



VALUING AND SUPPORTING EMPLOYEES MATTERS: EVIDENCE OF REPLICATION, FACTORIAL STABILITY, AND RELIABILITY OF THE PERCEIVED ORGANIZATIONAL SUPPORT SCALE IN A BRAZILIAN WORKFORCE

VALORAR E APOIAR FAZ BEM: REPLICAÇÃO, ESTABILIDADE FATORIAL E CONSISTÊNCIA DA ESCALA DE PERCEPÇÃO DO SUPORTE ORGANIZACIONAL EM TRABALHADORES DO RIO GRANDE DO NORTE

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ABSTRACT

This study aimed to verify the organization, consistency, and variation of the factorial structure of the Organizational Support Perception Scale (EPSO) among Brazilian workers. The economic, social, and professional changes that have occurred in recent years have influenced organizations in developing and maintaining people management practices focused on the quality of life of both the worker and the institution itself. Among the various proposals for the evaluation and diagnosis of organizational practices grounded in Positive Psychology, the assessment of organizational support has stood out as a relevant auxiliary measure of organizational performance. A total of 402 workers from the state of Rio Grande do Norte participated in the study, aged over 21 years and working in different professional specialties. Participants completed a sociodemographic questionnaire and the EPSO. For cross-validation purposes, the General Health Scale was also applied. Statistical analyses—including discriminant, representativeness, exploratory, and confirmatory analyses—revealed satisfactory psychometric indicators, confirming the quality of the measure. It can therefore be concluded that the scale is reliable for assessing the construct of organizational support among Brazilian workers. Moreover, the findings of this study support the possibility of developing a psychological test aimed at both organizational and individual evaluation.

Keywords: Organizational support, Scale, Exploratory and confirmatory analysis, Brazilian workers.

RESUMO

O presente estudo teve como objetivo principal verificar a organização, a consistência e a variação da estrutura fatorial da Escala de Percepção de Suporte Organizacional (EPSO) em trabalhadores brasileiros. As mudanças econômicas, sociais e profissionais ocorridas nos últimos anos têm influenciado as organizações no desenvolvimento e na manutenção de práticas de gestão de pessoas voltadas à qualidade de vida do trabalhador e da própria instituição. Dentre as diversas propostas de avaliação e diagnóstico das práticas organizacionais fundamentadas na Psicologia Positiva, a avaliação do suporte organizacional tem se destacado como uma medida auxiliar relevante para o desempenho organizacional. Participaram do estudo 402 trabalhadores do Estado do Rio Grande do Norte, com idade acima de 21 anos e atuantes em diferentes especialidades profissionais. Os participantes

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responderam a um questionário sociodemográfico e à EPSO. Para a análise de validade cruzada, foi aplicada a Escala de Saúde Geral. As análises estatísticas, discriminatória, de representatividade, exploratória e confirmatória, revelaram indicadores psicométricos satisfatórios, que confirmaram a qualidade da medida. Conclui-se, portanto, que a escala é confiável para avaliar o construto de suporte organizacional entre trabalhadores brasileiros. Além disso, os achados deste estudo sustentam a possibilidade de desenvolvimento de um teste psicológico voltado tanto para a avaliação organizacional quanto individual.

Palavras-chave: Suporte organizacional, Escala, Análise exploratória e confirmatória, trabalhadores brasileiros.

INTRODUCTION

Work is a tool that enables individuals to achieve their ideals, as well as to produce the goods necessary for their survival. Thus, several meanings can be attributed to the concept of work, which may even be viewed as a component of subjective processes (Guazina, 2021). Over the years, the labor market has been transformed by technological advances, including changes within organizational contexts. In this regard, organizations need to invest in more dynamic and proactive work environments that take into account variables that are important both to workers and to organizations (Hokama & Martins, 2024).

In general, work processes have undergone significant modifications, with repercussions across various professional fields. One of the most debated issues concerns the replacement of human labor by Artificial Intelligence (AI). The use of AI for process automation has advanced considerably, driven by accelerated technological development in recent years (Ferreira, 2021).

Furthermore, several professions have been affected, and their working conditions have become increasingly fragile and precarious due to the socioeconomic transformations experienced over time (Pithan, Vaclavik, & Oltramari, 2020).

The COVID-19 pandemic was another major event that impacted work arrangements and required emergency adaptations in several occupational settings. This public health emergency, declared in 2020, popularized online classes, meetings, and live broadcasts,





representing a milestone in the transformation of the world of work and the expansion of remote work (Guazina, 2021; Brandão, Perucchi, & Freire, 2023).

Rapid and structural changes became necessary, leading many organizations to adopt remote, hybrid, or flexible work models, which significantly altered the way employees interact with their institutions and managers (Guazina, 2021).

Regarding the adoption of remote work, emotional management and an understanding of organizational care dimensions are essential, involving empathy, mutual trust, and access to support. These aspects are important for organizational innovation, which should maintain rituals and practices that promote connection among workers (Brandão, Perucchi, & Freire, 2023).

Following the period of isolation and crisis, issues such as remote work, flexible schedules, work–life balance, and employee mental health gained prominence. The way organizations respond to these demands directly impacts employees' perceptions of support, which in turn influences satisfaction, engagement, and productivity (Brandão, Perucchi, & Freire, 2023).

It is important to note that, for many years, organizational management prioritized financial aspects over other dimensions, emphasizing competitiveness and production-based incentives as means of promoting workplace satisfaction. However, the need emerged to reformulate workplace practices through better planning, organization, and coordination (Fidelis, Formiga, & Fernandes, 2023).

Organizational support is related to employees' perceptions regarding whether their needs are recognized and fulfilled by the organization, being essential for well-being, engagement, and productivity (Eisenberger et al., 1986).

In this sense, organizational support promotes employee appreciation and better work organization, fostering greater happiness, satisfaction, and pleasure in the workplace. Measures designed to assess such support should examine its effects on the development of





affective bonds between workers and organizations, aiming to identify professional perceptions and expectations (Eisenberger et al., 1986).

Based on the premise that employees' emotional and professional health depends on the provision of adequate organizational support, it is understood that such support contributes to improved productivity and job performance. Organizational support represents sustenance, assistance, and protection for institutional employees (Franco et al., 2021).

The lack of employees' affective identification with their organizations may weaken the exchange relationship between these social actors. This may negatively affect organizations, which may fail to achieve their goals without employees' commitment, while simultaneously contributing to worker illness and distress (Melo Júnior & Helal, 2023).

Therefore, organizational support is related to the way workers perceive the organization's concern for their well-being. Measuring this construct is important for organizational performance because employees who feel supported and valued are more likely to embrace challenges that contribute to institutional development, becoming more engaged and satisfied professionals (Formiga, Araujo, Oliveira et al., 2019).

According to Formiga et al. (2021), job satisfaction is an important predictor of employee retention. Therefore, organizations should invest in the emotional health of their employees, taking future expectations into consideration. Self-esteem is an important aspect of mental health and acts as a mediating variable in workers' behavior within organizational environments.

Thus, it is essential to consider workers beyond the professional sphere, understanding them within an innovative and creative context characterized by complex social relationships, while also recognizing the importance of commitment, engagement, and trust in the performance of work activities (Formiga, Freire, & Fernandes, 2019).

Perceived organizational support in the post-COVID-19 context is particularly relevant, as the global crisis highlighted challenges that affected work relationships, employee mental health, and organizational dynamics (Guazina, 2021). Organizations must adapt to these new





expectations by establishing more effective policies that not only address immediate needs but also contribute to the development of healthy and sustainable work environments in the long term.

Consequently, organizational support becomes not only a productivity factor but also a key element in building trust and quality relationships between employees and organizations. It is therefore necessary to strengthen organizational bonds with employees through the provision of adequate support, promoting healthy work environments and ensuring organizational success.

The objective of this study is to conduct a cross-validation and empirical invariance analysis of an organizational support measure among workers in the state of Rio Grande do Norte in the post-pandemic context.

METHOD

Research Design and Sample

This study was developed based on a post-positivist epistemological orientation, adopting a quantitative research strategy with a descriptive, exploratory, and correlational design (Creswell, 2010), involving workers from different professional sectors in Brazil.

Regarding the inclusion criteria, participants were required to be over 21 years of age, employed for more than one year, actively working in their respective sectors, and covered by the regulations of the Brazilian Consolidation of Labor Laws (CLT), with workloads ranging from 20 to 40 hours per week and representing different professional specialties.

A purposive and voluntary sampling strategy was adopted; therefore, the sample was non-probabilistic and convenience-based. Only employed individuals were invited to participate, and those interested were required to complete the questionnaire in its entirety. Sample size estimation was conducted using the statistical package G*Power 3.2, a software designed to calculate the statistical power required for research. A significance level of 95% ($p < .05$),





an effect size magnitude ($r \geq .50$), and a hypothetical statistical power ($\pi \geq .80$) were considered. Based on these parameters, a sample of 400 workers was deemed sufficient, providing reliable statistical indicators (e.g., $t \geq 1.97$, $\pi = .98$, $p < .05$).

Regarding ethical aspects, participants were previously informed about the objectives of the study and received clear instructions regarding the completion of the instruments. The research strictly followed the guidelines established by Resolution No. 510/2016 of the Brazilian National Health Council for studies involving human participants. Participation was voluntary and conditioned upon the digital signing of the Informed Consent Form (ICF).

The study was submitted to and approved by the Research Ethics Committee (REC) of Universidade Potiguar (UnP), under CAAE Protocol No. 83255924.0.0000.5296. Participants were informed about the benefits of the research as well as the potential risks involved, which were considered minimal (e.g., feelings of embarrassment, inhibition, or distrust). No reports of such effects were recorded.

Although there was a possibility of risks related to moral discomfort or embarrassment resulting from the questions or the interaction between researchers and respondents, participants were informed that they were not required to continue and could withdraw from the study at any time without penalty or pressure from the researchers. The questionnaire was made available electronically for two months, and the estimated completion time was approximately three minutes.

The study was conducted online through Google Forms and included workers from different sectors and organizational types throughout Brazil. Individuals willing to participate received a link to access the electronic questionnaire via social media platforms and/or e-mail.

Research Instruments

The following instruments were used in the study:

Perceived Organizational Support Scale (POSS): The Perceived Organizational Support Scale (POSS) consists of nine items originally developed by Eisenberger et al. (1986) and adapted and validated for the Brazilian context by Siqueira (1995). The scale aims to assess

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the extent to which employees working in public and/or private organizations perceive that their organization cares about their well-being. Participants responded using a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Regarding reliability, Siqueira's (1995) pioneering study reported a Cronbach's alpha coefficient of .86, indicating satisfactory internal consistency. Furthermore, Formiga, Fleury, and Souza (2014) examined the factorial consistency of the scale through Confirmatory Factor Analysis (CFA) in a sample of Brazilian workers. Their findings provided psychometric evidence supporting the factorial structure originally proposed for the POSS.

General Health Questionnaire (GHQ-12): The General Health Questionnaire (GHQ-12) is a shortened version of the GHQ-60 developed by Goldberg and Williams (1988) and adapted to the Brazilian context by Pasquali et al. (1994). The instrument consists of 12 items designed to assess the extent to which individuals (in this case, workers) have experienced symptoms described in each item (e.g., *Have you been feeling unhappy or depressed?*, *Have you been able to concentrate on what you are doing?*, *Have you been able to face your problems adequately?*). Responses are provided on a four-point scale. Lower scores indicate a more favorable health condition.

In addition to these measures, sociodemographic and occupational variables were collected, including sex, age, income, type of organization, and length of service, among others.

Data Collection and Analysis Procedures

Data were analyzed using SPSSWIN version 25.0. Initially, multivariate outliers and sample normality were assessed through the Kolmogorov–Smirnov (K–S) test. Common method variance (CMV) was evaluated following the recommendations of Podsakoff et al. (2003), using Harman's single-factor test to investigate the presence of common method bias in the collected data.

Data analysis was conducted in four stages:

- Descriptive and inferential analyses;

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- Exploratory analyses;
- Confirmatory analyses;
- Criterion validity analyses (convergent and discriminant).

The first and second stages were performed using SPSS version 25.0. In the first stage, descriptive and inferential analyses included Student's *t*-tests and Pearson correlation coefficients.

In the second stage, an Exploratory Factor Analysis (EFA) was conducted. Descriptive statistics (mean, standard deviation, and mode) and Principal Components Analysis (PCA) were also performed without factor rotation, given the theoretical originality of the instrument's structure and development. The following criteria were considered: Kaiser-Meyer-Olkin (KMO) values equal to or greater than .70, Bartlett's Test of Sphericity (χ^2), Kaiser's criterion (eigenvalues ≥ 1.0), Cattell's Scree Plot criterion, and Cronbach's alpha reliability coefficient.

In the third stage, a Confirmatory Factor Analysis (CFA) was conducted using AMOS Graphics version 24.0. The covariance matrix of the scale items served as input, and the Maximum Likelihood (ML) estimator was employed. The following goodness-of-fit indices were considered: chi-square and chi-square/degrees of freedom ratio (χ^2/df), Root Mean Square Residual (RMR), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Expected Cross-Validation Index (ECVI), and Consistent Akaike Information Criterion (CAIC). Composite Reliability (CR) and Average Variance Extracted (AVE) were also calculated.

In the fourth stage, convergent and discriminant validity were assessed through Pearson correlation analyses and chi-square tests, examining the association between organizational culture variables and the type of organization in which participants were employed.





RESULTS AND DISCUSSION

After completing data collection and considering the originality of the measures adopted in this study, a set of psychometric analyses was conducted to ensure the robustness of the proposed model based on the measurement properties of each construct.

The final sample consisted of 402 workers from different occupational fields, including administrators, civil and environmental engineers, physiotherapists, biomedical professionals, physicians, dentists, community health agents, teachers, social workers, physical education professionals, technicians (information technology, healthcare, public safety, gastronomy, administration, nursing, among others), pharmacists, speech therapists, public servants, geographers, nurses, animal scientists, and other professionals. The largest proportion of participants were nurses (14%), whereas none of the remaining professions accounted for more than 5% of the sample.

Most participants were from the state of Rio Grande do Norte (74%), while respondents from other Brazilian states individually represented less than 5% of the sample. Participants' ages ranged from 20 to 71 years (Mean = 41.33 years, SD = 10.13); 72% of the sample were women. Regarding family income, 32% reported earnings between BRL 3,000 and BRL 5,000 per month, 51% had more than ten years of service, 62% worked in the public sector, and 67% worked during daytime hours.

Based on these sociodemographic characteristics, multicollinearity was assessed through correlations among the study variables. Following the guidelines proposed by Tabachnick and Fidell (2001), correlations below .90 were considered acceptable. The observed correlations ranged from .37 to .72, indicating the absence of excessive intercorrelations among the variables and suggesting that the proposed models would present low estimation error.





Multivariate outliers and sample normality were evaluated using the Kolmogorov–Smirnov (K–S) test, which is recommended for samples larger than 100 participants. The results indicated an approximately normal distribution of the data ($KS = 1.29$, $p < .34$).

Considering that the present study included multiple independent variables (IVs) and dependent variables (DVs) measured through self-reports obtained from the same participants, the possibility of Common Method Variance (CMV) was examined. Assessing CMV is essential for controlling potential measurement biases and ensuring the quality and validity of the results. To address this issue, Harman's single-factor test was employed to investigate the existence of common method bias (Podsakoff, MacKenzie, Lee, et al., 2003).

The results showed that the IVs and DVs loaded onto a single factor with an eigenvalue greater than 1.00, accounting for less than 50% of the total variance. Specifically, the factor explained 41.7% of the covariance among the variables, indicating the absence of significant common method variance.

Given the satisfactory distributional properties of the sample, item discrimination (t) and content representativeness (r) analyses were subsequently conducted to evaluate the adequacy and reliability of the content represented by each measure. These analyses were grounded in the assumptions of Classical Test Theory (CTT), emphasizing the importance of systematically evaluating item content in accordance with the theoretical foundations of the instruments. Such procedures ensure consistency between the theoretical assumptions underlying the constructs and the empirical findings obtained (Pasquali, 2011; Sartes & Souza-Formigoni, 2013).

As shown in Table 1, using an initial subsample of 30 workers, all items of the Perceived Organizational Support Scale (POS) and the General Health Perception (GH) measure demonstrated satisfactory performance in terms of both discrimination and representativeness indicators. These findings support the adequacy of the items for assessing the core aspects of the constructs under investigation.





Esta versão está adequada ao padrão de redação científica internacional utilizado em periódicos indexados nas áreas de Organizational Psychology, Occupational Health e Psychometrics.

Table 1: Discriminative Power and Content Representativeness of the Items of the Scale

Construct	° Itens	Statistic		
		° <i>t</i> (>1,96)	° <i>r</i> (>0,50)	p -valor (< 0,05)
Perceived Organizational Support (POS)	PSOrg 1 a PSOrg 9	-11,25 a -19,31	0,59 a 0,74	0,001
Perceived General Health (GH)	SG 1 a SG 12	-7,12 a -18,11	0,59 a 0,67	0,001

Note. *t* = Student's *t* test; *r* = Pearson correlation coefficient; POS1–POS9 represent Items 1 through 9 of the Perceived Organizational Support scale; GH1–GH12 represent Items 1 through 12 of the General Health scale.

After establishing the conceptual and empirical adequacy of each construct, the second stage of the study was conducted, corresponding to the Exploratory Factor Analysis (EFA). This phase included 205 respondents, comprising men and women employed in public and private organizations in the state of Rio Grande do Norte, Brazil. Based on the results obtained from the item discrimination and content representativeness analyses, factor analysis procedures were performed following the psychometric criteria recommended in the literature (Dancey & Reidy, 2006; Hutz et al., 2015; Pasquali, 2011).

The extraction procedure was conducted using the Principal Axis Factoring (PAF) method, with the number of factors specified a priori according to the theoretical structures proposed by the original authors of each instrument. Specifically, a one-factor structure was assumed for the Perceived Organizational Support Scale (POSS), originally developed by Eisenberger et al. (1986), adapted and validated for the Brazilian context by Siqueira (1995), and subsequently corroborated by Formiga, Fleury, and Souza (2014). Likewise, the General Health Questionnaire (GHQ-12), developed by Goldberg and Williams (1988) and adapted to the Brazilian context by Pasquali et al. (1994), was analyzed according to its theoretical structure.





To enhance decision-making reliability regarding factor retention, an oblique factor rotation was employed, adopting a minimum factor loading criterion of $\pm .30$. The Kaiser criterion was used to determine the number of factors to be retained, whereby only factors with eigenvalues greater than 1.00 were considered. Eigenvalues indicate the amount of variance explained by each factor, considering that the sum of all eigenvalues is equal to the total number of items included in the analysis.

Regarding the assessment of internal consistency, it is important to emphasize that Cronbach's alpha coefficients should exceed .70. In numerous international studies, Cronbach's alpha has been recognized as one of the most appropriate psychometric indicators for estimating reliability (Gottens et al., 2018; Pasquali, 2011). Additionally, the Intraclass Correlation Coefficient (ICC) was calculated to estimate the reproducibility of the measures. The ICC represents the proportion of total measurement variability attributable to differences among individuals and should also exceed .70 (Hutz et al., 2015; Pasquali, 2011).

After establishing the psychometric evaluation criteria, the results demonstrated the adequacy of the correlation matrices. For the Perceived Organizational Support construct (POS), the Kaiser-Meyer-Olkin (KMO) index was .89, and Bartlett's Test of Sphericity yielded $\chi^2/df = 2123.74/36$, $p < .001$. For General Health Perception (GH), the KMO index was .90, and Bartlett's Test of Sphericity yielded $\chi^2/df = 2773.98/66$, $p < .001$. Overall, the findings indicated a factorial structure similar to those previously reported by Eisenberger et al. (1986), Siqueira (1995), and Formiga, Fleury, and Souza (2014) for the Perceived Organizational Support Scale (POSS), as well as by Goldberg and Williams (1988) and Pasquali et al. (1994) for the General Health Questionnaire (GHQ-12).

Table 2 presents the factor loadings, communalities, explained variance, and internal consistency indicators (Cronbach's alpha and ICC). The results demonstrate that the measures met the psychometric standards recommended in the literature (Dancey & Reidy, 2006; Formiga, 2003; Hair et al., 2019; Pasquali, 2017). It is noteworthy that all factor loadings



exceeded .30, eigenvalues were greater than 1.00, and the retained factors explained at least 30% of the total factorial variance.

Also presented in Table 2 are the psychometric indicators obtained through Confirmatory Factor Analysis (CFA) for the Perceived Organizational Support Scale (POSS) and the General Health Perception Scale (GHPS). The analyses were conducted using AMOS Graphics 24.0 and JASP software, aiming to test the factorial structures identified during the exploratory stage. In the CFA procedures, covariances (ϕ) were freely estimated, resulting in goodness-of-fit indicators that were consistent with the recommendations found in the psychometric literature (Hair et al., 2019).

The findings demonstrated that the proposed one-factor structure for the Perceived Organizational Support Scale (POSS) and the two-factor structure for the General Health Questionnaire (GHQ-12) presented satisfactory statistical indicators, supporting the factorial consistency of both measures among workers. These results provide stronger empirical confirmation of the original theoretical proposals advanced by the aforementioned authors. Furthermore, the fit indices not only met the established statistical criteria but were also comparable to, and in some cases superior to, those reported in previous validation studies.

Table 2. Summary of the Statistical Indicators from the Exploratory and Confirmatory Factor Analyses and Internal Consistency of the Scales.

Exploratory Factor Analysis	Statistics						Internal Consistency	
	Exploratory Factor Analysis (n = 201)							
	Factor Loadings > 0,30	Communality h^2	Min - Max	Number of Items	Eigenvalues > 1,00	Explained Variance (%)	° Cronbach's Alpha (>0,70)	° ICC (95% IC) (>0,70)
Perceived Organizational Support Scale (POSS) [Unidimensional]	0,49-0,68	0,26-0,39	1-5	9	2,68 a 11,65	68,12	0,89	0,75-0,89
General Health Perception Scale (GHPS) [Two-Factor Structure]	0,43-0,68	0,29-0,37	1-5	12	1,54-a 4,80	17,09 a 53,08	0,78 a 0,82	0,81 a 0,85



Confirmatory Factor Analysis (CFA) (n = 202)

Modelos estruturais confirmatórios	Absolute Fit Measures				Incremental Fit Measures			Parsimony Fit Measures
	χ^2/df < 3	SRMR < 0,05	GFI > 0,80	AGFI > 0,80	CFI > 0,90	TLI > 0,90	RMSEA < 0,05	ECVI < Best Value
Perceived Organizational Support Scale (POSS) [Unidimensional]	1,86	0,02	0,99	0,98	0,99	0,99	0,01	1,26
General Health Perception Scale (GHPS) [Two-Factor Structure]	2,09	0,04	0,98	0,97	0,99	0,98	0,03	1,19

The findings presented in Table 2 indicate that the statistical indicators provide strong evidence supporting both the validity and structural consistency of the scales administered in this study. Specifically, the one-factor model of Perceived Organizational Support and the two-factor model of General Health, following the adjustment of error terms, respectively, were those that best represented the factorial structure proposed for each construct, both in the exploratory and confirmatory stages of analysis.

As additional evidence, Table 3 presents the internal consistency indicators derived from the Confirmatory Factor Analysis (CFA). Across the different reliability estimates examined, the results met the quality standards recommended in the psychometric and statistical literature (Hair et al., 2019; Hutz et al., 2015; Pasquali, 2011), providing further support for the reliability and stability of the measurement models adopted in the present study.

Table 3. Psychometric Indicators of the Factor Structure of the Administered Scales.

Construtos	Statistic					
	Confirmatory Factor Analysis (CFA)		Internal Consistency			
	Standardized Fac- tor Loadings () > 0,50	ϵ (Error Terms)	° CC > 0,70	° VME > 0,50	° Alfa (α) > 0,70	Coefficient (ω) (> 0,70)





Perceived Organizational Support Scale (POSS) [Unidimensional]	0,61 a 0,79	0,32 a 0,51	0,85	0,61	0,89	0,87
General Health Perception Scale (GHPS) [Two-Factor Structure]	0,52 a 0,73	0,34 a 0,57	0,76 a 0,82	0,63 a 0,71	0,78 a 0,82	0,81 a 0,85

Fonte: Dados da pesquisa (2025).

Particular attention should be given to the Cronbach's Alpha (α), McDonald's Omega (ω), and Average Variance Extracted (AVE) indices for each scale. Some of these indicators had already been presented during the evaluation of the factorial structure quality of the measures and were initially intended to assess the overall adequacy of their factorial organization. In the analysis presented in Table 3, however, these indicators were examined specifically for each construct and were found to fall within the recommended range ($> .70$ and < 1.00), thereby supporting the reliability and convergent validity of the measures.

To further strengthen the measurement quality of the bifactorial General Health model, additional analyses were conducted. Such procedures were not applicable to the Perceived Organizational Support Scale due to its unifactorial structure, which does not allow the estimation of psychometric indices designed to assess heterotrait and monotrait relationships among dimensions.

According to Roemer, Schuberth, and Henseler (2021), Fornell and Larcker (1981), and Henseler, Hubona, and Ray (2016), discriminant validity can be assessed through the Heterotrait–Monotrait Ratio (HTMT). This index is calculated as the ratio between correlations, where the numerator represents the average correlations between indicators of different constructs (heterotrait correlations), and the denominator represents the average correlations among indicators measuring the same construct (monotrait correlations).

An HTMT value below .85 indicates that the constructs are sufficiently distinct from one another, thereby providing evidence of discriminant validity. Conversely, HTMT values above





.85 may suggest a lack of differentiation among constructs, indicating that the measures could be capturing the same underlying phenomenon.

The results obtained for the General Health Scale (GHS) demonstrated that its dimensions exhibited satisfactory discriminant validity and were psychometrically adequate for the proposed measurement model. Specifically, the dimensions showed sufficient differentiation from one another while maintaining convergence toward the higher-order construct represented by the scale. These findings provide additional support for the construct validity of the measure and reinforce the adequacy of the factorial solution proposed for the General Health construct (see Table 4).

Table 4. Heterotrait–Monotrait Ratio of Correlations (HTMT) Scores Among the Factors of the Scale (< .85)

General Health Perception Scale	
Depression	Social Dysfunction
1.000	
0.61*	---
0.55*	0.68*

Note: . * < 0,85

Considering these findings, it is possible to highlight the reliability evidence obtained for each instrument and measurement scale. Such evidence was derived from the factor loadings of the items obtained through factor analysis, allowing reliability estimation based on the proportion of item variance explained by common factors and the unique variance associated with each item. This procedure is particularly important when working with scales conceived as measures of latent constructs, that is, concepts that cannot be directly observed, such as Perceived Organizational Support and General Health.

Based on the evidence regarding the quality and consistency of the scales, the study's objective of assessing cross-validation and factorial invariance was subsequently addressed. Concerning the first analysis, cross-validation was examined through an error estimation procedure designed to evaluate predictive models in a data-agnostic manner. The purpose of





this approach is to obtain an error estimate that summarizes the model's performance if applied to different samples, potentially presenting distinct characteristics (Zafar & Khan, 2023).

To accomplish this objective, a regression analysis was conducted based on the hypothesis that Perceived Organizational Support would positively predict workers' General Health. The total sample was randomly divided into two subsamples (N1 and N2), generating a predictive model that was subsequently tested across both groups.

For N1, the results showed that Perceived Organizational Support significantly predicted General Health, yielding a standardized beta coefficient (β) of .31, $t = 4.69$, $p < .001$, with the following model fit indicators: $R^2 = .10$, Adjusted $R^2 = .10$, $F(1, 200) = 19.24$, $VIF = 1.00$, $p < .001$. For N2, the same predictive model was tested using the same directional relationship between the constructs. Similar results were observed, with a standardized beta coefficient (β) of .29, $t = 3.93$, $p < .001$, and the following indicators: $R^2 = .08$, Adjusted $R^2 = .08$, $F(1, 200) = 14.51$, $VIF = 1.00$, $p < .001$. The similarity of these results across the two independent subsamples provides evidence of cross-validity for the proposed model.

Regarding the second analysis, factorial invariance was examined based on the factorial structure previously identified and presented in Table 2. Specifically, invariance was assessed by comparing the Comparative Fit Index (CFI) across the two subsamples. According to Hair et al. (2019) and Marôco (2010), factorial invariance can be supported when the difference in CFI (ΔCFI) between groups is smaller than .01.

The results indicated that the ΔCFI between the first sample ($CFI = .99$) and the second sample ($CFI = .98$) was equal to .01. Similarly, the difference in the Tucker-Lewis Index (ΔTLI) was negligible and fully consistent with psychometric expectations, as both samples presented identical values ($TLI = .99$), resulting in a ΔTLI equal to .00.

Taken together, these findings provide robust evidence that the Perceived Organizational Support Scale demonstrates factorial invariance across different samples.





Therefore, the scale maintains its psychometric properties regardless of sample characteristics or temporal context, confirming the stability and generalizability of its factorial structure.

The present study aimed to evaluate the psychometric properties of the Perceived Organizational Support Scale (POSS) after more than five years of its application in Brazilian research, following the studies previously conducted by Siqueira (1995), Formiga, Fleury, and Souza (2014), and Formiga, Freire, and Fernandes (2019). The POSS demonstrated not only structural consistency but also theoretical convergence regarding the perception of organizational support, understood as the degree of appreciation and support employees perceive they receive from their organization. This approach considered both the conceptual and empirical dimensions of the internal dynamics of contemporary organizations.

The study also sought to provide robust psychometric evidence for assessing organization–employee relationships, emphasizing the value of the workplace system as an instrument applicable across different fields of inquiry, including the human and social sciences, as well as disciplines related to human behavior and organizational and work psychology.

The relevance of perceived organizational support from the employee's perspective reflects the theoretical foundations of the construct, particularly the norm of reciprocity. This perspective suggests that the employee–organization relationship does not develop within an occupational vacuum but rather emerges from an interactive process in which both parties play complementary roles. Therefore, it is essential to emphasize the shared responsibility of organizations and employees in fostering healthy work environments, promoting productivity, and protecting workers' mental health (Formiga, Freire, & Fernandes, 2019; Estevam, Formiga, & Gondim, 2024).

Another important aspect motivating this research concerns the scarcity of studies in Brazilian and South American scientific databases that employ the POSS as a psychometric instrument for developing psychological measures applicable to organizational phenomena. A review of the national literature identified studies that conducted exploratory, confirmatory,





and predictive statistical analyses, considering perceived organizational support as a determinant of productive dynamics and quality of work life. However, these investigations examined such issues separately (Siqueira, 1995; Formiga, Fleury, & Souza, 2014; Formiga, Freire, Azevedo, & Faria, 2020; Paula et al., 2021; Nogueira & Oliveira, 2022). No studies were found that integrated the full set of statistical analyses—including cross-validation and factorial invariance testing—within a single investigation, both of which were addressed and supported in the present study.

Regarding the psychometric indicators, particularly the analyses based on Classical Test Theory (CTT) applied to the quality of the POSS items, the discrimination and representativeness indices supported the consistency of the proposed factorial structure (Pasquali, 2011; Hutz, Bandeira, & Trentini, 2015; Piton-Gonçalves & Almeida, 2018). The findings demonstrated the adequacy of all items, with no need for item exclusion, indicating that participants were able to recognize the relevance of the instrument within their occupational context and reinforcing the theoretical and empirical coherence of the measure.

The Exploratory Factor Analysis, conducted within the CTT framework, revealed factor loadings above .50, while internal consistency indicators, assessed through Cronbach's alpha coefficients, demonstrated satisfactory reliability ($\alpha \geq .70$) for all items. These results confirm that the scale retained the factorial structure originally adapted to the Brazilian context (Siqueira, 1995), corroborating previous confirmatory analyses conducted with Brazilian samples (Formiga, Fleury, & Souza, 2014; Formiga, Freire, & Fernandes, 2019).

The Confirmatory Factor Analysis maintained the theoretically proposed item-factor relationships, confirming the unidimensional structure of the scale. This finding provides both theoretical and empirical support for the application of the POSS among worker samples. Thus, the conceptual definition and factorial structure of the construct remain consistent with previous studies, supporting the suitability of the instrument for psychological assessment of employee–organization relationships, particularly regarding occupational bonds and psychosocial conditions influencing the work environment.





The aforementioned reflections receive empirical support through the evidence of convergent and discriminant validity observed in the psychometric indicators of the POSS. These findings suggest that when employees perceive stronger bonds and greater involvement with their organization, as highlighted by Formiga, Fernandes et al. (2021), Formiga, Pereira, and Estevam (2020), and Formiga et al. (2021), they tend to display higher levels of motivation, appreciation, and organizational sensitivity toward the institution in which they work.

A particularly noteworthy contribution of this dissertation is the inclusion of an analysis not previously reported in earlier studies: the empirical assessment of differences between the Comparative Fit Index (CFI) and the Tucker–Lewis Index (TLI). According to the literature, differences smaller than .01 between these indices indicate satisfactory factorial equivalence (Hair et al., 2019; Marôco, 2010). In the present study, this criterion was met, allowing the inference that regardless of the data collection period or sample characteristics, the factorial structure of the POSS remained stable and psychometrically coherent across different Brazilian occupational contexts.

Furthermore, evidence of cross-validity was identified, with significant predictive coefficients confirming the role of perceived organizational support as an explanatory variable of workers' general health. These findings reinforce the theoretical and empirical robustness of the scale and support its applicability for psychological assessment in diverse organizational settings.

Overall, when workers perceive the existence of organizational support, they tend not only to develop and apply their emotional resources more effectively to work activities but also to reduce their intentions to leave the organization—whether through voluntary turnover in private organizations or requests for departmental transfer in public institutions. This functional reciprocity, when strengthened by effective organizational practices, contributes to the enhancement of the work environment, favoring talent retention and increased productivity.





The factorial structure identified in this study was similar to those reported in previous investigations conducted with workers from different occupational groups in Brazil. This convergence confirms the theoretical and empirical adequacy of the POSS as a psychological assessment instrument for perceived organizational support and highlights its applicability across diverse occupational segments.

Finally, concerning external criterion analyses, the POSS demonstrated sensitivity in measuring professional characteristics, gender differences, and age-related variations, thereby expanding its practical utility. This finding reinforces the scale's potential to support strategic initiatives in training, development, and human resource management, contributing to the strengthening of professional identity and employee integration within organizations.

CONCLUSIONS

Based on the results obtained, it can be concluded that the proposed objectives were successfully achieved, particularly regarding the quality of the measurement instruments employed. Thus, this study provides a relevant evaluative contribution that, although not the only possible approach, offers meaningful evidence for advancing research and intervention proposals focused on quality of work life and occupational health, with particular emphasis on perceived organizational support.

The findings indicate that the quality of work is not limited to the existence of an adequate economic structure or a comfortable physical environment, although these aspects remain important. The central focus of this investigation was to highlight the value of workers as human beings and to recognize that their qualifications, engagement, and well-being are closely associated with organizational dynamics and the management practices adopted within organizations.

In this sense, the relevance of the study lies in fostering reflection on the need for more human-centered organizations that prioritize management practices focused on human





development, employee engagement, and the promotion of healthy and productive work environments. Such practices are likely to strengthen organizational bonds while simultaneously enhancing both employee performance and well-being.

However, as with any scientific investigation, this study presents limitations that should be acknowledged. The primary limitation concerns its cross-sectional design, which does not allow causal relationships among the investigated variables to be established. Furthermore, the sample consisted of workers from a specific geographical and institutional context, limiting the generalizability of the findings to other sectors or regions.

Based on these limitations, future studies are encouraged to:

- Conduct longitudinal investigations to examine the evolution of the relationships among perceived organizational support, positive psychological capital, and quality of work life over time;
- Expand the sampling scope by including professionals from different sectors, regions, and even countries, in order to assess potential cultural and contextual variations;
- Develop and test integrative theoretical models that associate these constructs with organizational culture, talent retention, and occupational health outcomes;
- Evaluate organizational interventions aimed at strengthening positive psychological capital and promoting healthy work environments, thereby empirically validating the effects of such strategies on employee well-being and productivity.

Overall, the findings reinforce the importance of perceived organizational support as a strategic organizational resource capable of fostering healthier, more engaged, and more productive work environments. Moreover, the psychometric evidence obtained in this study supports the continued use of the Perceived Organizational Support Scale (POSS) as a reliable and valid instrument for assessing workers' perceptions of organizational support in diverse occupational contexts.





REFERENCES

BRANDÃO, J. L. A.; PERUCCHI, V.; FREIRE, G. H. A. Inovação, trabalho remoto e bibliotecas educativas públicas: caminhos para a transformação digital no mundo do trabalho pós-pandemia. *RDBCI*, v. 21, 2023.

CRESWELL, J. W. *Projeto de pesquisa: métodos qualitativo, quantitativo e misto*. 3. ed. Porto Alegre: Artmed, 2010.

DANCEY, C.; REIDY, J. *Estatística sem matemática para psicologia: usando SPSS para Windows*. Porto Alegre: Artmed, 2006.

EISENBERGER, R.; HUNTINGTON, R.; HUTCHISON, S.; SOWA, D. Perceived organizational support. *Journal of Applied Psychology*, v. 71, n. 3, p. 500-507, 1986.

ESTEVAM, I. D.; FORMIGA, N. S.; GIBSON, M. L. S. G. Replicação do modelo mediacional entre suporte organizacional, capital psicológico e saúde geral em profissionais da saúde durante a pandemia da Covid-19 no Rio Grande do Norte. *Revista Brasileira de Previdência*, v. 14, n. 1, p. 254-282, 2024. Disponível em: <http://dx.doi.org/10.21902/rbp.v14i1.7214>.

FERREIRA, J. M. Análise de pesquisas sobre o impacto das tecnologias modernas e as transformações no mundo do trabalho (2013-2020). *Future Studies Research Journal*, v. 13, n. 3, 2021.

FIDELIS, A. C. F.; FORMIGA, N. S.; FERNANDES, A. J. Valores métricos e invariância fatorial da medida de capital psicológico positivo em trabalhadores hospitalares brasileiros e portugueses. *Research, Society and Development*, v. 11, n. 4, 2022.

FORMIGA, N. S.; ARAUJO, I. T.; OLIVEIRA, B. F. et al. Suporte organizacional, engajamento e espiritualidade no trabalho: verificação empírica de um modelo teórico concorrente em organizações brasileiras. *Boletim Academia Paulista de Psicologia*, v. 39, n. 97, p. 247-259, 2019.

FORMIGA, N. S.; FERNANDES, A. J.; FREIRE, B. G. O. et al. Apoio organizacional, capital social e atitudes inovadoras: um estudo correlacional entre trabalhadores da cidade de Natal-RN. *Research, Society and Development*, v. 10, n. 3, 2021.

FORMIGA, N. S.; FLEURY, L. F. O.; SOUZA, M. A. Evidências de validade da escala de percepção de suporte organizacional em funcionários de empresa pública e privada. *Estudos Interdisciplinares em Psicologia*, v. 5, n. 2, p. 60-76, 2014.

**Revista *OWL Journal*, Campina Grande - PB, v. 4 n. 6 (2026) - DOSSIÊ ESPECIAL:
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FORMIGA, N. S.; FREIRE, B. G. O.; AZEVEDO, I. M.; FARIA, S. S. Correlatos entre o suporte organizacional, capital psicológico no trabalho e expectativa de futuro: um estudo com trabalhadores brasileiros. *Research, Society and Development*, v. 9, n. 6, e155963486, 2020. Disponível em: <https://doi.org/10.33448/rsd-v9i6.3486>.

FORMIGA, N. S.; FREIRE, B. G. O.; FERNANDES, A. Evidência métrica de constructo e invariância fatorial da escala de percepção de suporte organizacional em trabalhadores brasileiros. *Revista de Gestão e Secretariado*, v. 10, n. 2, p. 194-221, 2019.

FORMIGA, N. S.; PEREIRA, G. A.; ESTEVAM, I. D. Proposta de modelo mediacional entre suporte organizacional, capital psicológico e saúde geral em enfermeiros de um hospital público. *Psicologia Revista*, v. 29, n. 2, p. 375-403, 2020.

FRANCO, J. B. M.; FORMIGA, N. S.; GRANGEIRO, S. R. A. et al. Correlatos e variações na percepção do suporte organizacional e gestão do conhecimento em trabalhadores de organizações públicas e privadas em Natal-RN. *Revista Científica Multidisciplinar*, v. 2, n. 4, 2021.

GOLDBERG, D.; WILLIAMS, P. *A user's guide to the General Health Questionnaire*. Windsor: NFER-Nelson, 1988.

GOTTEMS, L. B. D. et al. Good practices in normal childbirth: reliability analysis of an instrument by Cronbach's alpha. *Revista Latino-Americana de Enfermagem*, v. 26, p. 1-8, 2018.

GUAZINA, L. As configurações do trabalho musical e a pandemia da Covid-19: precarização, luto, resiliência e redes de cooperação. *Opus*, v. 27, n. 3, 2021.

HAIR, J. F.; BLACK, W. C.; BABIN, B. J.; ANDERSON, R. E. *Análise multivariada de dados*. 7. ed. Porto Alegre: Bookman, 2019.

HENSELER, J.; HUBONA, G.; RAY, P. A. Using PLS path modeling in new technology research: updated guidelines. *Industrial Management & Data Systems*, v. 116, n. 1, p. 2-20, 2016.

HOKAMA, E.; MARTINS, M. C. F. Capital psicológico: relações entre desenho do trabalho, engajamento e intenção de rotatividade. *PSI UNISC*, v. 8, n. 1, 2024.

HUTZ, C. S. (org.). *Adaptação de instrumentos de avaliação psicológica: fundamentos e aplicações*. Porto Alegre: Artmed, 2015.

**Revista *OWL Journal*, Campina Grande - PB, v. 4 n. 6 (2026) - DOSSIÊ ESPECIAL:
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(CC BY)**





HUTZ, C. S.; BANDEIRA, D. R.; TRENTINI, C. M. (org.). *Psicometria*. Porto Alegre: Artmed, 2015.

MARÔCO, J. *Análise estatística com utilização do SPSS*. Lisboa: Edições Sílabo, 2010.

MELO JUNIOR, A. A.; HELAL, D. H. Suporte organizacional percebido e vínculos organizacionais: um estudo com trabalhadores terceirizados de uma instituição federal de ensino superior. *Management and Connections Journal*, v. 1, n. 3, 2023.

NOGUEIRA, A. P. S.; OLIVEIRA, A. F. Impacto da percepção de suporte organizacional e capital psicológico no bem-estar no trabalho. *Psicologia: Ciência e Profissão*, v. 42, 2022.

PASQUALI, L. *Psicometria: teoria dos testes na psicologia e na educação*. 5. ed. Petrópolis: Vozes, 2011.

PASQUALI, L.; GOUVEIA, V. V.; ANDRIOLA, W. B. et al. Questionário de Saúde Geral de Goldberg (QSG): adaptação brasileira. *Psicologia: Teoria e Pesquisa*, v. 10, n. 3, p. 421-438, 1994.

PAULA, N. H. M. M.; FORMIGA, N. S.; FRANCO, J. B. M. et al. The better bond I have with my organization, the healthier I am! Correlates between organizational support and work-related injuries. *Research, Society and Development*, v. 10, n. 6, 2021.

PITHAN, L. H.; VACLAVIK, M. C.; OLTRAMARI, A. P. Carreiras vulneráveis: uma análise das demissões da mídia como um ponto de inflexão para jornalistas. *Cadernos EBAPE.BR*, v. 18, n. 1, 2020.

PITON-GONÇALVES, J.; ALMEIDA, A. M. Análise da dificuldade e da discriminação de itens de Matemática do ENEM. *REMAT: Revista Eletrônica da Matemática*, v. 4, n. 2, p. 38-53, 2018. Disponível em: <https://doi.org/10.35819/remat2018v4i2id3060>.

PODSAKOFF, P. M.; MACKENZIE, S. B.; LEE, J. Y. et al. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, v. 88, n. 5, p. 879-903, 2003.

ROEMER, E.; SCHUBERTH, F.; HENSELER, J. HTMT2—An improved criterion for assessing discriminant validity in structural equation modeling. *Industrial Management & Data Systems*, v. 121, n. 12, p. 2637-2650, 2021. Disponível em: <https://doi.org/10.1108/IMDS-02-2021-0082>.

Revista *OWL Journal*, Campina Grande - PB, v. 4 n. 6 (2026) - DOSSIÊ ESPECIAL:
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SARTES, L. M. A.; SOUZA-FORMIGONI, M. L. O. Avanços na psicometria: da Teoria Clássica dos Testes à Teoria de Resposta ao Item. *Psicologia: Reflexão e Crítica*, v. 26, n. 2, p. 241-250, 2013.

SIQUEIRA, M. M. M. *Antecedentes de comportamentos de cidadania organizacional: a análise de um modelo pós-cognitivo*. 1995. Tese (Doutorado em Psicologia) – Universidade de Brasília, Brasília, 1995.

TABACHNICK, B. G.; FIDELL, L. S. *Using multivariate statistics*. 4. ed. Boston: Allyn & Bacon, 2001.

ZAFAR, M. R.; KHAN, N. Deterministic local interpretable model-agnostic explanations for stable explainability. *Machine Learning and Knowledge Extraction*, v. 3, n. 3, p. 525-541, 2021. Disponível em: <https://doi.org/10.3390/make3030027>.

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