis. In addition, the items on satisfaction about the hours or salary received (c2p81_7), training opportunities (c2p81_10), filling out the medical records (c2p81_15), and respect for the patient (c2p81_16) presented very low factor loads so were also eliminated from subsequent analyses. On the other hand, in the three-dimensional model we found that the first dimension was unstable (very few items,) so this model was also eliminated. Therefore, only the 2-dimensional model was considered for further analysis, only after excluding the five problematic items that were identified during this analysis (c2p81_2, c2p81_7, c2p81_10, c2p81_15, and c2p81_16).

Confirmatory factor analysis

Satisfaction scale on general professional activity

The one-dimensional model evaluated achieved adequate goodness-of-fit indices (see Table 3), so the six items on this scale could be added up into an overall score.

Health Services Management Satisfaction Scale
The one-dimensional model and the two-dimensional model had adequate goodness-of-fit indices. However, the two-dimensional model has an extremely high latent correlation (greater than 0.80) suggesting that its dimensions might have been overlapping (see Table 3). Hence, the best model for this scale was the one-dimensional one with eight items.

Satisfaction scale on the working conditions of the health center
The two-dimensional model consisting of eleven items showed adequate goodness-of-fit indices and the latent correlation between the two dimensions was also within the appropriate values (less than 0.80, see Table 3). The first dimension was made up from eight items related to satisfaction with the physician´s working conditions (i.e. workload, hours, salary) and the second dimension had three items related to structural working conditions (i.e. infrastructure, equipment). From this analysis it was possible to conclude that this model presented adequate evidence of validity based on its internal structure and, therefore, was considered for further analysis (see Figure 1).

Measurement Invariance
Satisfaction scale on general professional activity
Invariance was reached between marital status categories (those who live with a couple and those who don´t), having a chronic disease (those who have vs. those who do not), and people who have a work-related disease (those who have vs. those who do not). Therefore, comparisons between these groups could be performed. On the other hand, invariance was violated between men and women (sex), between people working in other institutions, and according to the time working in the institution. Comparisons between these variables could not be performed (see Supplement 3). Finally, it was not possible to evaluate invariance according to the type of organization, monthly income, having a specialty, nor age of the participant, because necessary assumptions for such analysis were not fulfilled in this group of variables.

Health Services Management Satisfaction Scale and Satisfaction scale on the working conditions of the health center
In both scales, invariance was reached according to sex, age groups, marital status, if you have a specialty or not, if you work in another institution, time working, and whether you have a work-related or chronic disease (see Supplement 3). Therefore, comparisons could be made between these groups using each of these scales. However, it was not possible to evaluate the invariance according to the type of organization and the monthly income since they did not meet the required assumptions.

Reliability
The *Satisfaction scale on general professional activity* (α=0.70; ω=0.70; 6 items) and the *Health Services Management Satisfaction Scale* (α=0.90; ω=0.90; 3 items) presented adequate internal consistency values. The *Satisfaction scale on the Working Conditions of the Health Center* presented adequate values of internal consistency for both the individual working conditions dimension (α=0.81 ;ω=0.81; 8 items) and the structural working conditions dimension (α=0.81 ;ω=0.82; 3 items).

DISCUSSION

Main findings

The set of instruments was composed by three independents scales that were analyzed proved solid factorial structure and measurement invariance, which makes it possible for group comparison. They also achieved stability in their scores as they showed adequate internal consistency coefficients. Based on our findings, these instruments are suitable for measuring job satisfaction in physicians who work in the outpatient clinic in the Peruvian health system, as our data is representative at the country level. These instruments could become useful tools for evaluating different aspects of job satisfaction in physicians and could guide decision-making in human resources arena and health services research. These scales can be used together to assess different aspects of job satisfaction of physicians or independently to assess specific areas of job satisfaction.

Contrasting findings with existing literature

A systematic review identified that, between 2000 and 2017, 61 studies evaluating job satisfaction in physicians had been carried out in Europe, in which 26 different instruments were used to assess it (38). Moreover, 31% of the studies included developed their own instruments to assess job satisfaction (38). The great heterogeneity of instruments used in the European context could be related to differences in how these healthcare systems are organized and function, so that using a single instrument could lead to biased conclusions. In Latin America there is no data reporting which are the most frequent instruments used to assess job satisfaction. However, some studies conducted in this region have adapted a variety of instruments to assess it like the Copenhagen Psychosocial Questionnaire (39) or the Warr–Cook–Wall Job Satisfaction Scale (40). These studies were conducted on small samples, they were not nationally representative, and they selected instruments that were originally designed in very different healthcare contexts in countries located in the European region. Although there are some instruments designed in Latin American countries, they experience the same limitations of the European ones.

In all, there is limited data on this topic in the Latin American region and a great variety of scales developed elsewhere that need further analysis and testing. The three scales presented in our study have been created considering the peculiarities of a middle-income country in the Latin American region like Peru and reported adequate evidence of validity and reliability. For example, the consideration that there are primary care centers where water, drainage, and light may not be available permanently (item c2p81_11), that many health professionals tend to work in several institutions at the same time (items c2p82_3), or on the way in which rotations or changes in opening hours are organized (item c2p83_5). Therefore, they could be used as a set of tools to evaluate different aspects of job satisfaction in physicians in this and other Spanish speaking countries with similar healthcare contexts.

Factor analysis

We found evidence of internal structure of the scales resulting from exploratory and confirmatory factor analysis. Our analyses indicates that both the professional activity satisfaction scale and the health center management scale are one-dimension scales; i.e. all items can be added up to obtain an overall score (23). For its part, the satisfaction scale on working conditions was a two-dimension scale (individual and structural dimensions), so it is possible to obtain an independent score for each dimension (23).

Our three instruments allow us to collect information on different aspects of job satisfaction in physicians, considering the peculiarities of the health system in a middle-income country. For example, our scale on general professional activity evaluates the availability of physicians to work as care staff in other institutions (item c2p82_3), since in Peru about half of the physicians work in more than one institution. On the other hand, in the Health Services Management scale included items that assess satisfaction with how the rotating shifts are managed (item c2p83_5) and with drug management (item c2p83_2). It should be noted that we have not identified any other scale in the literature that assesses satisfaction with how health centres are managed. Finally, our working conditions scale allows us to assess satisfaction with your position in your institution (item c2p81_6) and with basic services such as water or drainage (item c2p81_11).

It is noted, some items of our scales (professional activity, health center management, individual and structural working conditions) are theoretically similar to other psychometric scales reported in the past. For example, the 4CornerSAT questionnaire used to measure physicians´ career satisfaction has four dimensions that are akin to the ones we have identified in this study (personal, professional, performance, and inherent) (41, 42).

Measurement Invariance

The number of studies that have evaluated measurement invariance in job satisfaction scales is limited, so very few instruments have enough evidence to justify making comparisons between groups. However, the practice of making comparisons between groups is very common, even when there is not enough evidence to carry out this analysis. This could end in biased results if invariance is violated (29). One study identified that invariance was achieved by comparing the outcomes of physicians and nurses from 14 European countries, suggesting that cultural factors allow different organizational variables to be assessed in these professionals over time (43). Our study tested measure invariance of the scales and, therefore, allows comparisons between different groups such as marital status, whether they have occupational or chronic diseases. In addition, for the working conditions and health center management scales, further comparisons can be made between men and women, age groups, whether they have a specialty, whether they work in another institution, and between the time of service. Based on our findings, all these comparisons are free of measurement bias (29).

Reliability

We found stability in the scores of three scales. The advantage of our scales compared to others is that they are reasonably short and report adequate levels of internal consistency. This is relevant since many scales like the Warr-Cook-Wall Job Satisfaction Scale 38 provide little variability and require a large amount of items to achieve stable values (25).

Strengths and limitations

One of the strengths of our study was the representativeness of the results at the country level in Peru, allowing us to test the scales in different outpatient settings. Also, there was quality control and real-time monitoring of the data being collected. However, we recognized three mains limitations. First, despite having evidence of internal structure for the three instruments, our scales lacked a cut-off that could have determined whether a Peruvian physician was satisfied or not with any of the dimensions evaluated. This happened because we found no robust result in both sensitivity and specificity analyses performed for the selected scales. Second, validity and reliability estimates were only

estimated on outpatient physicians; therefore, results cannot be generalized to other health professionals or doctors in other settings such as hospitals or community settings. Third, as this was secondary data analysis, it was not possible to evaluate some variables that would allow a better understanding of job satisfaction. For example, race, the presence of a diagnosed mental health problem, etc. we're not considered.

Implications in public health, health services management and future research

We are going through challenging times for healthcare systems worldwide. Due to global challenges in demographic, political, economic and social dimensions of human life, the healthcare field is experiencing unprecedented changes that threaten the ability of many organizations to effectively promote and protect population health. Many of these healthcare systems struggle to survive, too. To successfully navigate these challenges, healthcare systems need committed and productive teams, including physicians working in collaboration with organization leaders and the community (44). Job satisfaction is a relevant dimension to monitor over time, but most measurement scales available nowadays are outdated, limited or not culturally translated to other countries and highly diverse territories. In order to support the existence and protective capacity of healthcare systems to promote and maintain population health and wellbeing, job satisfaction needs to be adequately addressed.

In Peruvian health system, National Health Authority (SUSALUD) is responsible of protect and promote the health rights based on insurance and health care provision. Within this competence, physician's job satisfaction was become relevant, yet little has been done to measure it. This study provides novel evidence of the validity and reliability of the ENSUSALUD satisfaction scales to measure job satisfaction among physicians. Having national measures of work satisfaction and other work variables in health professionals represent a valuable tool for decision-makers. In particular, the ENSUSALUD allowed us to have a vision of several important organizational elements in Peruvian primary care physicians. Our results could contribute to a better measurement of physician satisfaction in Peru, and it serves as basis for making-decisions public policies in the human resources in health area, as well as serve as source for developing their applicability to Spanish-speaking physicians in other health systems in Latin America and Europe.

Studies are needed that compare Peruvian regions according to different areas of job satisfaction (an objective that is beyond the scope of this study). Also, it is necessary to identify a gold standard of job satisfaction as it would allow for sensitivity and specificity studies. It is suggested to be able to evaluate the measurement properties of the three scales presented in other contexts, for which we attach in supplement 1 and 2, the Spanish and English versions, respectively. In particular, the psychometric properties of the English version need to be evaluated, since this is only one proposal of the authors.

Conclusion and recommendations

The three scales presented allow different aspects of job satisfaction to be evaluated, such as professional activity, perception of health service management, and working conditions. Their use is recommended to assess the job satisfaction of primary care physicians in Peru. In addition, it is suggested that stakeholders may use the scales as an indicator of decision-making in the health system.

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TABLES AND FIGURES

SUPPLEMENT

Table 1. Characteristic of physicians included in ENSUSALUD 2016 (n=2,137).

		n	%
Sex	Men	1,598	69.0%
	Women	539	31.0%
Age	23 to 29	145	7.7%
	30 to 39	664	31.8%
	40 to 49	595	25.8%
	50 to 65	733	34.8%
Civil status	Living with a couple (married or cohabiting)	1,483	64.4%
	Living without a partner (single, divorced, separated and widowed)	654	35.7%
With specialty	Yes	1,243	52.1%
	No, in process	344	12.0%
	No	550	36.0%
Work in other institution	Yes	932	41.5%
	No	1,205	58.5%
Monthly income	< 4 minimun wages	70	4.2%
	4 - 10 minimum wages	1,421	65.0%
	More to ten minimum wages	610	29.3%
	No report	36	1.5%
Work-related illness	Yes	487	23.0%
	No	1,650	77.0%
Chronic Disease	Yes	563	30.3%
	No	1,575	69.7%
Institution	Ministry of Health	979	43.3%
	Social Security (EsSalud)	999	37.4%
	Armed forces and Police Services	33	8.3%
	Private subsector	126	14.0%
Time working in..	2 years or less	691	36.5%
	3 to 5 years	405	19.6%
	6 to 10 years	296	12.5%
	11 years or more	745	31.4%

Note: Monthly income = Less than four minimum wages (≤$890), four to ten minimum wages ($890 to $2,225) or more to ten minimum wages (≥$2,225).

Table 2. Exploratory Factor Analysis on three satisfaction scale evaluated.

		One-factor model	Two-factor model		Three-factor model		
Scales	Items	F1	F1	F2	F1	F2	F3
Satisfaction scale on general professional activity	c2p82_1	0.449	-0.667	0.449	-	-	-
	c2p82_2	0.521	-0.617	0.521	-	-	-
	c2p82_3	0.506	-	0.506	-	-	-
	c2p82_4	0.497	-	0.497	-	-	-
	c2p82_5	0.620	-	0.620	-	-	-
	c2p82_6	0.537	-	0.537	-	-	-
Health Services Management Satisfaction Scale	c2p83_1	0.773	0.851	-	0.850	-	-
	c2p83_2	0.769	0.853	-	0.806	-	-
	c2p83_3	0.848	0.762	-	0.773	-	-
	c2p83_4	0.812	0.715	-	0.759	-	-
	c2p83_5	0.568	-	0.508	-	0.529	-
	c2p83_6	0.690	-	0.819	-	-	0.421
	c2p83_7	0.663	-	0.442	-	-	0.762
	c2p83_8	0.805	-	0.451	-	-	0.446
Satisfaction scale on the working conditions of the health center	c2p81_1	-	0.554	-	-	0.771	-
	c2p81_2	-	0.400*	0.423*	-	0.499	-
	c2p81_3	-	0.642	-	-	0.566	-
	c2p81_4	-	0.550	-	-	-	-
	c2p81_5	-	0.660	-	0.717	-	-
	c2p81_6	-	0.588	-	-	0.616	-
	c2p81_7	-	-	-	-	-	-
	c2p81_8	-	0.569	-	0.648	-	-
	c2p81_9	-	0.444	-	-	-	-
	c2p81_10	-	-	-	-	0.472	-
	c2p81_11	-	-	0.844	-	-	0.816
	c2p81_12	-	-	0.803	-	-	0.792
	c2p81_13	-	0.518	-	-	0.459	-
	c2p81_14	-	-	0.701	-	-	0.739
	c2p81_15	-	-	-	-	-	0.416
	c2p81_16	-	-	-	-	-	-

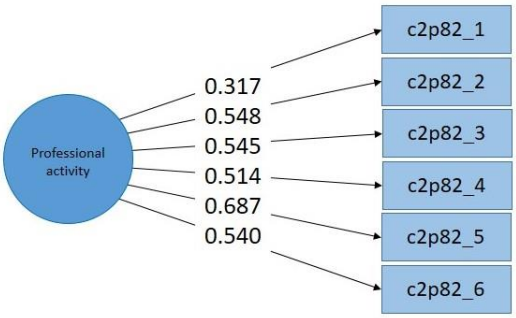
Note: Only factor loads between 0.400 and 1.000 are shown. * The difference of the factorial loading is lower of 0.200 between the factors.

Table 3. Confirmatory Factor Analysis of the three scales evaluated (n=2,137)

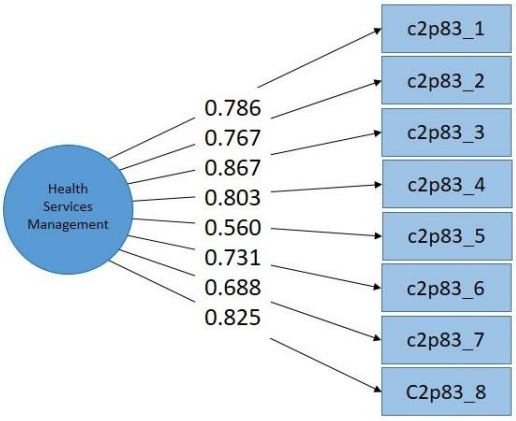
Scales	Model	X^2 (df)	CFI	TLI	RMSEA [90% CI]	SRMR	ϕ F1-F2
Satisfaction scale on general professional activity	One-factor	29.170 (9)	0.946	0.909	0.071 [0.043 – 0.100]	0.035	-
Health Services Management Satisfaction Scale	One-factor	75.319 (20)	0.972	0.961	0.081 [0.062 - 0.101]	0.028	-
	Two-factor	45.774 (19)	0.986	0.980	0.059 [0.037 - 0.080]	0.023	0.927
Satisfaction scale on the working conditions of the health center	Two-factor	125.047 (43)	0.914	0.890	0.080 [0.064 – 0.097]	0.055	0.506

X^2 = Chi squared. df = Degrees of freedom. CFI = Comparative fit index. TLI = Tucker-Lewis index. RMSEA = Root mean square error of approximation. SRMR = Standardized root mean square residual. ϕ = Latent relationship between dimensions F1 and F2.

A) Satisfaction Scale on General Professional Activity.



B) Health Services Management Satisfaction Scale.



C) Satisfaction Scale on the Working Conditions of the Health Center.

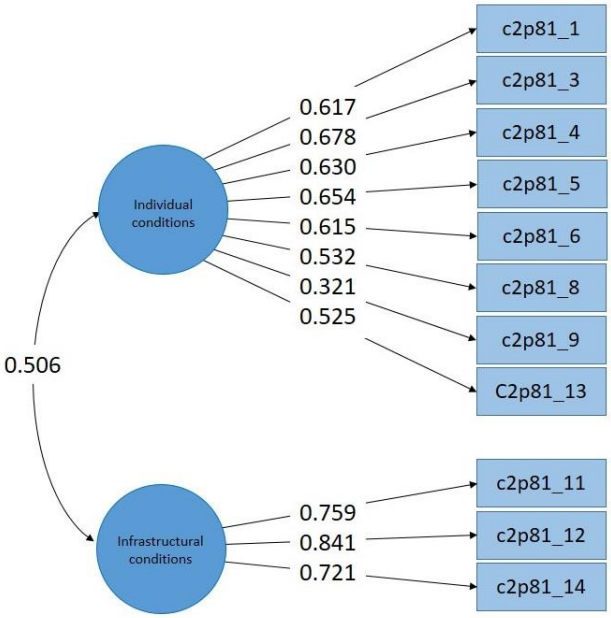


Figure 1. Factorial structure of the three scales evaluated.

Supplement 1. Items of the three instruments (Spanish version).

SPANISH VERSION

Question 81: Satisfaction scale on the working conditions of the health center

Respecto a su trabajo en este establecimiento de salud, ¿cómo calificaría su nivel de satisfacción en cuanto a:

5	4	3	2	1
Muy satisfecho/a	Satisfecho/a	Ni insatisfecho/a Insatisfecho/a	Insatisfecho/a	Muy insatisfecho/a

Código	Ítems	5	4	3	2	1
c2p81_1	Posibilidades de promoción o ascenso?					
c2p81_2*	Orden de los servicios y organización laboral? *					
c2p81_3	La valoración de su trabajo?					
c2p81_4	El tipo de labor que realiza?					
c2p81_5	La carga laboral que realiza?					
c2p81_6	Posición en su institución y participación en las decisiones de gestión de su servicio?					
c2p81_7*	Honorarios o sueldos recibidos*					
c2p81_8	Horario o jornada de trabajo?					
c2p81_9	La relación con sus compañeros de trabajo?					
c2p81_10*	Oportunidades de capacitación/actualización? *					
c2p81_11	La infraestructura e instalaciones de servicios (agua, desagüe, luz, oxígeno, etc.)?					
c2p81_12	El instrumental y equipamiento para atender a los pacientes?					
c2p81_13	La relación con sus jefes o superiores?					
c2p81_14	Las condiciones de higiene y bioseguridad?					
c2p81_15*	El llenado de registro, partes, órdenes o formatos? (Excluye historia clínica) *					
c2p81_16*	El respeto y consideración de sus pacientes?*					

Nota: * ítems que son eliminados en el análisis final.

Question 82: Satisfaction scale on general professional activity

En relación a su actividad profesional en general, ¿cómo calificaría usted su nivel de satisfacción, respecto a:

5	4	3	2	1
Muy satisfecho/a	Satisfecho/a	Ni insatisfecho/a Insatisfecho/a	Insatisfecho/a	Muy insatisfecho/a

Código	Ítems	5	4	3	2	1
c2p82_1	La relación médico paciente durante la consulta?					
c2p82_2	Su expectativa en satisfacer las necesidades de sus pacientes?					
c2p82_3	Su disponibilidad para realizar ejercicio profesional asistencial en otras instituciones?					
c2p82_4	Los logros obtenidos en su carrera?					
c2p82_5	Impacto en su vida personal o familiar por la carga laboral asociada a su profesión?					
c2p82_6	Los riesgos asociados a su actividad profesional?					

Question 83: Health Services Management Satisfaction Scale

En relación al equipo de gestión de su establecimiento, ¿cómo calificaría usted su nivel de satisfacción, respecto a:

5	**4**	**3**	**2**	**1**
Muy satisfecho/a	Satisfecho/a	Ni insatisfecho/a Insatisfecho/a	Insatisfecho/a	Muy insatisfecho/a

Código	Ítems	5	4	3	2	1
c2p83_1	Manejo de presupuesto?					
c2p83_2	Gestión de medicamentos - farmacias?					
c2p83_3	Organización de los servicios?					
c2p83_4	Gestión de los recursos humanos?					
c2p83_5	Programación de turnos?					
c2p83_6	Atención al usuario?					
c2p83_7	Prevención de infecciones intrahospitalarias / eventos adversos?					
c2p83_8	Capacidad de gestión / trabajo?					

Supplement 2. Preliminary English version of the three instruments

ENGLISH VERSION

Question 81: Satisfaction scale on the working conditions of the health center

Regarding your work in this health facility, how would you rate your satisfaction level in terms of the:

5	4	3	2	1
Very satisfied	Satisfied	Neither unsatisfied nor dissatisfied	Unsatisfied	Very unsatisfied

Code	Items	5	4	3	2	1
c2p81_1	Opportunities for advancement or promotion					
c2p81_2*	Order of services and labor organization*					
c2p81_3	Appreciation of work by coworkers					
c2p81_4	Nature of work carried out					
c2p81_5	Workload					
c2p81_6	Position in the institution and participation in management decisions of the medical service.					
c2p81_7*	Salary or remuneration*					
c2p81_8	Working hours					
c2p81_9	Relationship with coworkers					
c2p81_10*	Skills training/updating opportunities*					
c2p81_11	Physical plant and service facilities (water suply, drainage, power supply, ventilation, etc.)					
c2p81_12	Instruments and equipment to treat patients					
c2p81_13	Relationship with bosses and superiors					
c2p81_14	Hygienic and biosecure conditions of workplace					
c2p81_15*	Filling out forms, medical parts, orders and formats (excluding medical records) *					
c2p81_16*	Respect and consideration from patients*					

Note: * items that are eliminated in the final analysis.

Question 82: Satisfaction scale on general professional activity

Regarding your general professional activity, how would you rate your satisfaction level in terms of the:

5	4	3	2	1
Very satisfied	Satisfied	Neither unsatisfied nor dissatisfied	Unsatisfied	Very unsatisfied

Code	Items	5	4	3	2	1
c2p82_1	Dealing with patients during consultation (Doctor-patient relationship)					
c2p82_2	Expectation to meet the needs of your patients					
c2p82_3	Willingness to extend professional care in other institutions					
c2p82_4	Career achievements					
c2p82_5	Impact of workload on your personal and/or family life					
c2p82_6	Risks associated with the profession					

Question 83: Health Services Management Satisfaction Scale

Regarding the management in this health facility, how would you rate your satisfaction level in terms of the:

5	4	3	2	1
Very satisfied	Satisfied	Neither unsatisfied nor dissatisfied	Unsatisfied	Very unsatisfied

Code	Items	5	4	3	2	1
c2p83_1	Budget management					
c2p83_2	Drug/Pharmacy management					
c2p83_3	Organization of services					
c2p83_4	Human resources management					
c2p83_5	Work scheduling					
c2p83_6	User support					
c2p83_7	Prevention of nosocomial infections/adverse events					
c2p83_8	Management/work capacity					

Supplement 3. Measurement invariance between groups for the three scales evaluated (n=2,137).

									DIFFTEST	
Scale	Group	Invariance	X^2-Robust	*df*	CFI	RMSEA	SRMR	ΔCFI	Value	*df*	*p*
Satisfaction scale on general professional activity	Sex *	Configural	659.1	18	0.920	0.120	0.062	-	-	-	-
		Thresholds	733.4	30	0.913	0.097	0.062	-0.008	23.1	12	0.027
		Metrict	689.4	35	0.919	0.087	0.063	0.006	9.8	5	0.081
		Scalar	790.4	40	0.907	0.087	0.063	-0.012	71.3	5	0.000
	Civil status	Configural	655.0	18	0.920	0.119	0.062	-	-	-	-
		Thresholds	716.1	30	0.913	0.096	0.062	-0.006	14.9	12	0.250
		Metrict	670.6	35	0.920	0.085	0.063	0.006	10.5	5	0.063
		Scalar	651.7	40	0.923	0.078	0.063	0.003	3.0	5	0.704
	Work in other institution *	Configural	679.1	18	0.916	0.122	0.063	-	-	-	-
		Thresholds	759.6	30	0.908	0.099	0.063	-0.009	27.9	12	0.006
		Metrict	709.7	35	0.915	0.088	0.064	0.007	9.3	5	0.099
		Scalar	970.3	40	0.882	0.097	0.064	-0.032	153.3	5	0.000
	Work-related illness	Configural	632.2	18	0.920	0.117	0.062	-	-	-	-
		Thresholds	687.6	30	0.914	0.094	0.062	-0.006	16.4	12	0.172
		Metrict	646.5	35	0.920	0.084	0.063	0.006	13.5	5	0.019
		Scalar	729.0	40	0.911	0.830	0.064	-0.009	49.0	5	0.000
	Chronic disease	Configural	664.7	18	0.918	0.120	0.063	-	-	-	-

Scale	Group	Invariance	X^2-Robust	*df*	CFI	RMSEA	SRMR	ΔCFI	DIFFTEST		
									Value	*df*	*p*
		Thresholds	727.3	30	0.911	0.097	0.063	-0.006	19.5	12	0.077
		Metrict	661.4	35	0.920	0.085	0.063	0.009	6.7	5	0.243
		Scalar	651.3	40	0.922	0.078	0.063	0.002	9.4	5	0.095
	Time working *	Configural	754.3	36	0.910	0.127	0.066	-	-	-	-
		Thresholds	825.7	72	0.906	0.092	0.066	-0.004	45.7	36	0.130
		Metrict	753.9	87	0.917	0.079	0.068	0.011	20.4	15	0.016
		Scalar	814.1	102	0.911	0.075	0.068	-0.006	44.9	15	0.000
Health Services Management Satisfaction Scale	Sex	Configural	1446.1	40	0.977	0.119	0.042	-	-	-	-
		Thresholds	1299.7	56	0.980	0.095	0.042	0.003	24.1	16	0.087
		Metrict	1267.4	63	0.980	0.088	0.043	0.001	27.0	7	0.000
		Scalar	1317.7	70	0.980	0.085	0.043	-0.001	50.8	7	0.000
	Age	Configural	1542.4	80	0.976	0.121	0.044	-	-	-	-
		Thresholds	1364.9	128	0.980	0.088	0.044	0.004	84.2	48	0.001
		Metrict	1257.1	149	0.982	0.077	0.044	0.002	24.5	21	0.269
		Scalar	1325.6	170	0.981	0.074	0.044	-0.001	51.2	21	0.000
	Civil status	Configural	1445.7	40	0.977	0.119	0.042	-	-	-	-
		Thresholds	1289.1	56	0.980	0.094	0.042	0.003	12.7	16	0.694
		Metrict	1194.2	63	0.982	0.085	0.043	0.002	14.1	7	0.050

Scale	Group	Invariance	X^2-Robust	*df*	CFI	RMSEA	SRMR	ΔCFI	DIFFTEST Value	DIFFTEST *df*	DIFFTEST *p*
		Scalar	1172.5	70	0.982	0.080	0.043	0.000	11.0	7	0.139
	With specialty	Configural	1456.5	60	0.977	0.119	0.043	-	-	-	-
		Thresholds	1199.4	92	0.982	0.085	0.043	0.005	36.5	32	0.267
		Metrict	1111.8	106	0.984	0.076	0.043	0.002	15.5	14	0.343
		Scalar	1168.4	120	0.983	0.073	0.043	-0.001	41.8	14	0.000
	Work in other institution	Configural	1483.5	40	0.976	0.121	0.044	-	-	-	-
		Thresholds	1377.8	56	0.978	0.097	0.043	0.002	39.1	16	0.001
		Metrict	1319.4	53	0.979	0.900	0.043	0.001	21.0	7	0.004
		Scalar	1327.1	70	0.979	0.085	0.043	0.000	28.4	7	0.000
	Work-related illness	Configural	1446.0	40	0.977	0.119	0.043	-	-	-	-
		Thresholds	1289.1	56	0.980	0.094	0.043	0.003	16.2	16	0.442
		Metrict	1154.5	53	0.982	0.083	0.043	0.002	9.9	7	0.197
		Scalar	1141.3	70	0.982	0.078	0.043	0.000	14.5	7	0.043
	Chronic disease	Configural	1448.5	40	0.977	0.119	0.043	-	-	-	-
		Thresholds	1278.8	56	0.980	0.094	0.043	0.003	18.2	16	0.311
		Metrict	1163.0	53	0.982	0.084	0.043	0.002	7.2	7	0.410
		Scalar	1129.2	70	0.983	0.078	0.043	0.001	6.9	7	0.434
	Time working	Configural	1480.5	80	0.978	0.119	0.043	-	-	-	-
		Thresholds	1311.4	128	0.981	0.086	0.043	0.003	83.6	48	0.001

Scale	Group	Invariance	X^2-Robust	*df*	CFI	RMSEA	SRMR	ΔCFI	DIFFTEST		
									Value	*df*	*p*
		Metrict	1216.8	149	0.983	0.076	0.044	0.002	21.9	21	0.408
		Scalar	1345.0	170	0.981	0.075	0.044	-0.002	79.3	21	0.000
Satisfaction scale on the working conditions of the health center	Sex	Configural	1880.1	86	0.946	0.092	0.055	-	-	-	-
		Thresholds	1991.2	108	0.944	0.084	0.055	-0.003	30.0	22	0.119
		Metrict	1905.0	117	0.946	0.078	0.055	0.003	31.7	9	0.000
		Scalar	1979.6	126	0.945	0.077	0.055	-0.002	72.9	9	0.000
	Age	Configural	1850.8	172	0.949	0.089	0.055	-	-	-	-
		Thresholds	2030.1	238	0.945	0.078	0.055	-0.003	101.7	66	0.003
		Metrict	1794.9	265	0.953	0.068	0.055	0.008	26.4	27	0.499
		Scalar	1937.3	292	0.950	0.067	0.055	-0.004	89.8	27	0.000
	Civil status	Configural	1784.8	86	0.949	0.089	0.054	-	-	-	-
		Thresholds	1889.2	108	0.946	0.081	0.054	-0.002	26.4	22	0.237
		Metrict	1741.4	117	0.951	0.075	0.054	0.005	8.1	9	0.523
		Scalar	1733.6	126	0.952	0.072	0.054	0.001	23.5	9	0.005
	With specialty	Configural	1829.2	129	0.949	0.089	0.054	-	-	-	-
		Thresholds	1922.9	173	0.947	0.078	0.054	-0.001	47.8	44	0.322
		Metrict	1763.5	191	0.953	0.070	0.055	0.005	32.5	18	0.019

Scale	Group	Invariance	X^2-Robust	*df*	CFI	RMSEA	SRMR	ΔCFI	DIFFTEST		
									Value	*df*	*p*
		Scalar	2047.4	209	0.945	0.073	0.055	-0.008	138.7	18	0.000
	Work in other institution	Configural	1775.6	86	0.949	0.089	0.053	-	-	-	-
		Thresholds	1886.9	108	0.946	0.081	0.053	-0.003	31.0	22	0.097
		Metrict	1778.1	117	0.950	0.076	0.054	0.004	18.2	9	0.033
		Scalar	1779.8	126	0.950	0.073	0.054	0.000	27.1	9	0.001
	Work-related illness	Configural	1781.1	86	0.949	0.089	0.054	-	-	-	-
		Thresholds	1889.6	108	0.947	0.081	0.054	-0.003	35.2	22	0.035
		Metrict	1732.0	117	0.952	0.075	0.055	0.005	12.7	9	0.175
		Scalar	1739.8	126	0.952	0.072	0.055	0.000	28.6	9	0.001
	Chronic disease	Configural	1768.3	86	0.950	0.089	0.053	-	-	-	-
		Thresholds	1851.7	108	0.948	0.081	0.053	-0.002	22.3	22	0.444
		Metrict	1723.9	117	0.952	0.074	0.053	0.004	16.0	9	0.067
		Scalar	1708.6	126	0.953	0.071	0.054	0.001	18.9	9	0.026
	Time working	Configural	1894.6	172	0.949	0.090	0.056	-	-	-	-
		Thresholds	2063.4	238	0.946	0.079	0.056	-0.003	99.3	66	0.005
		Metrict	1934.3	265	0.950	0.071	0.057	0.005	54.5	27	0.001
		Scalar	2123.5	292	0.946	0.071	0.057	-0.005	120.9	27	0.000

X^2-Robust = Chi squared Robust. *gl* = Degrees of freedom. CFI = Comparative fit index. TLI = Tucker-Lewis index. RMSEA = Root mean square error of approximation. SRMR = Standardized root mean square residual. ΔCFI = Variation of the Comparative-Fit-Index. DIFFTEST = ANOVA difference test. * The measurement invariance is not met between the groups.

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