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Assessment of occupational risks in nurses in Spain
Preliminary psychometric analysis of the ISTAS_Enfermería scale

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Abstract

To adapt and evaluate the psychometric properties of the SUSESO/ISTAS21 questionnaire for nurses in Spain. Cross-sectional study for the cross-cultural adjustment and psychometric validation of the COPSOQ-ISTAS21 scale. Descriptive analyses were conducted, and data was correlated. A confirmatory factor analysis was performed, thus assessing the reliability and criterion validity. The sample consisted of 2757 Spanish nurses. The exploratory factor analysis identified a 5-factor structure with 15 items, which explained 63.6% of the variance. The factors were named: Support at work; Job satisfaction; Work-related emotional well-being; Job insecurity; and Double presence. The internal consistency of the questionnaire, measured by Cronbach alpha and McDonald omega coefficient, was adequate, with values of 0.764 and 0.741, respectively. The results of the confirmatory factor analysis indicated a good model fit. Three levels of psychosocial risk (low, intermediate, and high) were identified based on percentiles and quartiles of mean scores. The adapted version of the SUSESO/ISTAS21 questionnaire showed reliable psychometric properties in Spanish nurses, making it a valid and robust tool for assessing psychosocial risks in this group.

Abbreviations: CFI = comparative fit index, COPSOQ = Copenhagen Psychosocial Questionnaire, EFA = exploratory factor analysis, ISTAS = Instituto Sindical de Trabajo, Ambiente y Salud, RMSEA = root mean square error of approximation, SUSESO = Superintendencia de Seguridad Social, TLI = Tucker-Lewis index.

Keywords: factor analysis, nurses, psychosocial risks, scales, Spain, statistical, validation study, workplace stress

1. Introduction

Psychosocial risks in the work environment are defined as a set of factors that can be detrimental to the mental and physical health of workers.[1] These risks range from work overload and high intensity of emotional demands, to lack of work autonomy, insufficient peer support, and abusive working conditions in the work environment.[2] Psychosocial risks are particularly prevalent in healthcare professions, given the demanding and stressful nature of the jobs, which are characterized by long working hours, high pressure, and constant contact with human suffering.[3]

In particular, nurses face specific psychosocial risks that can affect both their personal well-being and the quality of care they provide to patients.[4] These include work overload, role conflicts, lack of clearly defined responsibilities, harassment at work, and insufficient organizational support.[5] These factors not only directly influence the mental health of nurses, but can also affect their professional practice and, consequently, the quality of care provided.[6] Several recent studies highlight how psychosocial risks in the workplace negatively affect nurses' mental health and performance. Conditions such as burnout, work overload, and lack of organizational support have been found to be related to high levels of stress and symptoms of

anxiety and depression.[7] These situations not only impact on the personal well-being of nurses, but also increase the likelihood of errors during care and compromise patient safety.[8] Indeed, an unfavorable working environment in terms of support and management of stress may contribute to a decrease in patient satisfaction, as well as to a higher incidence of adverse events.[9] This evidence highlights the importance of interventions in the work environment that promote a safe and supportive environment for healthcare workers, as improved psychosocial conditions have the potential to positively impact both the health of professionals and the quality of care they provide.[7]

As outlined, the above psychosocial risks not only affect nurses, but also have an impact on patients, as their perceived quality of care may decrease when nurses experience high levels of stress and emotional exhaustion.[10] In addition, patient satisfaction is closely linked to nurses' well-being. Recent studies have shown that a positive working environment for nurses translates into higher levels of patient satisfaction.[11] On the other hand, the presence of psychosocial risks may lead to an increased incidence of adverse events, such as medication errors or an increased risk of falls, thus compromising patient safety.[12] Therefore, addressing these risks is considered crucial not only to improve the health of nurses, but also to ensure safe and quality care for patients.

To address and measure these risks, several scales and questionnaires have been developed to assess different dimensions of this construct. These include the Job Content Questionnaire, the Effort-Reward Imbalance Questionnaire, and the Copenhagen Psychosocial Questionnaire (COPSOQ), which are widely recognized for their psychometric properties and their ability to provide useful data on psychosocial risks in various work contexts.[13]

The first of these, the Job Content Questionnaire, assesses aspects such as job demands, control over work, and social support at work.[14] This questionnaire has been widely used in international research and has been translated into Spanish and validated.[15]

The second questionnaire, the Effort-Reward Imbalance Questionnaire, focuses on the relationship between effort invested at work and rewards received, thus addressing the imbalance between effort and reward perceived by the employee.[16] The Spanish version has also been validated and used in several studies, showing a reliability with Cronbach alphas of 0.85 for the effort scale, 0.88 for the reward scale, and 0.78 for the imbalance scale.[17]

Finally, the COPSOQ assesses a wide range of psychosocial factors at work, including job demands, influence and possibilities for development at work, interpersonal relations at work, and emotional demands at work.[18] This questionnaire also has a validated version in Spanish,[13] with such validation showing adequate internal consistency, making it a very useful tool for assessing psychosocial risks in a variety of work contexts.

Among these scales, the SUSESO/ISTAS21 questionnaire stands out as a robust and effective tool for assessing psychosocial risks.[13] This questionnaire was developed in Chile by the Social Security Superintendency (SUSESO [Superintendencia de Seguridad Social] in Spanish) in collaboration with the Spanish Trade Union Institute for Work, Environment, and Health (ISTAS [Instituto Sindical de Trabajo, Ambiente y Salud] in Spanish), based on the second version of the COPSOQ.[18] Its adapted and validated version for the Chilean context has proven to be reliable and valid for assessing psychosocial risks in a wide variety of work settings in Chile. In addition, it is a brief scale that facilitates its use in mass assessments, which makes it a valuable tool for identifying risk factors and planning specific interventions in the workplace.[15] The SUSESO/ISTAS21 scale is organized into 5 main factors: psychological demands at work, which assesses both quantitative and qualitative demands in the work environment, with a total of 5 items; active work and skill development, which measures autonomy and ability to develop

skills, also with 5 items; social support and quality of leadership, which addresses the social support received and the quality of leadership, consisting of 5 items; compensation, which assesses the balance between effort and reward, with 3 items; and double presence, which considers the additional burden of domestic tasks, assessed with 2 items.[19]

Many studies have used the SUSESO/ISTAS21 questionnaire to identify risk factors and plan specific interventions.[13] However, a comprehensive study of its psychometric properties in nurses in Spain has not yet been carried out.

In this context, this article aims to adapt and evaluate the psychometric properties of the SUSESO/ISTAS21 questionnaire in nurses in Spain. The relevance of this research lies in the need for a validated and reliable tool to measure psychosocial risks in the Spanish context, especially in a vulnerable population such as nurses. This study will not only contribute to knowledge about psychosocial risk factors in this professional group, but could also help to develop preventive strategies and labor policies that improve the mental health and well-being of nurses in Spain, in turn promoting higher quality of care for patients.

2. Methods

2.1. Design

A cross-sectional and descriptive study was designed for the cross-cultural adjustment and psychometric validation of the COPSOQ-ISTAS21 scale.

2.2. Field of study

Spanish registered nurses working in health care centers in the Spanish territory.

2.3. Study population and sample

The study population consisted of 325,018 nurses registered in Spain.[20] Specific data on the number of registered nurses were obtained from the General Council of Nursing in Spain. For this population group, a necessary sample of 384 nurses was estimated, with an error of 5%, a confidence of 95%, and a heterogeneity of 50%. However, eventually, data were collected from 2757 nurses. Since a simple random sampling method was used, the design effect was not considered, as no complex sampling procedures requiring statistical adjustments for clustering or stratification were applied. This sampling approach assumed independence between observations, fulfilling the assumptions necessary for the statistical analyses performed.

The inclusion criteria were: (i) nurses working in health care centers, regardless of their public or private nature; (ii) residents in the national territory (Spain); and (iii) active nurses. The exclusion criteria were: (i) questionnaires not completed in their totality; (ii) questionnaires completed in anomalous times (too short or too long); and (iii) questionnaires in which an unusually high consistency of responses was detected, which could indicate a lack of attention in the response process.

2.4. Instrument

The initial questionnaire used for this study was the short version of the COPSOQ-ISTAS21 questionnaire adapted and validated in Chile.[19]

This scale, which is based on the Copenhagen Psychosocial Questionnaire developed by the Danish Institute for Health and Work Environment, was translated and culturally adapted for use in Chile.[19] In this validation, the overall internal consistency, as measured by Cronbach alpha, was 0.85, indicating good reliability. For the subscales, Cronbach alpha values were 0.80 for "Psychological demands"; 0.83 for "Control over

work"; 0.82 for "Social support"; 0.79 for "Job insecurity" and 0.75 for "Double presence." In addition, confirmatory factor analyses supported the structure of the scale, showing satisfactory fit indices (comparative fit index [CFI] = 0.92; Tucker-Lewis index [TLI] = 0.91; root mean square error of approximation [RMSEA] = 0.05), which confirms the construct validity of the Chilean version.

The short version of the questionnaire contains 20 questions grouped into 5 dimensions:

I. *Psychological demands at work*: encompassing both qualitative and quantitative factors in the workplace.
II. *Active labor and skills development*: collecting elements of employee autonomy.
III. *Social support and leadership quality*: concerning job support received and elements of leadership.
IV. *Compensation*: elements concerning the effort-reward balance.
V. *Double presence*: including elements on domestic chores and work-related tasks.

The dimensions and specific items of the SUSESO/ISTAS21 Questionnaire initially analyzed are shown in Table S1, Supplemental Digital Content, http://links.lww.com/MD/O250. The calculation of scores in the SUSESO/ISTAS21 questionnaire is directly performed with the points obtained, without transforming them into percentages. The simple summation of the total points obtained gives the score for each dimension. The response scale is a 4-point Likert-type scale, where 0 is the most favorable value and 4 the most unfavorable.

2.5. Procedure

2.5.1. Adaptation of the ISTAS scale.
First, a cross-cultural adaptation of the scale was carried out by a panel of experts using the Delphi technique. The experts were selected according to their academic degree (master's degree for university graduates, secondary school for students, and PhD for the university professor), area of expertise (nursing, psychology, management, and/or preventive medicine), experience (>10 years for graduates, no experience for students, and one-year experience for recent graduates) and their relationship with the specific subject area. The members of the panel of experts were identified by their affiliation to the Spanish National Health Service, through direct consultation on the agency's official website. They were sent an email requesting their participation, which included information about the project and an express request to participate as an expert, under the premises of confidentiality and voluntariness.

Two psychologists with extensive knowledge of scale validation (female, PhD in Psychology, 43 years old, with 15 years of experience; and female, PhD in Psychology, 45 years old, with 19 years of experience), one professor of Biostatistics (male, PhD in Health Sciences, 54 years old, 27 years of experience), one 4th year undergraduate nursing student (21-year-old woman with no experience) and one 3rd year undergraduate nursing student (22-year-old man with no experience), one dean of nursing (male, PhD in Health Sciences, 63 years old, with 39 years of experience), 2 nursing supervisors (female, MSc, 58 years old, with 35 years of experience; and male, MSc, 49 years old, with 27 years of experience), 2 recent graduates (year 22/23) (female, MSc, 23 years old, with 1 year of experience; and male, MSc, 25 years old, with half a year of experience) and 2 nurses who graduated 2 years earlier (female, MSc, 26 years old, with 2 years of experience) were selected. The composition of the panel of experts (5 men and 6 women) was designed to provide adequate representation for the validation of the scale in the specific context of the study.

In this process, the expert panel assessed areas such as psychometrics, linguistics, and the specific subject matter of the scale and its items. This procedure was carried out in several rounds of anonymous questionnaires that were answered independently by the experts. The panel of experts reviewed the original scale, which was written in Chilean Spanish, in order to assess its suitability and cultural relevance for the context in which it was intended to be applied (see Table S1, Supplemental Digital Content, http://links.lww.com/MD/O250). During the review, the experts analyzed each item of the scale in terms of clarity, relevance, and cultural appropriateness. At this point, each item was given a score by each expert ranging from 0 to 15 (clarity: 0–5 points; relevance: 0–5 points; and cultural appropriateness: 0–5 points) and a comment box was provided. The maximum total score for each item was therefore 15 points. The first consensus meeting was held in July 2023, in which the experts discussed and evaluated each item with the purpose of determining whether modifications to the wording were necessary. The consensus session began by welcoming the participants and informing them about how the session would be carried out. After asking the participants to score each item, a discussion was opened for each item whenever the median score was <10 points (indicating a lack of consensus that needed to be addressed) or if there were any observations, clarifications, or suggestions for improvement). The session lasted 40 minutes and the responses were analyzed. A summary of opinions and suggestions was made and sent back to the experts for the second round until agreement was reached on the items and appropriate language. The items in the final tool received a final expert consensus median score of 15 points.

2.6. Data collection

A pilot test of the questionnaire was carried out involving ten participants (6 registered female nurses and 4 registered male nurses, contacted individually, from 10 different provinces and aged between 23 and 63 years, with a mean of 43 years, and with different years of experience (between 1 and 39 years of experience with a mean of 19.4 years). The aim of the test was to assess the comprehension of the questionnaire, to detect possible typing errors or ambiguities in its drafting, and to ascertain the total time taken to complete the tool. The participants were selected for voluntary participation in the study through the General Council of Nursing of Spain, and adequately represented the profile of the target population. Following this, the evaluation of the questionnaire began.

For the general purpose, an online survey was created with Google Forms © software containing the scale items along with socio-demographic variables relevant to the study. Before accessing the questions in the questionnaire, all subjects participating in the study were required to read and sign the informed consent form, confirming that their participation was voluntary.

The dissemination of the study was conducted through various means and channels, including social media, emails to registered nursing professionals, specialized websites, and collaborations with professional nursing associations and organizations. Data collection took place between 01 August and October 31,2023.

2.7. Variables

Socio-demographic and scale variables were included. Thus, the variables considered were sex (male, female, nonbinary, or rather not stated), age, marital status (single, married, cohabiting, not cohabiting, separated, divorced, or widowed), and current position held.

The data collection on the scale variables was done through the SUSESO/ISTAS21 Questionnaire.

Table 1

Results of the descriptive analysis.

Variables	Total sample (n = 2764)	ISTAS21 mean score (X/SD)	Hypothesis test*
Sex			
Male	341 (12.3%)	1.792 (SD = 0.562)	*P* = .50**
Female	2414 (87.3%)	1.779 (SD = 0.494)	
Nonbinary	1 (0.0%)	1.200 (SD = 0)	
Rather not say	9 (0.3%)	1.874 (SD = 0.590)	
Mean		1.78 (SD = 0.503)	
Age			
Mean	40.87 years	1.78 (SD = 0.5)	**Tau-b*** = -0.12 (*P* .001)**
Marital status			
Married	1186 (42.9%)	1.722 (SD = 0.494)	**.001****
Divorced	117 (4.2%)	1.751 (SD = 0.500)	
With a partner (cohabiting)	748 (27.1%)	1.840 (SD = 0.517)	
With a partner (not cohabiting)	242 (8.8%)	1.828 (SD = 0.484)	
Separated	41 (1.5%)	1.824 (SD = 0.561)	
Single	422 (15.3%)	1.819 (SD = 0.492)	
Widowed	9 (0.3%)	1.814 (SD = 0.546)	
Mean		1.781 (SD = 0.503)	
Current position			
Auxiliary nurse	2287 (82.7%)	1.804 (SD = 0.493)	
Resident Nurse	37 (1.3%)	1.690 (SD = 0.551)	
Nurse in charge of a unit or service without recognized management position	139 (5%)	1.711 (SD = 0.477)	
Area or unit supervisor with management functions only	93 (3.4%)	1.465 (SD = 0.455)	
Unit supervisor with direct patient care as well as management activities	84 (3%)	1.590 (SD = 0.517)	
Specialist nurse	29 (1%)	1.671 (SD = 0.602)	
School nurse	11 (0.4%)	1.636 (SD = 0.598)	
Teaching and research	9 (0.3%)	1.837 (SD = 0.501)	
Mean		1.780 (SD = 0.502)	

Bold values indicate statistically significant results: *P* < .05.

SD = standard deviation, X̄ = mean score.

* The Kolmogorov–Smirnov test showed a *P*-value of *P* < .005 indicating a non-normal distribution of the data.

** Kruskal-Wallis H.

*** Kendall Tau-b.

2.8. Data analysis

The descriptive analyses were performed using SPSS Statistics © v26 software,[21] licensed by the University of Huelva. The Kolmogorov–Smirnov test showed a *P*-value of *P* < .005 indicating a non-normal distribution of the data, thus, nonparametric tests were considered, such as Kruskal Wallis' H test or Kendall Tau-b test.

To assess the reliability of the ISTAS_Nursing scale, Cronbach alpha coefficient and McDonald omega coefficient were calculated, the latter being recommended as a more robust indicator of scale reliability.[22] In both cases, a reliability value > 0.7 was used as an indication of adequate scale consistency.[23]

Next, the factor structure of the scale was studied by means of an exploratory factor analysis (EFA), using the principal components method. This method, suitable for data with nonnormal distribution and for the search for stable factorial solutions, used a varimax rotation to correlate the factors.[24]

Subsequently, a confirmatory factor analysis was carried out using AMOS© software.[25] The goodness of fit of the confirmatory model was assessed using several criteria, such as the TLI, the normalized fit index, the CFI (values ≥ 0.90 indicate adequate fit), the standardized root mean square residual (values ≤ 0.08 indicate good fit), and the RMSEA (values ≤ 0.08 show good fit).[26]

Finally, since no standard reference scale was used, neither ROC curve nor predictive validity were calculated for the assessment of criterion validity, although levels of psychosocial risk were identified based on the study of quartiles and percentiles of the sample.

2.9. Ethical aspects

This study was approved by the Huelva Provincial Research Ethics Committee, with code 1520-N-23. In addition, this study adheres to the guidelines of the Declaration of Helsinki (Fortaleza, Brazil, 2013).[27]

All participants (including the experts) gave their acceptation to participate in the study by clicking on the appropriate box in the online survey, after reading the pertinent information on the study and the informed consent document. Strict measures were taken to guarantee the privacy and confidentiality of the participants, in accordance with the Organic Law on Data Protection and Guarantee of Digital Rights (Law 3/2018),[28] with storage of the information in a secure database and access limited to the research team only.

3. Results

3.1. Descriptive analysis

The sample consisted of 2764 subjects, all active nurses, over 18 years of age, and residing in Spain. Of the total sample, 87.3% were women, with a mean age of 40.82 years (SD = 10.677), and 12.3% were men, with a mean age of 41.21 years (SD = 10.979). The 42.9% of respondents were married and 27.1% were cohabiting, and 15.3% were single. Smaller percentages corresponded to divorced (4.2%), separated (1.5%), and widowed (0.3%) persons (Table 1).

The mean score of the participants for the ISTAS_Enfermería scale was 1.78 points (SD = 0.503). The study of the correlation between this score and age showed that the older the age of the sample, the lower the perceived levels of psychosocial risks measured with the ISTAS_ Enfermería scale by 0.12 times. Looking at marital status, divorced (mean = 1.751, SD = 0.500) and separated (mean = 1.824, SD = 0.561) individuals showed higher scores compared to married individuals (mean = 1.722, SD = 0.494), suggesting that being married may be associated with lower psychosocial risk perception.

Similarly, single nurses (mean = 1.819, SD = 0.492) and those living with a partner (mean = 1.840, SD = 0.517) also showed higher scores, indicating significant differences by marital status (P = .001).

In addition, the analysis of job positions revealed a remarkable variability in perceived psychosocial risks. Area or unit supervisors with exclusively managerial functions reported the lowest scores (mean = 1.465, SD = 0.455), which could indicate a perception of lower risk, possibly due to greater job autonomy. In contrast, nurses engaged in teaching and research had the highest scores (mean = 1.837, SD = 0.501), reflecting higher perceived psychosocial demands (Table 1).

3.2. Psychometric study

Before performing the EFA, Bartlett test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy were applied, obtaining a value of 0.773 in the Kaiser-Meyer-Olkin measure and a significance of P < .001. This confirmed the suitability of the data for the factor analysis. The EFA (through principal axial factorization and varimax rotation) granted a factorial solution of 5 dimensions and 15 items (Table 1). Items 1, 5, 6, 7, and 12 of the original SUSESO/ISTAS21 scale have been removed (Candia et al[19]) for factor loadings below 0.4, a criterion supported by previous studies suggesting this threshold for measuring behaviors.[29] The final solution is a 5-factor structure, with 15 items, explaining 63.6% of the variance. Specifically, Factor 1 explains 18.025% of the variance; Factor 2, 12.244%, Factor 3, 12.069%; Factor 4, 10.895%; and Factor 5, 10.405%, with a cumulative variance percentage of 63.638% (Table 2).

Likewise, each of the factors that conform the scale were named as follows:

1. **Factor 1 – Support at work:** This factor refers to the support and cooperation a person receives in their work environment. It includes direct support from superiors, mutual help between colleagues, and the ability to resolve conflicts by line managers. It also refers to the recognition given to employees for their work.
2. **Factor 2 – Job satisfaction:** This factor describes the level of satisfaction and fulfillment that a person experiences in their work. It includes the opportunity to learn and develop professionally, the perceived importance of the tasks assigned, the sense of belonging to the company or institution, and the clear understanding of work responsibilities.

3. **Factor 3 – Emotional well-being at work:** This factor refers to emotional balance and stress management in the work environment. It includes the ability to make difficult decisions, the level of emotional exhaustion experienced at work, and the need to manage emotions in the work environment.
4. **Factor 4 – Job insecurity:** This factor describes the concern and uncertainty that a person may experience with regard to their work stability. It includes fear of dismissal or nonrenewal of contract and concern about unwanted changes in job responsibilities.
5. **Factor 5 – Double presence:** This factor refers to the balance between work demands and family and domestic responsibilities. It includes the tendency to think about family matters while at work and the occasional need to be present both at work and at home to attend to urgent family situations.

The scale reliability yielded a Cronbach α value of 0.764, and a McDonald omega value of 0.741. Likewise, the Cronbach α value obtained for each factor was: 0.80 for Support at work, 0.7 for Job satisfaction, 0.76 for Emotional well-being at work, 0.72 for Job insecurity, and 0.70 for Double presence.

Then, confirmatory factor analyses for the construct validity study yielded a CFI of 0.933, a TLI of 0.912, a normalized fit index of 0.926, a RMSEA of 0.057 and a standardized root mean square residual of 0.068 (Fig. 1).

The study of the mean score in the scales showed 3 levels of psychosocial risk for nurses in Spain (Low level: 0 to 1.46; Intermediate level: 1.47 to 2; High level: above 2) that were identified and depicted in a box-and-whisker plot. (Fig. 2). Significant differences between each pair of level were identified (P < .05) and checked with the Mann–Whitney U test. In the comparisons made between the 3 levels, the following was obtained: the comparison between the low level and the intermediate level produced a Mann–Whitney U value of 0.000, with a P value < .001; the comparison between the intermediate level and the high level showed a U value of 0.000 and P < .001; and, finally, the comparison between the low level and the high level also gave a U value of 0.000 with P < .001. These results indicate statistically significant differences across the levels.

4. Discussion

Considering the increasing workload and emotional pressures faced by nurses in Spain, the assessment and reduction of

Table 2

Scale items and factor structure.

Factor	% of variance	% accumulated	ITEMS	F1 – Support at work	F2 – Job satisfaction	F3 – Emotional well-being at work	F4 – Job insecurity	F5 – Double presence
1	18.025	18.025	ISTAS_13	.876				
			ISTAS_14	.450				
			ISTAS_15	.879				
			ISTAS_18	.800				
2	12.244	30.269	ISTAS_8		.703			
			ISTAS_9		.834			
			ISTAS_10		.501			
			ISTAS_11		.473			
3	12.069	42.338	ISTAS_2			.703		
			ISTAS_3			.783		
			ISTAS_4			.768		
4	10.895	53.233	ISTAS_16				.895	
			ISTAS_17				.821	
5	10.405	63.638	ISTAS_19					.872
			ISTAS_20					.865

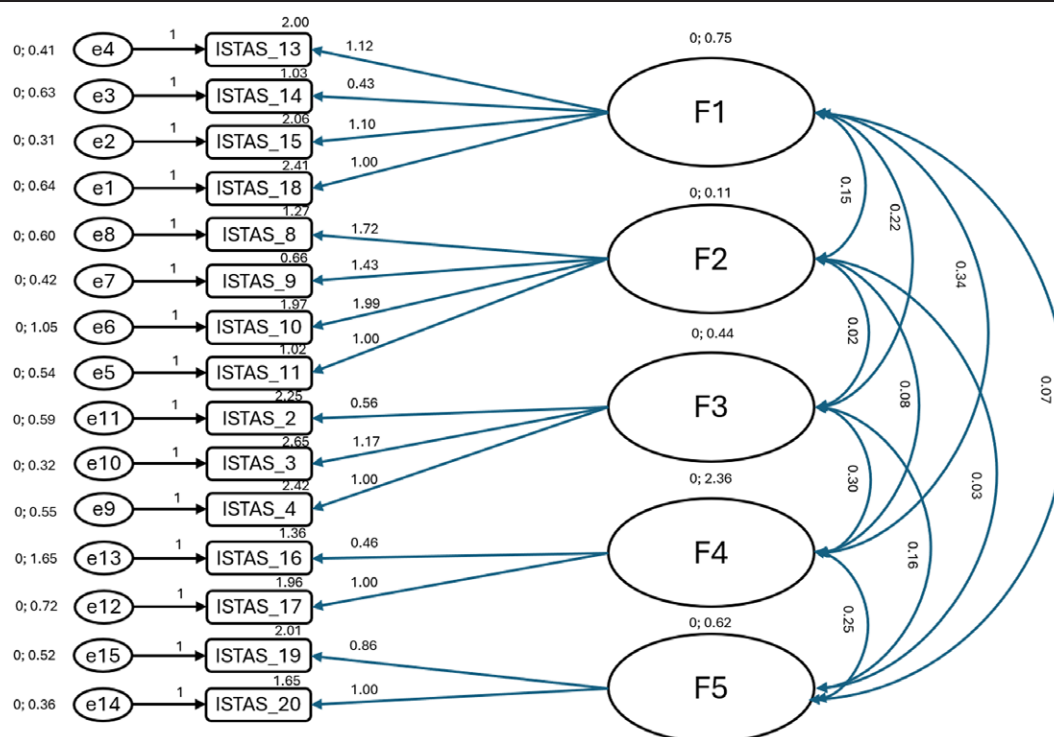Bold values indicate statistically significant results: P < .05.

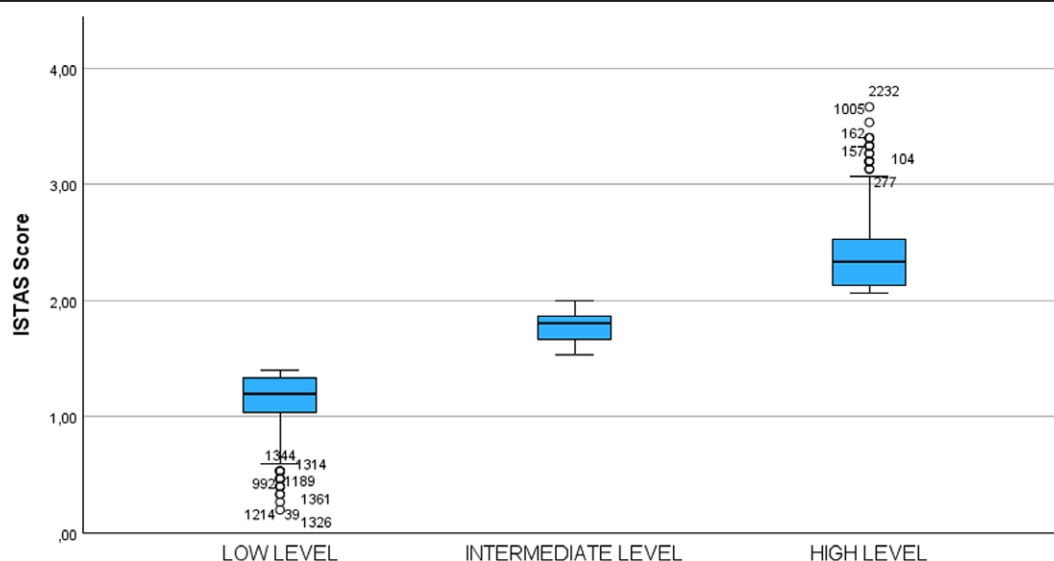**Figure 1.** Factor structure of the scale.

Figure 2. Psychosocial risk levels in nurses in Spain.

psychosocial risks in their daily work is essential. In this context, the main objective of this study was the adaptation and initial psychometric validation of the SUSESO/ISTAS21 questionnaire for nurses in Spain. The study sought to create a reliable tool to help improve both the health of nurses and the quality of care they provide to their patients. The results obtained indicate that the adapted SUSESO/ISTAS21 questionnaire presents adequate validity and reliability indices.

This study has significant implications for clinical practice, teaching, and research. In the clinical setting, the adapted SUSESO/ISTAS21 questionnaire allows the identification of psychosocial risk factors in nurses in order to develop preventive and supportive interventions. In the field of education, this tool can be integrated into training programs to increase the

awareness of future professionals about psychosocial risks and how to manage them. In terms of research, this validated questionnaire facilitates longitudinal and comparative studies on the psychosocial well-being of nurses. Overall, these findings confirm the validity of the ISTAS_Enfermería as a tool for detecting and assessing psychosocial risks in the nursing environment in Spain.

Recent studies show that the sustained stress to which nurses are exposed, especially in high-pressure clinical settings, can trigger significant symptoms of post-traumatic stress disorder. Implementing structured support programmes and strategies to improve the mental health of nursing staff becomes essential to ensure both their well-being and their ability to provide quality care. It has been shown that interventions based on emotional

de-escalation and peer support can be particularly effective in reducing work-related stress and strengthening resilience.[30]

The bivariate analyses performed show that there were no significant differences in mean ISTAS_Enfermería scores by sex, with similar scores between female and male nurses ($P = .50$). This finding is consistent with previous studies showing no significant differences in work stress scores between female and male nurses, and supports the idea that sex differences relating to stress may not be as pronounced in nursing as in other work contexts, even considering sex differences within the profession.[31] It is worth noting that although this study did not find significant differences between sexes, recent studies such as that by Costa (2021) highlight that, in high-stress situations, these differences may become more noticeable. This could indicate that in situations of overload or high-stress events, female nurses may experience higher levels of stress than their male counterparts, due to a combination of biological and social factors. Exploring these differences in future qualitative and quantitative studies would help to better understand the impact of sex on the perception of psychosocial risk in high-demand settings.[32]

Conversely, a significant negative correlation was observed between age and ISTAS21 score (Tau-b^b = -0.12, $P = .001$), suggesting that the older the nurse, the lower the perception of psychosocial risks. This trend has been observed in other studies, which argue that younger nurses tend to experience higher levels of stress and psychosocial risk due to their reduced experience in managing work demands. This, in turn, indicates that youth and lack of experience may be significant factors contributing to the perception of psychosocial risk in nursing.[33] In this regard, the implementation of mentoring programmes in which more experienced nurses can guide younger nurses is essential to strengthen confidence and resilience among young nurses. Hoover et al. (2020) note that these programmes not only improve resilience and confidence in clinical skills, but also create a supportive environment, which can mitigate the perception of stress and facilitate adaptation to the work environment in the early years of the profession.[34]

Effective management of work-related stress benefits greatly from approaches that promote autonomy and professional development. Work environments where nurses feel they have control over their tasks and opportunities for growth can mitigate the negative effects of stress. Tools such as the ISTAS_Enfermería should not only measure psychosocial risk, but also identify key areas for intervention. Incorporating ongoing education strategies and personalized stress management training can be crucial, particularly in high-demand clinical settings, to maximize the positive impact on staff well-being.[35]

Furthermore, regarding the marital status category, the present study showed significant differences ($P = .001$), with married nurses having lower scores (1.722) compared to other marital statuses, such as those in a non-cohabiting relationship (1.828) and single nurses (1.819). This may be related to the fact that married people often report higher levels of social support, which may act as a protective factor against work-related stress.[36]

As regards the current position, area or unit supervisors with purely managerial functions had the lowest scores (1.465), while teaching and research nurses had the highest scores (1.837). This may be due to a greater perception of control and autonomy in their roles, factors that are associated with lower levels of stress and psychosocial risk.[37]

With respect to the reliability results obtained by means of Cronbach alpha, in the sample of the present study, they showed an adequate internal consistency, with an overall value of 0.764, slightly higher than the value reported in the Chilean version, which was 0.758 (95% CI: 0.719–0.794).[36] This finding suggests that the ISTAS_Enfermería may be offering greater overall reliability in the specific context of nurses in Spain.

Regarding the factor structure of the ISTAS_Enfermería, all the dimensions assessed showed better reliability scores than those reported in the Chilean version of the SUSESO/ISTAS21.

In particular, the dimensions "Support at work" ($\alpha = 0.80$), "Job satisfaction" ($\alpha = 0.70$), "Emotional well-being at work" ($\alpha = 0.76$), "Job insecurity" ($\alpha = 0.72$) and "Double presence" ($\alpha = 0.70$) showed higher alpha coefficients compared to their Chilean equivalents, suggesting a higher reliability in the Spanish sample.[38]

These differences in factor structure suggest that the perception of psychosocial risks varies depending on the cultural context. While both questionnaires maintain a five-factor structure, the ISTAS_Enfermería has significantly reconfigured the items and factors in response to the specific context of nurses in Spain. The present study identified 5 work factors with structural differences with respect to the Chilean version. The first factor, "Support at work," does not have an exact equivalent in the Chilean questionnaire, but is similar to "Social support and leadership quality." The second factor, "Job satisfaction," did not have a direct correspondence either, yet similar aspects are found in the categories "Active labor and skills development" and "Compensation." The third factor, "Emotional well-being at work," is not represented in the Chilean version. The fourth factor, "Job insecurity," also differs, although some aspects are related to the "Compensation" factor. The fifth factor, "Double presence," is similar in both versions, reflecting the reconciliation of work and family responsibilities.

In the Chilean version, the factor "Psychological demands" was eliminated due to low factor loadings. The factor "Active labor and skills development" was redistributed in the ISTAS_Enfermería. The factors "Social support and leadership quality" and "Compensation" showed differences in the structure of the ISTAS_Enfermería.

These differences in the dimensional structure and item distribution between the ISTAS_Enfermería and the Chilean version reflect variations in the perception and relevance of psychosocial risk factors in different cultural and occupational contexts.[39] While both versions maintain a five-factor structure, the ISTAS_Enfermería has resulted in a significant reconfiguration of items and factors, underlining the importance of cultural and context-specific adaptation in psychosocial risk assessment.

Additionally, it is relevant to compare the present results with those of studies such as the one by,[13] who also validated the SUSESO/ISTAS21 in a sample of workers in Spain. In the said study, the "Psychological demands" dimension obtained a Cronbach alpha of 0.79, while in the present study this same dimension had an alpha of 0.82. The "Job insecurity" dimension in Moncada study obtained an alpha of 0.70, while in this study an alpha of 0.72 was obtained. Finally, the "Social support" dimension had an alpha of 0.85 in the Moncada study,[13] compared to 0.84 in the present study. These similarities and slight improvements suggest good internal consistency and robust reliability in different work contexts.

That said, this study also has some limitations that should be considered. Firstly, the criterion validity of the ISTAS_Enfermería using another gold standard scale or ROC curve was not included, so there are no data on predictive validity. Also, the sample used was non-probabilistic and of convenience, which could affect the generalizability of the results to the entire population of nurses in Spain. Similarly, the dissemination methods used were broad and based on social networks, specialized nursing websites in Spain, and e-mails to registered nurses through official media, so it was not possible to know the response rate or the total reach of this dissemination. Also, the use of online surveys may have left out some nurses with little access to the internet or less proficiency with technology. Also, the majority of the study sample was made up of women. In this regard, previous studies have shown that women may perceive and experience work-related stress differently from men, suggesting the need to further explore these differences between the sexes in future studies.[40] Although the sample size is large and the distribution by sex is similar to that of the Spanish nursing population, the need for future research to consider these aspects

should be borne in mind. In addition, recent studies indicate that nurses' emotional exhaustion is influenced by specific work environment factors, such as autonomy, available resources, and team support, all of which significantly affect their engagement and mental health. High-pressure units, such as the emergency department, show higher levels of burnout, which may affect quality of care. These findings highlight the importance of future longitudinal research examining individual and systemic factors that impact nurses' well-being in diverse care settings.[41]

Overall, these findings confirm the validity of the ISTAS_Enfermería as a tool for detecting and assessing psychosocial risks in the nursing environment in Spain. This tool may be useful not only for identifying risk factors, but also for evaluating the effectiveness of interventions designed to reduce work-related stress and improve nurses' well-being in different contexts. However, it would be desirable for future research to further explore these findings through longitudinal studies and in different care settings, which would contribute to the development of occupational health policies tailored to the specific needs of nurses in Spain.

5. Conclusion

The ISTAS_Enfermería scale has proven to be reliable and valid for the assessment of psychosocial risks in nurses in Spain. The scale contains 15 items organized into 5 factors: Support at Work, Job Satisfaction, Emotional Well-being at Work, Job Insecurity, and Double Presence, which explain 63.6% of the variance. These items cover key factors of the perception of psychosocial risks in the work environment.

To develop the adaptation of the scale, a thorough cultural adaptation and psychometric validation procedure was carried out. A panel of experts in areas such as nursing, psychology, and management participated in the review and adaptation process using the Delphi technique, evaluating each item in terms of clarity, relevance, and cultural appropriateness. Subsequently, a pilot test was conducted to assess the understanding and usability of the questionnaire in the target population. The dissemination of the questionnaire was done through digital media, including social media, e-mails to nursing professionals, and collaboration with specialized organizations, which allowed for data collection between August and October 2023.

The psychometric analysis showed robust results: the overall internal consistency measured by Cronbach alpha was 0.764, while exploratory and confirmatory factor analyses confirmed the 5-factor structure with adequate fit indices (CFI = 0.933; TLI = 0.912; RMSEA = 0.057). These findings suggest that the scale is valid and reliable for assessing psychosocial risks in nursing in the Spanish context.

In the clinical setting, this will allow the development of preventive interventions and specific support programmes to improve nurses' mental health and well-being at work. At the educational level, integrating this tool into nursing education can help future professionals to better manage work-related stress from the beginning of their careers. In the field of research, the validation of this scale facilitates long-term and comparative studies on psychosocial well-being in different contexts. In addition, the tool could be adapted and validated for other health professions, thus benefiting more workers. Future research should consider criterion validation and explore sex differences with respect to perceptions of work-related stress in order to design more inclusive and effective interventions.

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