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ARTIGOS

# The Comprehensive Work Performance Scale: Development and Initial Validity Evidence

*O Inventário Abrangente de Desempenho no Trabalho: Desenvolvimento e Evidências Iniciais de Validade*

*El Inventario Integral de Desempeño en el Trabajo: Desarrollo y Evidencias Iniciales de Validez*

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**Abstract:** Professional performance – a central concept in organizational psychology and fundamental for managers and workers in the workplace – needs more accurate definitions and measures that reflect the phenomenon's complexity in practice. The present study presents valid evidence tests for the Comprehensive Job Performance Inventory, including the internal structure, its relationship with external variables, and invariance by gender and stewardship. The participants were 648 adults working in different activities in Brazil (56% male and 32% in stewardship positions). We conducted two cycles of exploratory graph analysis and confirmatory factor analysis to reach the final model. The instrument also had a preliminary set of questions that helped customize the contents of several questions. We also tested the correlation with professional development and the invariance for gender and stewardship. We started from a 54-item questionnaire - preceded by a set of questions to customize items – and reached a 25-item model. The composite reliability of the five dimensions – Technical, Communication, Colleagues' Coordination, Subordinates' Coordination, and Counterproductive – ranged from .79 to .90. This model showed invariance for gender and stewardship and good correlation with the Professional Development external variable. The results showed that the test has adequate psychometric properties. We applied extensive customization to better reflect participants' working contexts. We addressed substantial challenges of performance evaluation as we approached the phenomenon, seeking to reflect its complexity theoretically and operationally. We also found a measure that could capture the specifics of a given work context and simultaneously allow comparisons between the performance dimensions of different types of workers.

**Keywords:** job performance; performance management; professional development; exploratory graph analysis; confirmatory factor analysis; invariance; Comprehensive Job Performance Inventory.

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**Resumo:** O desempenho profissional – um conceito central na psicologia organizacional e fundamental para gestores e trabalhadores no ambiente de trabalho – necessita de definições e medidas mais precisas que reflitam a complexidade do fenômeno na prática. O presente estudo apresenta testes de evidências válidas para o Inventário de Desempenho Profissional Abrangente, incluindo a estrutura interna, sua relação com variáveis externas e a invariância por gênero e supervisão. Os participantes foram 648 adultos atuando em diferentes atividades no Brasil (56% homens e 32% em posições de supervisão). Realizamos dois ciclos de análise exploratória de grafos e análise fatorial confirmatória para alcançar o modelo final. O instrumento também incluiu um conjunto preliminar de perguntas que ajudaram a personalizar o conteúdo de várias questões. Testamos ainda a correlação com o desenvolvimento profissional e a invariância para gênero e supervisão. Partimos de um questionário de 54 itens – precedido por um conjunto de perguntas para personalizar os itens – e chegamos a um modelo de 25 itens. A confiabilidade composta das cinco dimensões – Técnica, Comunicação, Coordenação de Colegas, Coordenação de Subordinados e Contraproducente – variou de 0,79 a 0,90. Este modelo mostrou invariância para gênero e supervisão e boa correlação com a variável externa Desenvolvimento Profissional. Os resultados mostraram que o teste possui propriedades psicométricas adequadas. Aplicamos ampla personalização para refletir melhor os contextos de trabalho dos participantes. Enfrentamos desafios substanciais na avaliação de desempenho ao abordar o fenômeno, buscando refletir sua complexidade teórica e operacionalmente. Encontramos também uma medida que poderia capturar as especificidades de um dado contexto de trabalho e, simultaneamente, permitir comparações entre as dimensões de desempenho de diferentes tipos de trabalhadores.

**Palavras-chave:** desempenho no trabalho; gestão de desempenho; desenvolvimento profissional; análise exploratória de grafos; análise fatorial confirmatória; invariância; Inventário de Desempenho Profissional Abrangente.

**Resumen:** El desempeño profesional – un concepto central en la psicología organizacional y fundamental para gerentes y trabajadores en el lugar de trabajo – necesita definiciones y medidas más precisas que reflejen la complejidad del fenómeno en la práctica. El presente estudio presenta pruebas de evidencias válidas para el Inventario Integral de Desempeño Profesional, incluyendo la estructura interna, su relación con variables externas y la invariancia por género y supervisión. Los participantes fueron 648 adultos que trabajan en diferentes actividades en Brasil (56% hombres y 32% en puestos de supervisión). Realizamos dos ciclos de análisis gráfico exploratorio y análisis factorial confirmatorio para alcanzar el modelo final. El instrumento también incluyó un conjunto preliminar de preguntas que ayudaron a personalizar el contenido de varias preguntas. También probamos la correlación con el desarrollo profesional y la invariancia para género y supervisión. Partimos de un cuestionario de 54 ítems – precedido por un conjunto de preguntas para personalizar los ítems – y llegamos a un modelo de 25 ítems. La fiabilidad compuesta de las cinco dimensiones – Técnica, Comunicación, Coordinación de Colegas, Coordinación de Subordinados y Contraproducente – varió de 0,79 a 0,90. Este modelo mostró invariancia para género y supervisión y una buena correlación con la variable externa Desarrollo Profesional. Los resultados mostraron que la prueba tiene propiedades psicométricas adecuadas. Aplicamos una personalización amplia para reflejar mejor los contextos laborales de los participantes. Abordamos desafíos sustanciales en la evaluación del desempeño al abordar el fenómeno, buscando reflejar su complejidad teórica y operativamente. También encontramos una medida que podría captar las especificidades de un contexto laboral determinado y, al mismo tiempo, permitir comparaciones entre las dimensiones de desempeño de diferentes tipos de trabajadores.

**Palabras clave:** desempeño laboral; gestión del desempeño; desarrollo profesional; análisis gráfico exploratorio; análisis factorial confirmatorio; invariancia; Inventario Integral de Desempeño Profesional.

## Introduction

The role of occupational and organizational psychologists revolves around three central and integrated axes: social and ethical commitment, the promotion of professional performance based on the assumption that good results favor well-being, and the mediation of labor relations (Tordera et al., 2020). Despite the importance of performance, its evaluation in organizations has been fundamentally flawed, signaling a need for changes in organizational systems that depend on evaluations (Murphy, 2020). Due to the relevance, it has for managers and workers, professional performance draws the attention of scholars of behavior in organizations. Professional performance directly associates with individual-level variables – such as well-being at work and Professional Development – and with organizational-level variables – such as productivity and competitiveness (Mourão & Monteiro, 2018). Research on work orientations indicates that individuals may view work as a job, a career, or a calling, and such orientations contribute to motivational differences that affect engagement and performance (Pitacho et al., 2019).

Considering these relations, the present study aimed to present validity evidence for the Comprehensive Job Performance Inventory (CJPI). Specifically, we examined its internal structure, its relationship with an external variable (Professional Development), and its measurement invariance by gender and stewardship (Chen, 2007; Hair et al., 2009).

Emphasizing professional performance as a phenomenon of an eminently behavioral nature circumscribes this construct and places attitudes in the sphere of its antecedents. Such an approach can offer benefits to the evaluation process. Focusing on behavior improves the accuracy of evaluation systems. It favors the clarity of prescribed tasks, detecting the development needs of workers, and supporting their engagement in actions in this direction (McGee & Crowley-Koch, 2021). The contact of workers with the effects of their performance and the transparency of managers regarding the achievement of goals is also a favorable factor (Lee et al., 2020). Additionally, the complexities of self-management in performance must be further explored. Within remote work settings, monitoring and increased job autonomy—intensified during the COVID-19 pandemic—enhanced job quality but posed productivity challenges (Qu & Yan, 2023).

Performance evaluation usually refers to a process in which one or more individuals in organizations – usually supervisors – observe and obtain information about each employee's work, performance, and effectiveness (Murphy, 2020). Thus, the measurement of this construct takes on a leading role both in management and in studies of organizational behavior. The performance diagnosis will be favored when it involves people and prepares them for a self--evaluation process that includes transparency concerning the objectives or feedback (Sandall & Mourão, 2023). However, more than 90% of managers, employees and heads of human resources (HR) considered that the performance management processes in their organization needed to meet expectations (Adler et al., 2016). Many assessed that they would be ineffective or inaccurate. These data confirmed that formal performance evaluations had ineffective and demotivating perceptions even for the best-performing employees (Culbertson et al., 2013). In another survey, 62% of HR leaders claimed that performance management mechanisms did not keep up with business transformation, and 81% were looking for new solutions to manage performance (Gartner, 2020).

Measuring professional performance to encompass its complexity is a challenge that persists in measuring workers' behavior in organizations (Gravina et al., 2021). Such measurement interests workers and allows them to self-manage their performance, with possible gains in Professional Development. It is also of interest to organizations since understanding the conditions that can favor and maintain workers' productivity and monitor their effectiveness requires an adequate measurement of professional performance (Andrade et al., 2020; Habeeb, 2020). Thus, producing accurate diagnoses and improving workers' performance are matters of survival for contemporary organizations and of autonomy for workers (Lee et al., 2020; Sandall & Mourão, 2020).

Despite the undeniable importance of professional performance, there needs to be more discussion on the most appropriate ways to measure individual diagnosis (DeNisi & Murphy, 2017). A broad perspective on the phenomenon requires that performance evaluations be carried out from a multidimensional viewpoint (Koopmans et al., 2013). From this angle, performance can be understood as the product of a worker's ability multiplied by support and effort, so an eventual decrease in one of these components would limit its characterization (Pawirosumarto et al., 2017).

Performance evaluations were discredited in several organizational environments due to procedural or comprehension failures concerning the phenomenon (Gartner, 2020). An outturn was giving increasing attention to three attributes associated with the effectiveness of evaluations: (a) the responsibility of evaluators for the accuracy of the measurements they perform, (b) the justice of the system, and (c) the adoption of multiple feedback sources. These three attributes may increase the chances of successful performance management or self-management (Levy et al., 2018).

In this study, we focus on presenting a measure that is adequate for assessing professional performance, which may contribute to greater

fairness in the performance evaluation system and the accuracy of the measurement. These processes would benefit from a theoretical model encompassing this construct's theoretical and practical dimensions. Given that performance encompasses multiple behavior dimensions that contribute – to varying degrees – to achieving the organization's goals, measurement instruments were proposed by different explanatory models (Griffin et al., 2007; Motowidlo & Kell, 2012). There are commonalities among these professional performance models. However, the theoretical model proposed by Campbell (1990, 2012) is the most comprehensive and is used in research in the field (Koopmans et al., 2013). In addition to the performance dimensions, this model includes direct and indirect antecedents (motivation and working conditions) and results (well-being and productivity). Based on it, a set of performance indicators assesses the phenomenon, respecting its complexity and scope. They follow the eight behavioral classes of those dimensions: Technical; Communication; Initiative, Persistence, and Effort; Counterproductive Work Behavior; Subordinates' Leadership and Management; and Colleagues' Leadership and Management (Sandall & Mourão, 2023).

The Technical Dimension relates to the core outcomes of the tasks assigned. It encompasses the primary behaviors expected in a role as defined by organizational norms (Andrade et al., 2020). Often viewed as the essential aspect of professional performance, this dimension has driven many unifactorial general performance measurements, which typically center on assessing behaviors aligned with prescribed tasks. However, these performance measurements have faced criticism for their narrow focus on task-related behaviors, potentially overlooking other critical facets of professional effectiveness (Koopmans et al., 2013).

The Communication Dimension comprises the adequate transmission and reception of information in the organizational context, which can occur by different means. The proposition of communication as a dimension of professional performance was innovative in the model by Campbell (2012). This dimension was unusual in performance studies. After the author's model, empirical relationships between communication behaviors and workers' performance were reported (Vogel et al., 2018).

The Initiative, Persistence, and Effort Dimension addresses behaviors in which an additional effort from the worker is evident. Some examples could be emotional work, helping colleagues, taking on task forces, creativity, and work redesign behaviors. Often, it comprehends behaviors in the interface with the Technical Dimension, depending on the nature of the work done. Thus, they commonly have a high correlation and sometimes are difficult to distinguish (Gordon et al., 2018; Koopmans et al., 2013; Pawirosumarto et al., 2017).

Unlike the prior three Dimensions, the Counterproductive Work Behavior Dimension encompasses intentional behaviors that reduce the chances of achieving organizational goals, such as theft, sabotage, gossip, and retaliation (Wiernik & Ones, 2018). It differs from organizational citizenship behaviors as the relationship between the two, when tested, resulted in modestly negative. The antecedents mapped for both diverged as well (Dalal, 2005). In an attempt to describe the Counterproductive Dimension in a positive sense, some authors proposed a dimension called Ethical Behavior (De Cremer & Moore, 2020).

The Subordinates' and Colleagues' Leadership Dimensions, in turn, focus on behaviors that favor the performance of different organizational members. The indicators referring to these two dimensions range from direct guidance on carrying out tasks to actions aimed at encouragement or recognition. The influence of the actions of leaders on the performance of subordinates and colleagues is corroborated in studies by Pawirosumarto et al. (2017) and Mourão (2018).

Finally, the Subordinates' and Colleagues' Management Dimensions follow the same logic as the previous two dimensions and comprise behaviors in anticipating problems or monitoring

performance at work (Campbell, 2012). Furthermore, these dimensions encompass management behaviors related to more effective use of organizational resources by others (colleagues or subordinates). These behaviors are expected from those in positions that allow them to access all different organizational resources and are closely associated with the support of managers and colleagues, which is an essential element for the well-being of workers (Andrade et al., 2020; Tordera et al., 2020).

Thus, Sandall and Mourão (2023) built a comprehensive proposal for measuring professional performance, comprising these eight dimensions from Campbell's Theoretical Model (2012). Those authors advocate a more thorough performance evaluation process – encompassing its different behavioral classes – since presenting adequate behaviors in one or two dimensions does not necessarily mean the overall performance is good. Measuring performance from a more comprehensive model of the construct can contribute to research on this topic and management practices in organizations (Gordon et al., 2018; Murphy, 2020; van Wingerden et al., 2017). In addition, a comprehensive self-diagnosis of professional performance favors the worker's self-management of behaviors. These behaviors can include expanding their planning, self-control, resource mobilization, tracking of results, and adaptability (Koopmans et al., 2013). Therefore, channeling initiative and intention to improve performance empowers workers and promotes their own Professional Development (Gravina et al., 2021; Mourão & Monteiro, 2018).

Another challenge proposed for a professional performance inventory is proper measurement for different audiences. Some performance measurement instruments focus almost exclusively on technical behaviors (Habeeb, 2020; Koopmans et al., 2013). This focus limits their use for evaluating the performance of leaders and managers. The proposed measure includes standard dimensions for workers and managers and specific ones (Subordinates' Management and Subordinates' Leadership) for this target audience. Besides including such dimensions, the proposal aims to verify measurement invariance by stewardship to cover future studies with different populations inside work organizations. Evaluating gender invariance is also proposed, considering the relevant discussions about gender inequalities in the labor market (ILO, 2019). In sum, the CJPI is expected to provide a comprehensive, valid, and reliable measure of professional performance, with potential applications in research and organizational practice (Levy et al., 2018; Murphy, 2020).

Guided by these objectives, the study was designed to collect evidence of validity through analyses of internal structure, relationships with an external variable, and measurement invariance. The following section describes the method employed to achieve these aims.

## Method

### *Participants*

We obtained the sample by convenience through announcements in their networks and social media, surpassing the criterion of a minimum of ten respondents per instrument item (Hair et al., 2009). Participants should be over 18 years old and working for at least one year. Among those who accessed the questionnaire, 17 declined to participate after reading the FICF (Free and Informed Consent Form), and three respondents failed to meet the criterion of being working. After their exclusion, the sample had 648 valid participants, and 55.9% identified themselves with the male gender. A total of 56.8% were married/living with partners. The sample represented 19 Brazilian federative units but concentrated respondents in some – especially from the State of Rio de Janeiro (34.1%). Most respondents had a graduate degree (59.4%, with 42.4% men and 66.7% women) and a monthly family income between US$770 and US$2,000 (32.1%).

Most participants worked in the tertiary sector (89.4%), with 53.2% in private companies, 45.8% of whom had a formal job in this type of organization. Public servants comprised 23.2% of the

sample, and 11.5% were self-employed. There was an expressive heterogeneity in the length of work, whose mean was 20.4 years (*SD* = 12.4). The dispersion was even more remarkable concerning the length of employment in the same work organization, ranging from 0 to 52 years, with a mean of 8.6 (*SD* = 9.5) and a median of 5 years. The sample had 31.8% of the participants (42.3% men and 21.5% women) in leadership roles in teams with 16 people on average (29 in the case of men and 4 in the case of women). The portion of participants who worked in organizations that adopted formal performance evaluations accounted for 59.8%.

### *Instruments*

The item elaboration followed the process described by Sandall and Mourão (2023). The authors started with a construction process based on a bibliographic survey of other professional performance measurements. The first version contained 195 items. After the reduction in redundancies, it resulted in a version of 88. The dimensions of Campbell's Model (Campbell, 2012) served as a basis for categorizing the items, and two judges' analyses and a semantic validation refined them. The judges' evaluation generated a measure with 54 items distributed into the eight dimensions of the theoretical model. For their assessment, we chose a frequency scale with five response alternatives. These alternatives expressed the frequency of behaviors (1 = *never* to 5 = *every time*). An example of an item is "I have put into practice ways to improve my work efficiency".

We adopted a set of initial questions to reduce the cognitive demand in the interaction with the items and increase the affinity of the instrument with the participants' work context. For example, the researchers asked the participants to indicate two typical behaviors that characterized their role. Thus, whereas a researcher could answer "advising master's/doctoral students" and "developing research projects", a driver could mention "checking the operation of the bus before departure" and "driving the vehicle within the speed limit along the route". Thus, the items related to the Technical Dimension of these two respondents would appear with excerpts from the answers to which they had previously informed themselves, equalizing jobs of a diversified nature. Whereas the former would receive the item "I have satisfactorily carried out the main activities of my job as a researcher (advising master's/doctoral students and preparing research projects)", the latter would receive the item "I have satisfactorily carried out the main activities of my job as a driver (checking the operation of the bus before departure and driving the vehicle within the speed limit along the route)".

In the preamble of the questionnaire, the participants presented elements of their work reality referring to some dimensions from Campbell's Model (Campbell, 2012), as well as indicators of professional performance results. Additional questions aimed at adapting the items into subsequent sections regarding gender, role, and name of the organization where they worked. The block of specific questions about subordinates' management and leadership included the criterion of being in a leadership position. The researchers also asked the participants to suggest the most appropriate terms for bosses, subordinates, and colleagues. This choice was because specific terms used in some organizations may be considered pejorative in others. Based on such customization, one participant could receive the item "I have encouraged my subordinates in their work", whereas another would receive "I have encouraged my employees in their work". In addition to increasing the identification of the participants with the items, such initiatives also favored their understanding, as they referred to the respondent's universe. As a result, 29 of 54 items (54%) had their writing customized.

Professional Development was measured using the Current Perception of Professional Development Scale [*Escala de Percepção Atual do Desenvolvimento Profissional*] (EPADP), developed by Mourão et al. (2014). The EPADP has eight items ($\alpha$ = 0.89; e.g., "I have become a more qualified professional"). Participants answered

the items on a Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

### *Data Collection*

We previously submitted the research project to a research ethics committee (CAAE 36444820.4.0000.5289, Plataforma Brasil) and complied with precepts expected from a study with human beings. Such precepts encompassed the confidentiality of personal information, the right to voluntary participation, and the right to quit this participation following the Declaration of Helsinki. We collected data between November 2020 and January 2021 through a questionnaire prepared on the Questback platform, accessible via the Internet on different devices, such as cell phones or computers. The participants received invitations by email and on social networks.

### *Data Analysis*

In the initial exploratory database analysis, we excluded participants who wrote that they were not working. Since the participants had to complete items in the electronic questionnaire mandatorily, there were no occurrences of incomplete answers.

We analyzed the initial models using Exploratory Graph Analysis (EGA). EGA consists of a neural network model that uses lasso regressions to estimate the correlations (edges) between the observed variables (network nodes). Furthermore, using the Walktrap algorithm, the nodes are clustered, resulting in a graphical model (Christensen & Golino, 2021). We conducted EGA models in two cycles: initial, with all items; final, with five items per cluster selection. To select the items that composed the final model, we used the following criteria: item factor loading above 0.50 – generated by Confirmatory Factor Analysis (CFA) – and conceptual scope attuned to the theoretical identity of the dimensions in Campbell's Model (Campbell, 2012). Afterward, the researchers analyzed the final model through structural equations. To this end, they declared the items ordinal observed variables and estimated the model parameters using Robust-Weighted Least Square (WLMSV). The following fit indices were adopted to evaluate the models: Chi-square and degrees of freedom ratio ($\chi^2$ / df <3), Confirmatory Fit Index (CFI) and Tucker-Lewis Index (TLI) above .90, and Root Mean Square Error of Approximation (RMSEA <.010 for a 90% confidence interval) (Hair et al., 2009). Cronbach's alpha coefficient and CR assessed internal consistency.

We also conducted an invariance analysis for the parameters of the items using the "gender" and "being or not in a leadership position" variables using a Multigroup Confirmatory Factor Analysis (MGCFA) between the model with fewer restrictions and the subsequent model with more restrictions. This analysis sought to investigate whether the parameters of the items may be the same for the different groups of participants. This investigation allows the researchers to compare the scores without interpreting their differences as consequences of the measurement (Chen, 2007). We tested the measurement invariance by performing the model for categorical variables proposed by Muthén and Asparouhov (2002). This model tests the configural invariance (the assumption is that the internal structure is equal between groups), the metric invariance (constraining the factor loadings), and the scalar invariance (constraining the thresholds). The researchers considered measure invariant when the fit indices' variation occurred according to the following values: $\Delta\chi^2$/df < 5; ΔRMSEA< .015; ΔCFI<.010; ΔMc <.015 and ΔGamma hat <.008 (Chen, 2007).

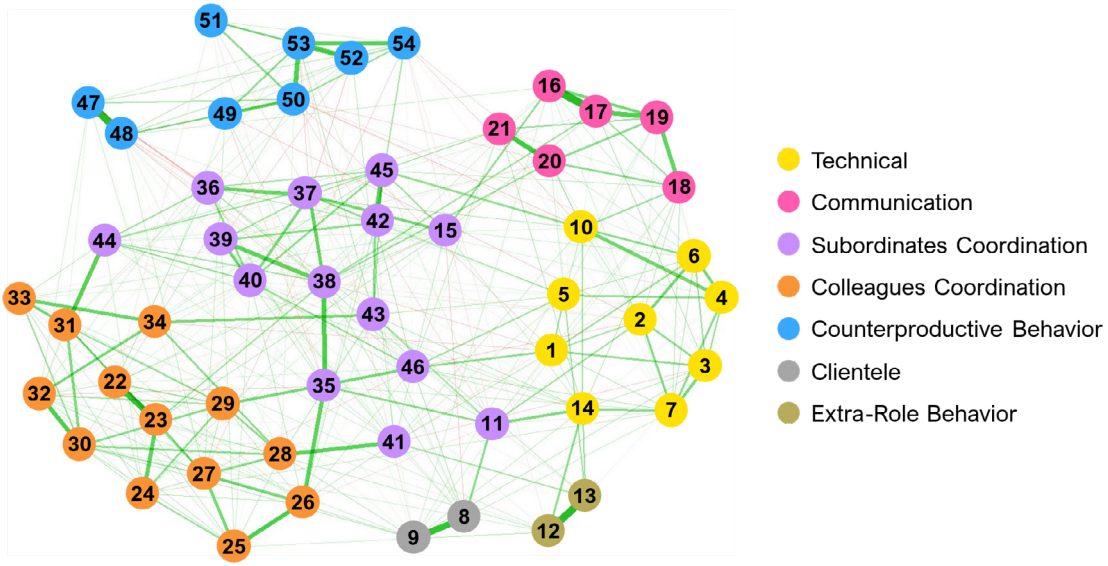
We considered the relationship between the Professional Development constructs and professional performance (Mourão & Monteiro, 2018). They performed a validity test with external variables between the CJPI and the EPADP based on the calculation of Pearson's correlations. Correlational measurements are one of the most frequent ways of measuring object similarity. The researchers adopted the following ranges as reference standards for the magnitude of the correlations: low (0.10-0.29), moderate (0.30-0.49), and high (0.50 and above; Hair et al., 2009).

## Results

### *EGA and AFC*

The first step in assessing the internal structure was to explore models of network analysis through an EGA. This initial approach returned seven clusters (Figure 1). However, two of them were composed of only two items each. Due to their instability in the network, the researchers excluded them in subsequent analyses, following Christensen and Golino (2021). The content of items 8 and 9 dealt with the organization's operation market and clientele, whereas items 12 and 13 dealt with extra-role behaviors. Additionally, the researchers excluded items 11 and 15 since a cluster different from the theoretical proposal accommodated them, suggesting that the participants diverged in their interpretation.

**Figure 1 -** *EGA of the initial model of the Comprehensive Job Performance Inventory (CJPI) with 54 items*



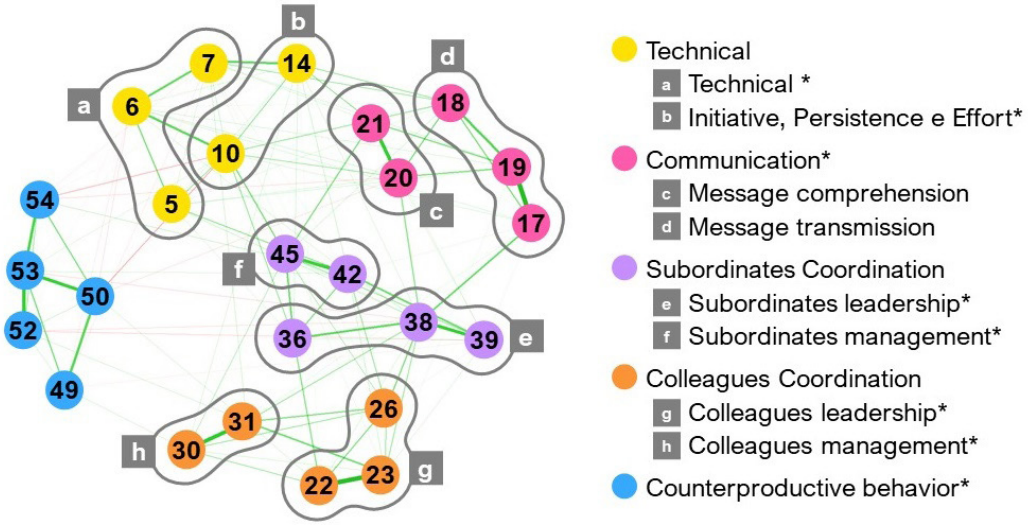

*Note:* The nodes (circles) represent observed variables, and the arris (lines) represent partial correlations in which the thickness of the edges represents their magnitude. Green lines = positive correlations; red lines = negative correlations.

To produce a more objective and balanced instrument, we reduced the number of items per cluster to five (Table 1). The short version of the instrument makes it easier to choose applications combined with other measures in the future. The procedure for reducing the items in each cluster combined the criteria of item factor loading above 0.50 obtained in the AFC and conceptual scope attuned to the theoretical identity of the dimensions in Campbell's Model (Campbell, 2012). This strategy allowed the study's objective – to propose a comprehensive instrument for measuring professional performance – to represent the dimensions.

We analyzed the clusters brought together by the EGA, as illustrated in Figure 2, in light of Campbell's Model (Campbell, 2012). Two clusters gathered items of only one theoretical dimension – Communication Dimension (pink cluster) and Counterproductive Behavior Dimension (blue cluster). The cluster called Technical (yellow) gathered all the items from the Technical Dimension of the theoretical model, in addition to two of the items inspired by the Initiative, Persistence, and Effort Dimension. The other two clusters gathered items from pairs of affinity

dimensions for the object. Thus, Colleagues' Leadership and Colleagues' Management formed a cluster (orange), and another single cluster (purple) also gathered Subordinates' Leadership and Subordinates' Management.

**Figure 2 -** *EGA of the final model of the Comprehensive Job Performance inventory CJPI*




*Note:* Gray outlines identified from "a" to "h" highlight agglomerations within clusters. * = Conceptual Dimensions based on Campbell (2012).

We then conducted confirmatory factor analyses to assess the final model's adequacy to a latent structure. We observed that the final model, with 25 items, fit the data — $\chi^2$ (df) = 582.58 (265); RMSEA (90% C.I.) = 0.04 (0.04-0.05); CFI = 0.97 and TLI = 0.96 —, and the factor loadings were very similar between the models (M = 0.68 for Model 1, with 54 items, pre-reduction, and M = 0.67 for Model 2, after the items' reduction. At this point, we also sought to assess the impact of reducing the number of items on the size of the factor loadings (Table 1).

***Table 1 -*** Standardized loadings of the CJPI items

| Dimensions and reliability | Items | Standardized factor loadings | |
|---|---|---|---|
| | | 1) 54-item model pre-reduction | 2) 25-item model post-reduction |
| Technical<br>$CR_1$=.87<br>$CR_2$=.79 | 5 | .63 (.03) | .60 (.03) |
| | 6 | .66 (.03) | .63 (.03) |
| | 7 | .69 (.03) | .64 (.03) |
| | 10 | .74 (.03) | .74 (.03) |
| | 14 | .72 (.03) | .68 (.03) |
| Communication<br>$CR_1$=.90<br>$CR_2$=.88 | 17 | .86 (.02) | .80 (.02) |
| | 18 | .77 (.03) | .77 (.02) |
| | 19 | .83 (.02) | .84 (.02) |
| | 20 | .72 (.03) | .74 (.02) |
| | 21 | .69 (.03) | .70 (.03) |

| Dimensions and reliability | Items | Standardized factor loadings | |
|---|---|---|---|
| | | 1) 54-item model pre-reduction | 2) 25-item model post-reduction |
| Colleagues Coordination $CR_1$=.94 $CR_2$=.87 | 22 | .75 (.02) | .79 (.02) |
| | 23 | .78 (.02) | .83 (.02) |
| | 26 | .79 (.02) | .77 (.02) |
| | 30 | .77 (.02) | .66 (.03) |
| | 31 | .75 (.02) | .73 (.02) |
| Subordinates Coordination $CR_1$=.93 $CR_2$=.90 | 36 | .74 (.04) | .74 (.04) |
| | 38 | .86 (.03) | .89 (.03) |
| | 39 | .73 (.04) | .74 (.04) |
| | 42 | .78 (.03) | .79 (.03) |
| | 45 | .81 (.03) | .82 (.03) |
| Counterproductive Behavior $CR_1$=.85 $CR_2$=.82 | 49 | .53 (.04) | .52 (.04) |
| | 50 | .79 (.03) | .79 (.04) |
| | 52 | .64 (.04) | .67 (.04) |
| | 53 | .80 (.04) | .82 (.04) |
| | 54 | .61 (.04) | .65 (.04) |

*Note:* All items were significant in both steps (p<.001). Parentheses show the standard error of estimate; CR1/2=composite reliability for models 1 and 2.

The final 25-item model maintained five factors: Technical, Communication, Colleagues' and Subordinates' Coordination, and Counterproductive Behavior. The annex of this study lists the items resulting from the reduction. The reliability of these factors was satisfactory, as measured by the composite reliability, which ranged from 0.79 to 0.90 (mean = 0.85).

### *Invariance Test*

We used the final model to test the CJPI's measurement invariance for gender (M = 362; F = 247) and stewardship (boss = 206; non-boss = 409). Table 2 presents the configural, metric, and scalar fit indices tested using MGCFA. The Subordinates' Coordination Dimension was excluded from this analysis because it was completed only by the participants in leadership roles.

***Table 2 -*** Fit indices of the multigroup confirmatory factor analysis for gender and stewardship with the CJPI

| Stewardship Invariance | $\Delta\chi^2$ ($\Delta$df) | RSMEA | CFI | ΔCFI | Gama | MC |
|---|---|---|---|---|---|---|
| Configural Model (Unrestricted) | 594.68 (328)* | .050 | .960 | | .960 | .813 |
| Metric Invariance | 37.73 (16)$^{sig}$ | .049 | .959 | -.001 | .959 | .809 |
| Scalar Invariance | 32.78 (16)$^{sig}$ | .049 | .958 | -.001 | .957 | .802 |
| Gender Invariance | $\Delta\chi^2$ ($\Delta$df) | RSMEA | CFI | ΔCFI | Gama | MC |
| Configural Model (Unrestricted) | 546.34 (328)* | .045 | .968 | | .967 | .843 |
| Metric Invariance | 19.88 (16)$^{ns}$ | .044 | .969 | .001 | .968 | .849 |
| Scalar Invariance | 26.07 (16)$^{ns}$ | .043 | .968 | -.001 | .967 | .844 |

*Note:* $\Delta\chi^2$ (df)=chi-square difference between the model and its predecessor (adjusted by Satorra-Bentler) for the configural model; the chi-square value of the model was presented; RMSEA=Root Mean Square Error of Approximation; CFI=Comparative Fit Index; ΔCFI=CFI difference (p<.01); *=statistically significant differences between model and predecessor; ns=no statistically significant difference between model and predecessor; *=p<.05.

The results indicated the invariance of the measurement for the groups of the "hierarchy" and "sex" variables. For the boss *vs.* non-boss groups (hierarchy), although the chi-square difference was statistically significant, all other indicators did not show substantial differences (e.g., ΔCFI < 0.01). For the "gender" variable, all indicators, including the chi-square difference, pointed to the invariance of the measurement. Therefore, the difficulties and discriminations of the CJPI items do not seem to be influenced by the "hierarchy" and "gender" variables.

### *Validity Concerning External Variables*

Table 3 presents the validity evidence between the CJPI dimensions and the Professional Development external variable. The five Performance dimensions showed significant correlations with Professional Development. The highest correlation was with the Technical Dimension (0.50), followed by the Communication (0.47) and Subordinates' Coordination (0.46) Dimensions. The Counterproductive Behavior Dimension, in turn, had the lowest correlation with Professional Development (0.17).

***Table 3 -*** Coefficients of the bivariate correlations between CJPI dimensions and Professional Development

| | | CJPI's Dimensions | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Dimensions | 1) Technical | | | | | |
| | 2) Communication | 0.59 | | | | |
| | 3) Colleagues Coordination | 0.37 | 0.35 | | | |
| | 4) Subordinates Coordination | 0.53 | 0.53 | 0.54 | | |
| | 5) Counterproductive behavior | 0.18 | 0.14 | -0.01$^{ns}$ | 0.07$^{ns}$ | |
| 6) Professional Development | | 0.50 | 0.47 | 0.39 | 0.46 | 0.17 |

*Note:* p<0.001 for all, except for "ns"=not significant.

In short, the results suggest a measurement instrument of professional performance with 25 items distributed into five Dimensions and good indicators of data fitting the hypothesized model. In addition, the analyses obtained invariance for gender and stewardship and a positive and significant correlation with the external variable (Professional Development).

## Discussion

This study intended to fill a gap related to finding more appropriate ways to obtain individual diagnoses of professional performance. This gap was pointed out by personnel management professionals and by scientific articles (Adler et al., 2016; Culbertson et al., 2013; DeNisi & Murphy, 2017; Gartner, 2020). We tested valid evidence of the internal structure of the Comprehensive Job Performance Inventory (CJPI) to reduce this gap. It also sought external variables and measurement invariance by gender and stewardship. The results showed five dimensions of professional performance, attesting to the behavioral and diverse nature of the construct.

Initiative, Persistence, and Effort was the only dimension that remained outside the inventory. Its items spread across different CJPI clusters. From a content point of view, we observed that the Initiative, Persistence, and Effort items – loaded in the Technical Dimension – are those associated with the activities identified as essential to the respondents' roles. Such behaviors would be components of technical performance and perceived as part of the actual work, even if the formal description of the respective position would not include them. In this sense, they were unlike the others, related to generic individual

dispositions more linked to motivational variables that more likely operate as antecedents of professional performance. The difficulty distinguishing the two dimensions has support in previously reported findings (Gordon et al., 2018). This result is also consistent with findings on work orientations, which show that the boundaries between categories such as job, career, and calling are not always clear-cut, reflecting overlapping motivational drivers that can also influence performance (Pitacho et al., 2019).

The empirical result of two items of the Initiative, Persistence and Effort Dimension – with loads in the Technical Dimension – needs discussion. This result signals the demand that begins to be imposed on workers when they repeat proactive behaviors. Given this, they are no longer considered extra effort and become expected in such a way that – prescribed or not – start to be perceived as an attribution or central element of performance, which characterizes the technical aspect (Andrade et al., 2020; Koopmans et al., 2013). Furthermore, the items attuned to the Technical Dimension can be comprehended in this dimension if we consider typical perspectives of the current labor world, such as adaptability ("I have put into practice ways to improve the efficiency of my work") and self-management ("I have organized my tasks to complete them within the agreed deadlines") (Lee et al., 2020). Thus, this dimension revealed two cores, one with three items focused on behaviors related to the prescribed work – as in Campbell's Model (Campbell, 2012) – and another core consisting of two items typical of the search for constant improvement. This result strengthens the theoretical relationship between Professional Development and Performance (Koopmans et al., 2013; Mourão & Monteiro, 2018).

The high correlation between the Technical and Communication Dimensions is also worth discussing. As one might expect, this connection is even more expressive with the Communication core, which involves behaviors that do not depend on others, confirming an association between technical performance and individual communication performance (Vogel et al., 2018). This core, most closely associated with the Technical Dimension, contains two items: "I have reviewed, before sending, the work messages I wrote". The other core of the Communication Dimension – focused on message exchange – comprises three items: "I have checked that I correctly understood the information I received at work". It is more peripheral in the model, indicating a lower correlation with the other dimensions of Campbell's Model (Campbell, 2012).

The correlation obtained between the Technical Dimension and the Subordinates' Coordination Dimension is also worth discussing. This result may be associated with the fact that a significant part of the sample had a leadership role. In these cases, technical performance corresponds precisely to the behaviors expected from those in leadership or management positions. This affinity between the two dimensions is discussed by Mourão (2018). She establishes that the development of subordinates is one of the central roles of a leader or manager. Another possible explanation is that leadership characteristics are increasingly valued in professionals, regardless of whether they hold management roles (Pawirosumarto et al., 2017). Leadership itself is evolving rapidly, with emerging leadership roles that are shared and distributed among formal and informal leaders.

In addition to being associated with the Technical Dimension, the Subordinates' Coordination Dimension occupied a central position and had a close link to the others. This dimension acted as a bridge – mediating relationships – between the Colleagues' Coordination Dimension, the Technical Dimension, and the Communication Dimension. The Subordinates' Coordination Dimension housed the items of the dimensions in the theoretical model (Campbell, 2012) aimed at subordinates (Subordinates' Leadership and Subordinates' Management). Such items did not present sufficient distinction between management and leadership behaviors constituting distinct dimensions, but the Subordinates' Coordination Dimension presented two cores. The

first Dimension grouped leadership activities and was composed of two items (for instance, "I have guided my [subordinates] when the result of their work could be better than that obtained"). The second core comprised three items related to management activities (for instance, "I have actively followed the progress of my [subordinates]"). The intricate network containing numerous connections between this dimension and the others attests to the findings of Pawirosumarto et al. (2017). These authors consider that leadership, in its different forms, is an essential determinant of workers' favorable performance. This relationship has a circular effect because the more the manager favors the performance of his/her subordinates, the better their performance will be since it will be partly composed of the results of their team members (Mourão, 2018).

In their turn, the items composing the Colleagues' Coordination Dimension (Figure 2) grouped typical elements of the Colleagues' Leadership and Management Dimensions of Campbell's Model (Campbell, 2012). They formed distinct cores, though amalgamated in the same dimension. The core referring to leadership involved three items (for instance, "I have manifested recognition for the successful results of my [colleagues]"). The other items also housed behaviors that influence colleagues' behavior in the organization. The core related to colleague management, on the other hand, was composed of two items (for instance, "I have proposed activities to be carried out by my [colleagues]"). This core includes behaviors concerning the management of organizational resources. The Colleagues' Coordination Dimension presented several bridges with the other performance dimensions, especially with the Subordinates' Coordination Dimension. This result corroborates the idea that the support of managers and colleagues is a culturally relevant matter for workers (Andrade et al., 2020).

In turn, the Counterproductive Behavior Dimension (Figure 2) grouped the items built from Campbell's Model (Campbell, 2012). It constitutes a core formed by five items (for instance, "I have deliberately ignored parts of my work that should have been completed"). This Dimension was the most isolated in the professional performance measurement network, possibly for being the only one that keeps a negative relationship with the set of the other dimensions, as the more counterproductive behaviors the worker presents, the worse their professional performance tends to be (Dalal, 2005).

The fact that the Counterproductive Behavior Dimension was isolated makes it possible to question whether Counterproductive Behavior is, in fact, a dimension of professional performance or whether it characterizes a distinct phenomenon. This latter interpretation would confirm the proposition of Wiernik and Ones (2018) that Counterproductive Behavior does not belong to a pole of behavioral classes that encompass organizational citizenship behaviors. Thus, the weak, primarily negative, relationships with the Technical and Communication Dimensions and the absence of correlation with the Coordination dimensions show that the dimension presents sufficient distinction compared to the items in the other dimensions.

The present study's findings regarding the CJPI invariance by gender allow future studies to investigate possible gender inequalities in the work environment, such as lower wages for women, even when they occupy the same positions as men (ILO, 2019). The CJPI invariance by stewardship results is also relevant, as several performance studies comprise organizational samples that include workers from different hierarchical levels. Given this, confirming this invariance broadens the possibilities of using the CJPI.

Regarding the analysis of the CJPI with the Professional Development external variable, the result confirms the theoretical assumption of a positive relationship between professional performance and development (Mourão & Monteiro, 2018). The correlations varied in magnitude, with a high correlation coefficient with the Technical Dimension, a moderate one with the Subordinates' Coordination, Colleagues' Coordination and Communication Dimensions, and a low cor-

relation coefficient with the Counterproductive Behavior Dimension. Together with the results presented earlier, these findings suggest that this dimension is a separate construct instead of a component of professional performance.

Through our analysis, we achieved our objective of presenting valid evidence tests for the Comprehensive Job Performance Inventory (CJPI) regarding its internal structure, relationship with external variables, and measurement invariance by gender and stewardship. The obtained inventory mostly meets Campbell's theoretical model (2012), with two relevant distinctions: the fusion of the management and leadership dimensions and the decomposition of the Initiative, Persistence, and Effort Dimension, which had only two items remaining in the Technical Dimension. In addition, there are a couple of considerations regarding the differences between the CJPI and Campbell's Model. The first is that this is a report of an empirical test, whereas Campbell's Model was theoretical. The second is that Campbell's Model rose from entry-level military career activities, which differs from other work contexts in the current labor market (Campbell, 1990).

Despite these changes in Campbell's original model (2012), the CJPI allows for a professional performance measurement that comprises different dimensions (Technical, Communication, Subordinates' Coordination, Colleagues' Coordination, and Counterproductive Behavior) without an excessive number of items (25). We recommend the final version of the inventory for use in future studies, including comparisons of professional performance by gender and stewardship. Measuring performance from a more comprehensive model makes it possible to identify the performance dimensions most affected by antecedent variables or that may have a greater effect on consequent variables. In this sense, an adequate measurement of professional performance can contribute to research on this topic and organizational management practices (Gordon et al., 2018; McGee & Crowley-Koch, 2021; Murphy, 2020; van Wingerden et al., 2017).

This study's contribution includes presenting an inventory that allows a certain level of item customization, from the initial set of questions, to bring the participants closer to their work contexts. This closeness is one of the things that differentiates the CJPI from other performance evaluation instruments. Moreover, the preamble of the questionnaire allows initial reflections to arise on the part of the participants, which enables greater engagement in the research or the assessment. When they think more deeply about their activities, eventual biases are reduced, as a more structured set of memories and experiences emerges (Habeeb, 2020). Additionally, considering the shift to more widespread remote work after the COVID-19 pandemic, using a self-management performance scale would be a valuable approach. This recommendation is influenced by the data collected during compulsory telework and the relevant literature, suggesting that the legacy of the pandemic supports a focus on self-management skills essential in remote and hybrid work environments (Qu & Yan, 2023). Thus, remembering, formulating, and recording experiences play an essential role in favoring the accuracy of the instrument's completion.

These characteristics concerning the customization and comprehensiveness of the CJPI reinforce its use in scientific and organizational research. By allowing a self-diagnosis of professional performance, the CJPI favors the self-management of behaviors on the part of the worker, with chances of expanding its results and adaptability (Gravina et al., 2021; Lee et al., 2020; Levy et al., 2018).

The present study presented favorable evidence of the validity of the CJPI, revealing a measurement of professional performance with a comprehensive perspective structured into five dimensions with adequate reliability indicators. Beyond psychometric aspects, this study contributes to knowledge about professional performance, both theoretically and methodologically. Theoretically, it advances the multidimensional understanding of the construct in such a way that fostering or presenting a positive performance

will consist of balancing its different aspects. Furthermore, invariance ensures compliance in applications that include participants with or without leadership roles. Research with such scopes can contribute to future theoretical advances on the construct.

The study innovated in the methodological sphere by employing an initial set of questions that provided information to customize the instrument. Thus, the respondents could interact with an instrument that portrayed their diversity of activities and fields of work, keeping the functional identity of the items. This strategy proved advantageous, mainly by maintaining the desired depth and the specificities of the participants' work realities, generating an instrument applicable to different contexts.

These research findings have implications for professional performance evaluation, both from the perspective of organizations and to support the worker's self-management. The available scale, composed of 25 items, comprises applications in conjunction with other measures or serialized in small instruments collected at more than one opportunity.

Despite the CJPI's positive results, the study has some limitations. One of them is that the data of the external variable and the CJPI items were collected in a single moment, increasing the method's chances of common variance error. Another area for improvement is that the sample concentrated on higher education workers, which prevents a broader reading of professional performance measurement.

As recommendations for future studies, we suggest new measurement validity tests, such as convergent, concurrent, and discriminant validity, involving other performance measures and correlated variables, such as organizational citizenship behavior, ethical performance, and leadership styles. In addition to expanding the CJPI's validity evidence, such studies may contribute to the field of studies on professional performance by broadening conceptual and epistemological discussions about the construct. One of the discussions that can move forward is whether Counterproductive Behavior is characterized as a dimension of professional performance, as advocated by Campbell (2012), or whether it is a different construct. Studies that comprehend social context variables, including appraisers' and appraisees' characteristics, messages, and environment, are also recommended. These elements are as essential as the structure of the instruments adopted, so measurement systems must consider them in their designs to be successful.

Future investigations could also include longitudinal studies assessing professional performance evolution, including when participants progress in their careers through promotions and transfers and, in this perspective, explore the relationships between the dimensions. Finally, we suggest studies that simultaneously involve workers from the industrial and services sectors, as well as those with different levels of education, to allow for the identification of possible differences in professional performance between the groups.

## Declaration of interest statement

The authors report no potential conflict of interest.

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## Annex – Items that compose the final model with 25 items per dimension

Technical Dimension

5) I have performed administrative tasks that are directly under my responsibility

6) I have satisfactorily performed the main activities of my job as a [position] (for instance: [informed technical behavior])

7) I have put my technical knowledge into practice to produce results (for instance: [informed delivery])

10) I have organized my tasks to complete them within the agreed deadlines

14) I have put into practice ways to improve the efficiency of my work

Communication Dimension

17) I have passed on clear information to other people at [organization]

18) I have checked that I correctly understood the information I received at work

19) I have communicated clearly with other people at work

20) I have carefully read the work messages I received

21) I have reviewed, before sending, the work messages I wrote

Colleagues' Coordination Dimension

22) I have helped my [colleagues] develop greater autonomy in their activities

23) I have encouraged my [colleagues] who were facing challenges at work

26) I have manifested recognition for the successful results of my [colleagues]

30) I have proposed activities to be carried out by my [colleagues]

31) I have warned my [colleagues] of difficulties they could encounter

Subordinates' Coordination Dimension

36) I have developed my [subordinates] for them to have greater autonomy when performing their tasks (for instance: [subordinate's informed technical behavior])

38) I have encouraged my [subordinates] in their work

39) I have guided my [subordinates] when the result of their work could be better than that obtained

42) I have supervised the evolution of the work of my [subordinates] (for instance: [subordinate's informed technical behavior])

45) I have actively followed the progress of my [subordinates]

Counterproductive Work Behavior Dimension

49) I have made mistakes (for instance: [Informed Counterproductive Behavior])

50) I have deliberately ignored parts of my work that should have been completed

52) I have been aggressive with people at work

53) I have used [organization]'s resources for my benefit, even knowing it might not be appropriate

54) I have done things knowing that they would harm my performance at work (for instance: poor sleep or alcohol abuse)