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Validation of the CD-RISC-10 in Peruvian Nurses and Its Association with Stress and Empathy

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Abstract

Background: This study aims to psychometrically validate the abbreviated version of the Connor-Davidson Resilience Scale (CD-RISC-10) in Peruvian nurses, evaluating its convergent validity through its association with perceived stress and empathy. Methods: A cross-sectional psychometric study was conducted in 374 Peruvian nurses to evaluate the psychometric properties of CD-RISC-10 through confirmatory factor analysis (CFA). In addition, convergent validity was examined by correlational analysis with Spearman's ϱ coefficient with empathy and resilience. Results: The CFA confirmed that the one-dimensional model has a good fit (CFI = 0.978, TLI = 0.971, RMSEA = 0.080, and SRMR = 0.044). Cronbach's alpha of 0.89 and McDonald's omega of 0.81 were obtained. Convergent validity showed significant correlations with perceived stress ($\varrho = -0.23$, $p < 0.001$) and empathy ($\varrho = 0.31$, $p < 0.001$). Conclusion: The CD-RISC-10 has excellent psychometric properties in Peruvian nurses. Future studies are needed to evaluate their factorial invariance between clinical specialties and determine cut-off points.

Keywords: resilience; stress; psychometric study; nurses; empathy; CD-RISC-10; confirmatory factor analysis

1. Introduction

Resilience is currently recognized as an essential component for the sustainability of professional practice in nursing, particularly in clinical contexts characterized by high uncertainty, work overload, and continuous exposure to human suffering [1–3]. Its strengthening not only contributes to preserving the psychological integrity of nurses, but also has a direct influence on patient safety and the technical and humanistic quality of the care provided [4–6]. From a theoretical perspective, resilience is defined as a dynamic, multidimensional, and continuous process by which people manage to maintain adaptive and healthy functioning, even in the face of adverse experiences or significant stressors [7,8].

The literature highlights that this construct is associated with various personal and contextual factors, including self-efficacy, positive coping, social support and, in particular, empathy which is considered a key resource that interacts synergistically with the resilient capacity to promote

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workplace well-being and the humanized response to the suffering of others [9–12]. On the other hand, resilience has been identified as a protective moderating factor against manifestations of psychological distress, showing negative associations with perceived stress, anxiety, depression and the different components of burnout [13–15].

The growing interest in assessing resilience in the nursing discipline has driven the development of various psychometric instruments that differ in their extent, level of specificity, and target population [4]. In the international arena, the evidence reflects a constant evolution in its adaptation and validation processes. In 2016, in the United States, Mealer et al. performed the first adaptation of the Connor-Davidson Resilience Scale (CD-RISC) in intensive care unit nurses, proposing an abbreviated version of 16 items [16]. Three years later, in Iran, the Emergency Nurse's Professional Resilience Tool (ENPRT) was designed, consisting of 37 items and aimed at measuring professional resilience in emergency services nurses, using a mixed approach of development and validation [6]. That same year, in China, the Resilience Scale-14 (RS-14) was validated in a sample of nurses with less than three years of experience, in order to explore their adaptation during the transition to clinical practice [17].

Subsequently, in 2022, the eight-item Nurse Team Resilience Scale (NTRS) was developed in China, aimed at assessing the collective resilience of nursing teams in the face of public health emergencies [18]. In 2023, they abbreviated the Wagnild & Young Resilience Scale into a 13-item version for application in U.S. nurses [19]. More recently, new cultural adaptations of the ENPRT in China [1] and the Persian version of the NTRS for resuscitation teams in Iran were reported [2]. Finally, in 2023, they confirmed in Greece the validity and unifactorial structure of the 10-item CD-RISC in nurses working in hospitals, demonstrating its psychometric consistency in European clinical settings [5].

Finally, in 2023, they confirmed in Greece the validity and unifactorial structure of the 10-item CD-RISC in nurses working in hospitals, demonstrating its psychometric consistency in European clinical settings [20], factorial consistency, and generalization capacity to different clinical and population contexts [21]. Its validation process in Spanish shows a progressive evolution that began with the adaptation of the abbreviated version of 10 items in Spain, applied to young university students [22] and older adults [23]. In Colombia, the validity and reliability of the short version in patients with chronic diseases was evidenced [24] and later in the university population [25]. Along the same lines, Spanish research confirmed its unifactorial structure in multi-occupational samples [26] and established normative scales for the full 25-item scale [27].

In the Peruvian context, the CD-RISC has been the subject of psychometric analyses that demonstrate its cultural relevance and applicability in different groups. The first adaptations included translation and validation into the Quechua language in women affected by the armed conflict in Ayacucho [28]. Subsequently, they examined the 10-item version in university students, proposing an abbreviated version of seven items (CD-RISC-7) with superior adjustment indicators [29]. More recently, the CD-RISC-10 has shown adequate properties in vulnerable populations such as adolescent mothers [30] and the factorial validity of the 25-item South American version has been confirmed (CD-RISC-25SA) in adolescents, evidencing a stable four-factor structure consistent with the regional sociocultural reality [8].

Although the CD-RISC has been validated in Peru in samples of university students and adolescent mothers [29,30], A knowledge gap persists regarding its specific cultural adaptation and formal psychometric validation in nursing professionals, a group exposed to unique care demands. This gap is particularly critical, as the absence of robust and culturally relevant psychometric tools makes it difficult to reliably assess resilience, analyze its relationship with other psychosocial variables, and integrate it into interventions to improve occupational health. Therefore, the objective of the present study was to psychometrically validate the 10-item version of the CD-RISC in Peruvian nurses, evaluating its convergence validity through its association with perceived stress and empathy.

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2. Materials and Methods

2.1. Sample and Procedures

A cross-sectional psychometric study was implemented with the participation of 374 Peruvian nurses to carry out the cultural adaptation, validation and determination of the psychometric properties of the CD-RISC-10 in the Peruvian context using Confirmatory Factor Analysis models. Additionally, convergent validity was examined through correlational analyses between resilience, stress, and empathy. The study was carried out between June 2025 and February 2026. The design comprised two sequential phases: (1) cultural adaptation and (2) psychometric analysis.

Phase 1: Cultural Adaptation

After obtaining formal authorization from the original authors [7], a panel of experts was constituted with the participation of 9 specialist nurses (mental health, emergency and intensive care) and a psychologist, with experience in cross-cultural validations [31]. The session, held virtually, began with the presentation of the objectives and a brief discussion about the definition of resilience according to the theoretical framework used, as well as the indicators considered in the CD-RISC-10. Subsequently, each of the items was presented to the thematic experts, who reviewed and evaluated their semantic and idiomatic understanding and cultural relevance in the Peruvian context. For each item, the observations and contributions of the participants were recorded. After the proposed amendment, it was put to a vote for approval. All amendments were adopted by consensus. The panel proposed minimal modifications in five items. These lexical adjustments preserved the semantic and perceptual equivalence, adapting idiomatic expressions to Peruvian Spanish, which were incorporated after review by the research team.

Phase 2: Psychometric analysis

The final sample was made up of Peruvian nurses who work in health facilities with hospitalization (public/private hospitals and clinics). The inclusion criteria were: (a) working in clinical areas with hospitalization, (b) having an electronic device with internet access, and (c) residing in Peru. Those who performed only administrative tasks or resided outside the country were excluded.

The minimum sample size was calculated considering a minimum of 10-20 subjects per item (n = 100-200) [32], prioritizing >300 to enhance factorial stability in CFA with moderate samples. Non-probabilistic convenience sampling was used, until 374 valid responses were reached, which increases statistical power and mitigates individual biases.

Data collection was carried out virtually using the AllCounted platform (for its ability to record response time and prevent random responses). The invitation was personally addressed to nurses who were pursuing postgraduate studies at Peruvian universities and professionals from verified health establishments, requesting a telephone number or email to send the unique link. In this way, compliance with selection criteria was verified through manual review of sociodemographic data.

All participants provided electronic virtual informed consent prior to the start of the questionnaire. The digital form began with the consent form (nature of the study, voluntariness, anonymity, risks/benefits) followed by a dichotomous acceptance question. Subsequently, sociodemographic data (age, sex, residence, type of establishment and professional experience) were recorded before the instrumental scales.

2.2. Measurement Tools

Resilience

The CD-RISC-10, a Spanish version authorized directly by the original authors, was used [7].

Empathy

To assess convergence validity, the "Empathy" subscale of the Communication Skills Scale (CSS) was used, adapted and validated specifically for Peruvian nurses through confirmatory factor analysis (CFA), focus group, and cultural adjustment [33]. This subscale showed high reliability

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(McDonald's ω = 0.82), factor loads >0.62 and stable factor structure equivalent to the original Spanish version [34].

Stress

The Perceived Stress Scale (PSS) was applied, structurally validated in Peruvian nurses through exploratory structural equation modeling (ESEM), demonstrating optimal bifactorial structure, factor loads ≥0.50 and adequate reliability in both PSS-10 and PSS-14 [35].

Both scales used a 5-point Likert format (1 = strongly disagree; 5 = completely agree), administered in fixed order to minimize fatigue effects.

2.3. Analysis

The statistical processing and analysis of the data was carried out using the R computing environment and the RStudio interface, using the psych packages for basic descriptive and psychometric analyses, lavaan for the modeling of structural equations and semTools for complementary fit and reliability analyses. In the first stage, the sociodemographic characteristics of the sample were explored by calculating frequencies and percentages for the categorical variables, as well as the mean and standard deviation for the quantitative variables. Subsequently, the validity evidence based on the internal structure was evaluated by means of a Confirmatory Factor Analysis (CFA). To determine the adequacy of the model, the comparative and absolute goodness of fit indices were interpreted, considering CFI and TLI values greater than 0.95, and RMSEA and SRMR values below 0.08 as acceptable fit criteria. Because the initial model presented indicators below these recommended thresholds, the modification indices were inspected, which justified the respecification of the model allowing the correlation between theoretically defensible residual errors. Finally, the reliability of the scores was estimated using McDonald's Alpha-ordinal and Omega coefficients, and the Average Variance Extracted (AVE) was calculated to evaluate discriminant validity. Similarly, concurrent validity evidence was analyzed using Spearman's correlation coefficients between resilience, perceived stress, and empathy.

3. Results

The final sample consisted of 374 Peruvian nurses (age M = 39.77 years, SD = 9.11; range: 21-69 years), of which 88.24% were women. Regarding professional career, almost half (47.33%) reported more than 10 years of work experience. Geographically, Metropolitan Lima predominated (74.06%), and 62.88% worked in hospitals (Table 1).

Table 1. Sociodemographic and job-related characteristics of the sample.

	f	%
Sex		
Male	44	11.76
Female	330	88.24
Years of experience		
Less than 5	84	22.46
Between 5 and 10 years	113	30.21
More than 10 years	177	47.33
Department of residence		
Lima	277	74.06
Other department of Peru	97	25.94
Work Environemnt		
Hospital	227	62.88

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Health center / Health post	59	16.34
Other*	75	20.78

* Clinic, independent practice and others.

Evidence of factorial validity

To report the validity of the internal structure, Confirmatory Factor Analysis (CFA) was used to evaluate the fit of the CD-RISC-10 questionnaire in the sample of Peruvian nurses. In the first instance, a single-factor model without residual correlations was tested, which showed suboptimal fit indicators, with a significant chi-square value ($x2 = 241.28$, $df = 35$ $p < .001$). In this initial model, although the SRMR was 0.059 and the CFI reached 0.945, the TLI stood at 0.929 and the RMSEA showed an elevated value of 0.126, suggesting the need to review the sources of error.

After the analysis of the modification indices, a second model was estimated that allowed the correlation of the residuals between item 4 and item 7. This modification resulted in a significant improvement in the overall fit of the model. The results for this model ($x2 = 114.86$, $df = 34$, $p < .001$). The comparative adjustment indices showed excellent levels, with a CFI of 0.978 and a TLI of 0.971. Likewise, the error indicators decreased considerably, reporting an RMSEA of 0.080 and an SRMR of 0.044, which confirms that this final model adequately represents the structure of the scale in the study population.

Figure 1 shows the graphical representation of the final model, which confirms a one-dimensional structure composed of ten items that converge on a single general resilience factor. All standardized factor loads were statistically significant with p values less than 0.001. The factor loads of the items ranged between 0.33 and 0.85, with item 2 with the highest load, followed by items 8 and 9. On the contrary, item 8 presented the lowest factor load of the set. Likewise, as detailed in the figure, the model incorporates a correlation between the residual errors of items 4 and 7, which presents a coefficient of 0.32. The significance of all the estimated parameters supports the validity of the internal structure of the instrument for this specific population.

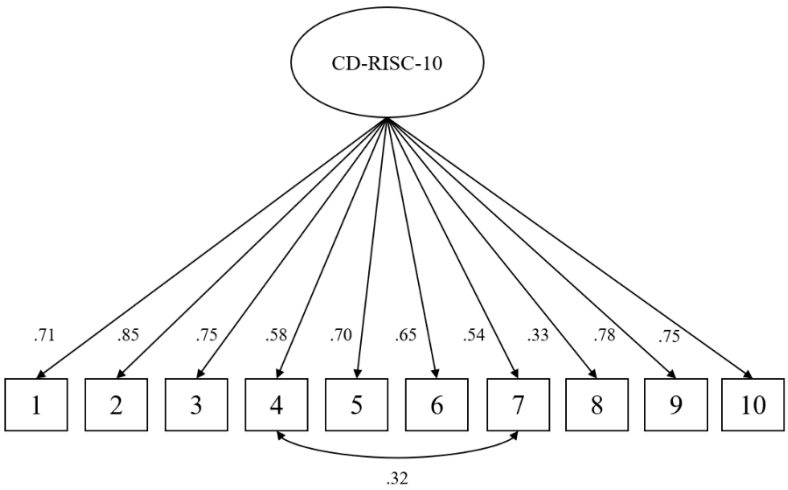

Figure 1. Factor model of the CD-RISC-10 in a population of Peruvian nurses. Note: CD-RISC-10: Connor-Davidson Resilience Scale of 10 items. All model parameters are significant at $p < 0.001$.

Evidence of reliability by internal consistency

The reliability of the scale was analyzed through two internal consistency coefficients to ensure the accuracy of the measurement. An Alpha-Cronbach coefficient of 0.89 was obtained, which indicates a high homogeneity between the instrument's items. In addition, the McDonald's Omega coefficient was 0.81, confirming a satisfactory and adequate internal consistency for the use of the scale in research and professional practice contexts.

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Evidence of discriminant validity

Regarding the evidence of convergent and discriminant validity evaluated by means of the Average Variance Extracted (AVE), a value of 0.46 was reported. Although this indicator is slightly below the conventional threshold of 0.50, it is considered acceptable in one-dimensional models with significant factor loads and high reliability coefficients, suggesting that the latent resilience factor manages to explain a considerable proportion of the variance of its indicators in this population of nurses.

Evidence of concurrent validity

The results of the correlation analysis revealed statistically significant associations between all the variables evaluated (Table 2). First, a negative and moderate correlation was observed between Resilience and Perceived Stress (rho = -0.53, $p < .001$), indicating that higher levels of resilience are associated with lower perception of stress in nursing staff. On the other hand, Resilience showed a positive and significant relationship with Empathy (rho = 0.31, $p < 0.001$), suggesting that professionals with greater resilience resources tend to also manifest higher levels of empathic disposition. Finally, a negative correlation between Empathy and Perceived Stress (rho = -0.23, $p < 0.001$) was reported, thus completing the panorama of interrelations between the evaluated constructs. These findings provide solid evidence in favor of the external validity of CD-RISC-10 in this population, as it behaves in a manner consistent with established theory.

Table 2. Spearman's correlation matrix between Resilience, Perceived Stress and Empathy.

	1	2	3
1. Resilience	-		
2. Perceived stress	-0.53***	-	
3. Empathy	0.31***	-0.23***	-

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

4. Discussion

The present study provides robust psychometric evidence on the adequate properties of the CD-RISC-10 in a sample of Peruvian nurses, confirming its unifactorial structure through confirmatory factor analysis (CFA) and demonstrating convergence validity through its association with perceived stress and empathy. These findings extend the international evidence on the abbreviated version of this scale to the Peruvian sociocultural context, where it lacked specific validation in nursing professionals.

The results converge with recent international validations in nursing personnel, such as the study carried out in Greece, where a one-dimensional structure with excellent reliability was also reported [5]. Similarly, research on Spanish workers from different disciplines has corroborated the robustness of this single-factor model [26]. Although other instruments such as the RS-14 have shown two-factor structures in Eastern nurses [17], the 10-item version used in this study proves to be highly functional and stable in the context of Peruvian nursing.

As for reliability, this was confirmed by two highly rigorous indicators: Cronbach's Alpha (0.89) and McDonald's Omega (0.81) coefficients, which demonstrated a solid and satisfactory internal consistency for use in research [5,21]. Higher than the results of the studies Serrano et al. (α=0.81) [23] and Soler et al. (α =0.87) [26], but lower than that obtained by Wang et al. (α=0.91) [36]. While the Average Variance Extracted (AVE) reported a value of 0.46, slightly below the ideal threshold of 0.50, it is considered evidence of acceptable validity due to the high factor loads and high reliability of the instrument [21,37].

The analysis of external and concurrent validity showed a negative and moderate correlation with perceived stress (rho = -0.53), validating the theoretical premise that the greater the resilience, the lower the stress. This finding supports that the instrument is theoretically predictably linked to

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related constructs, providing solid evidence that it measures the professional's ability to adapt positively to adversity [7,21]. This result aligns with the Job Demands and Resources (JD-R) model, which positions resilience as a fundamental protective personal resource to mitigate burnout and psychological distress in high-demand environments [3,13,38]. The fact that resilience presents this relationship with stress indicates that the construct behaves as a psychological force that preserves mental health in the face of threats from the environment [14,15]. Therefore, the ability of the scale to explain a significant proportion of the variance of stress levels suggests that the adapted CD-RISC-10 maintains the theoretical coherence of the original model. Consequently, these results confirm that the scale is a valid and functional indicator of the internal adaptation resources necessary for professional performance in the context of Peruvian nursing.

The positive and significant relationship found between resilience and empathy (rho = 0.31) in Peruvian nurses is consistent with contemporary scientific evidence that positions empathy as a protective personal resource [3,10]. This finding coincides with international research where it is documented that empathy is strengthened by higher levels of resilient capacity, allowing the professional to better manage the emotional pain of others [10,11,15]. Likewise, studies in nurses have corroborated that empathy maintains positive links with personal resources, acting synergistically with resilience to improve professional quality of life and mitigate compassion fatigue [10,12]. Recent systematic reviews also support that empathy is a critical work resource that correlates favorably with the ability to adapt in high-pressure healthcare environments [39]. Finally, these results suggest that greater resilience allows professionals to preserve their affective faculties to connect with the patient and provide humanized care, even under conditions of high demand for care or trauma [4,9].

Among the implications of this study, it is possible to highlight that this research provides evidence that resilience is an emotional factor negatively associated with perceived stress and positively with empathy. This is relevant information for educational institutions, indicating that the resilience assessment could be included as a selection criterion in this type of professional career. Resilience, empathy and perceived stress can be considered as factors associated with professional adaptation to high-demand clinical contexts. The selection of future professionals based on these psychological metrics would favor the general well-being of professionals, improving the stability of nursing and health professional teams.

At the educational level, the results of this research suggest that nursing training at the curricular level should include adaptive coping skills, emotional regulation, and skills to manage professional stress in general, perceived stress control skills, and resilient empathy.

Regarding the limitations, given the methodological characteristics of the study, it is important to highlight that being a correlational study, causal interpretations are limited, so it is suggested that future experimental or longitudinal studies explore the robustness of the conclusions of the present study. On the other hand, the sample selection method does not allow immediate generalizations to be made to other populations, so it is suggested to carry out studies with greater heterogeneity in the sample.

5. Conclusions

The present methodological study provides rigorous psychometric evidence that corroborates the optimal metric properties of the abbreviated 10-item version of the Connor-Davidson Resilience Scale in Peruvian nursing professionals. Confirmatory factor analyses revealed a stable univariate structure with excellent fit indices, internal reliability above the recommended threshold for clinical applications, and significant convergent validity with theoretically related constructs such as perceived stress and professional empathy. These findings position the instrument as a brief, robust, and culturally sensitive psychometric tool for the systematic assessment of occupational resilience in Latin American health contexts.

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Informed Consent Statement: Informed consent was obtained online from all study participants.

Data Availability Statement: The information will be available upon request addressed to the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

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