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Adaptation of the Work Design Questionnaire to Brazil

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Keywords:
measures,
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Abstract
Work design refers to the study, creation, and modification of the composition, content, structure of tasks and roles and the environment in which they are performed. A measure with evidence of validity is necessary to understand the impact of work design on people and organizations. To obtain such evidence in the Brazilian context, we conducted two studies to adapt an instrument developed in a different cultural context. Study 1 performed an exploratory factor analysis assessing the latent structure of the Work Design Questionnaire (N = 1,017). Study 2 confirmed the fit of the structure found (N = 1,224) and the robustness of the taxonomy investigated. The structure identified in the analysis corroborated one of the originally proposed models, including 18 subcategories and 71 items presenting adequate psychometric indexes.

Adaptação do Questionário de Desenho do Trabalho para o Brasil

Palavras-chave:
medidas,
diagnóstico organizacional,
características do trabalho

Resumo
O desenho do trabalho diz respeito ao estudo, à criação e à modificação da composição, do conteúdo, da estrutura e do ambiente no qual tarefas e papéis são desempenhados. Entender o impacto do desenho do trabalho sobre as pessoas e organizações depende da existência de medida com evidências de validade. Para obter tais evidências no contexto brasileiro, conduzimos dois estudos, visando adaptar um instrumento advindo de outros contextos culturais. O Estudo 1 realizou uma análise fatorial exploratória da estrutura do Work Design Questionnaire (N = 1.017), enquanto o Estudo 2 confirmou o ajuste da estrutura encontrada (N = 1.224) e a robustez da taxonomia investigada. De modo geral, a estrutura corroborou um dos modelos originalmente propostos, com uma solução composta por 18 subcategorias e 71 itens, que apresentou índices psicométricos adequados.

Adaptación del Cuestionario de Diseño del Trabajo para Brasil

Palabras clave:
medidas,
diagnóstico organizacional,
características del trabajo

Resumen
El diseño del trabajo se refiere al estudio, creación y modificación de la composición, contenido, estructura y ambiente en el que se desempeñan tareas y roles. Entender el impacto del diseño del trabajo sobre las personas y organizaciones, depende de la existencia de medidas con evidencias de validez. Para obtener estas evidencias en el contexto brasileño, realizamos dos estudios, con el fin de adaptar el instrumento proveniente de otros contextos culturales. El Estudio 1 realizó un análisis factorial exploratorio de la estructura del *Work Design Questionnaire* (N = 1.017). El Estudio 2 confirmó el ajuste de la estructura encontrada (N = 1.224) y la robustez de la taxonomía investigada. En general, la estructura corroboró uno de los modelos originalmente propuestos, con una solución compuesta por 18 subcategorías y 71 ítems, que presento índices psicométricos adecuados.

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The person who invented work
Must surely be thoughtless
To conceive of such a notion
What a crazy mess…
I take back my complaint
Regarding the inventor
For the blame is not all his
That his invention causes terror
(Batatinha, typesetter and samba composer, 1924-1997)
(lyrics translated from the original soundtrack in Brazilian Portuguese[2])

Neither work nor the way work is performed were invented during the lifetime of Batatinha. Neither work was invented during the Industrial Revolution or when Gutenberg developed the printing press. Systematic investigation of the topic of job or work design was a novelty when Batatinha was born in Bahia, Brazil. Over the last hundred years, more than 17,000 articles have been published on this topic, clearly illustrating the relevance and centrality of that "invention" to research on work and management (Parker, Morgeson, & Johns, 2017).

Interest in the subject has increased worldwide, as attested by the 2010 publication of a special issue of the *Journal of Organizational Behavior* and by a series of literature reviews (e.g., Parker, 2014; Parker et al., 2017). However, a Google Scholar search for relevant papers written in Portuguese yields just over 10 results, some of which are from Europe. The lack of emphasis on this subject in Portuguese-language might be related to the lack of valid work design measures, despite of its undeniable importance. Some Brazilian instruments do exist to measure work conditions (e.g., Borges et al., 2013) or to evaluate characteristics of the working context (e.g., Ferreira & Mendes, 2008). However, the constructs they employ are not equivalent to "work design".

A good measure could provide the necessary conditions for work design research to flourish in Brazil. Such a measure could be used to study, for instance, relationships between existing phenomena and constructs in the fields of psychology, management, health, education, ergonomics, engineering, economics, and sociology. Such studies would benefit several interventions. They would enable diagnosis, orientation, and high-quality testing of interventions in industrial and organizational psychology. They could predict individual characteristics, such as performance, well-being, learning, stress, absenteeism, satisfaction, commitment, and creativity. Labor regulation policies could be established based on systematic diagnostics using a valid and trustworthy measure, as has been done in Australia, the USA, Europe, and Japan. This study aimed to adapt the Work Design Questionnaire to the Brazilian context, in order to facilitate those possible benefits.

The term "job design" refers to the content and organization of tasks assigned to employees. However, some employees may choose to go beyond their assigned tasks, changing their designation. Some workers may not be formally employed. Finally, the work process may happen at the team level rather than at the individual level, as is implied by the definition of job design. Therefore, the term "work design" has been adopted to refer to the study, creation, and modification of the composition, content, and structure of tasks and roles, and the environment within which they are performed (Parker et al., 2017).

The effect of work design on collective processes has theoretical implications. Work design must be understood as a means by which organizations can be conceived as "processes" ("organizing"), rather than defined as "structures" (Parker, Knight, & Ohly, in press). These authors also stress the potential usefulness of work design in understanding how technology has affected several professional contexts, as well as in fostering evidence-based interventions for common situations in which organizations make poor choices when introducing new technologies and practices.

Patterns of work organization and design have emerged with different combinations of properties in different cultures (e.g., in the USA, Northern Europe, and Japan), and may even be responsible for shaping cultures (Erez, 2010). Such patterns could moderate relationships between work characteristics (e.g., autonomy, feedback) and organizational behavior variables (e.g., motivation, well-being, commitment, team spirit, performance). Many theoretical constructs can support hypothesis formulation and testing with respect to work design, as well as diagnostics and interventions in organizations or occupations. However, the full range of research and application options requires a basic understanding of work design's definition, possible taxonomic structure, and consequent operationalization.

Work design was a central construct in early psychological investigations of motivation, a response to the simplification and control imposed on work (Parker, 2014). The dominant model for these studies, proposed by Hackman and Oldham (1976), focused on the "job." Five central characteristics of jobs were proposed: variety, identity, significance, autonomy, and feedback. These were associated with a set of desirable behaviors and outcomes for organizations, such as worker motivation and satisfaction and reduced turnover. However, despite its strength and persistence, the model was criticized for its small number of dependent variables, and for its failure to consider any mechanism other than motivation in the relationship between characteristics and results. Moreover, the model employed a limited number of job characteristics, which were considered insufficient to account for the numerous circumstances and variations of work organization that would be effective in practice (Parker & Wall, 1998).

Work design must include features additional to the central five proposed by Hackman and Oldham's (1976) model. Some might have no effect on organizational behavior variables, such as learning and performance, but a significant effect on other variables, such as engagement and stress. Other features might have paradoxical effects depending on the organizational, social, economic, and political context, such as simultaneously promoting both creativity and poor ideas, or both citizenship and unethical behavior (Johns, 2010). Work design focused only on motivation is not enough, although its central importance in many theoretical models of work motivation must be recognized (Parker, 2014; Tannenbaum, 1980).

Work design might support an individual's cognitive, moral, and identity development (Parker, 2014). It could help to promote learning among adults and reduce the likelihood of dementia among elderly people. Therefore, the importance of work design to the health and well-being of nations should be duly considered. Furthermore, Parker (2014) suggested that both research and interventions should consider work design to promote flexibility and allow control over the work schedule. Recently, proponents of the five central characteristics model have noted the need to advance a research agenda that captures the current relationships between people and their various work activities, which are often fluid

[2] O tal que inventou o trabalho
Só pode ter uma cabeça oca
Pra conceber tal idéia
Que coisa louca ...
Contradigo o meu protesto
Com referência ao inventor
A ele cabe menos culpa
Por seu invento causar pavor

(Oldham & Hackman, 2010). Such fluidity is likely to be the result of the instabilities created by the context.

Social, cultural, political, and organizational contexts might be associated with certain characteristics of work design, and with the meaning attributed to them by the worker (Nicholson, 2010). The characteristics might differ among generational cohorts (Hernaus & Vokic, 2014). Elements from occupational and organizational contexts might shape, promote, or constrain how work is performed, but could likewise moderate the relationships between work design characteristics and organizational behavior variables (Morgeson, Dierdorff, & Hmurovic, 2010).

Five sets of studies reflecting most of the historical and theoretical developments regarding work design were identified by Parker et al. (2017): the tradition of sociotechnical systems and autonomous working groups, role theory, and the models of work characteristics, stress demand-control, and demand for jobs and resources. Despite a broad theoretical and empirical basis, limitations to the operationalization of work design were noted by Morgeson and Campion (2003). Their criticisms regarding the measures and models referred specifically to the validity of a questionable construct, and to a sub-optimal psychometric quality.

A taxonomy of work design and specific measures for its categories and subcategories, the Work Design Questionnaire (WDQ), was proposed by Morgeson and Humphrey (2006). They offered a contemporary perspective integrating many research traditions (Parker et al., 2017). The WDQ was later adapted to several languages (German, Spanish, French, Polish, Chinese, Indonesian, Italian, Russian, and European Portuguese). The taxonomy included four major categories of work design characteristics (task, knowledge, social, and work context), which were further divided into several subcategories.

The task characteristics of the WDQ include **autonomy** (freedom to plan, decide, and implement working methods), **variety** (necessity of multiple tasks), **significance** (influence over other people's lives), **identity** (recognizable complete products), and **feedback** (obtaining clear and direct information on performance). The knowledge characteristics include **complexity** (use of many higher-order intellectual skills), **information processing** (necessity of attention and data processing), **problem-solving** (necessity of unique ideas and solutions), **skill variety** (necessity of a variety of different skills), and **specialization** (necessity of knowledge and skills in a specific area). The social characteristics include **social support** (guidance and assistance offered by other people), **interdependence** (dependence of the worker on others, and dependence of others on the worker), **interaction outside the organization** (demand for interaction and communication with individuals outside the organization), and **feedback from others** (provision of information on performance by others in the organization). Finally, the work context characteristics include **ergonomics** (provision of appropriate posture and movement), **physical demands** (necessity of effortful physical activity), **work conditions** (presence of health risks; noise, temperature, and cleanliness of the environment), and **equipment use** (variety and complexity of technology and equipment used).

Of the items proposed to measure these categories and subcategories, 17% were taken verbatim from existing measures, 33% were adapted from existing measures (Morgeson & Humphrey, 2006), and the remaining half were developed by the authors. Each subcategory generally included four items, except when multiple subdivisions were assumed, as for the subcategory of autonomy. Autonomy included three distinct aspects, with three items for each aspect. Most items were described by affirmative sentences and referred to the work itself, rather than the reactions of the respondents.[3] A small number of items referred to broad aspects of the work environment. All items in the WDQ were grouped into the aforementioned taxonomic categories and subcategories, then answered based on a 5-point scale by 540 people holding 243 different jobs in the USA.

The original study performed a confirmatory factor analysis (CFA) without a previous exploratory factor analysis (EFA), based on the assumption that a theoretical model based on previous empirical findings already existed. Four acceptable solutions were obtained, with 18, 19, 20, and 21 factors (Morgeson & Humphrey, 2006). The solution with 21 factors, which included two factors for interdependence and three for autonomy, was considered the best. The authors reported an average factor reliability of .87, higher than other existing scales. The factor related to the ergonomics subcategory had the lowest reliability (.70) in the WDQ.

In addition to psychometric testing, Morgeson and Humphrey (2006) assessed construct validity and relationships with outcome variables and confirmed relationships that would make theoretical sense among the subcategories. Comparing occupations in their sample, they identified the expected differences in the subcategories. When motivation and job satisfaction, two classic variables of organizational behavior, were used as outcomes, the expected predictions were confirmed. The authors noted the implications of these findings for work design and redesign, and for the construction of a work design theory. As limitations of their study, they noted the excess of managers in the sample (possible bias), the simultaneous collection of data on work design and the two outcomes (possible inflated relationships), and having tested only direct relationships (moderators would also be expected).

Overview of the Present Studies

This article presents evidence on the validity of the WDQ adapted for the Brazilian context, based on the results of two studies. Study 1 performed EFA to assess the latent structure, given that the measures used in the original study remained unpublished in Brazil. This approach differed from that of other WDQ validation studies, including that of Fernández Ríos et al. (2017) for the Spanish version and Stegmann et al. (2010) for the German version, which performed CFA directly. As a consequence of the EFA, some items showed ambiguous loading or results different from those expected in the original model. This suggested the need for adjustments, which were made using the decentering procedure as proposed by Smith, Fischer, Vignoles, and Bond (2013). It aims to create similar or more generic statements understandable outside the original context in which certain terms or items were produced. This approach has been used frequently in adaptations of measures developed in different cultural contexts (e.g., Schwartz, 1992). The wording of items in the adapted model was adjusted so as to be understandable based on the culture and the average education level of the target population.

Study 2 performed CFA with a new sample. The results of the analysis are presented, and the adjustment indicators of the identified structure are discussed. The factors obtained were also related to socio-professional variables.

[3] For this reason, rating instruments in which respondents react to or assess characteristics of their job context (e.g., Ferreira & Mendes, 2008), cannot be considered measures of work design.

Study 1

Method

Participants. The initial sample included 1,017 workers, 93.5% in non-temporary employment, from 19 distinct sectors of the Brazilian economy, as identified by the National Classification of Economic Activities (CNAE). Data were collected using online surveys, which were distributed to participants employed by state- and privately-owned companies or non-governmental organizations (NGOs) and who had worked in their current occupations for at least six months. The sample consisted mainly of workers from the Northeast and Central-West regions of Brazil. Participants were mostly men (55.0%), with an average age of 35.31 years (*SD* = 10.5). The highest number of participants had a high school level of education (39.0%), followed by a graduate level (*stricto sensu* or *lato sensu*; 34.5%), an undergraduate level (26.1%), and an elementary school level of education (0.4%). Most participants performed operational (38.7%) or administrative (32.9%) roles, and 28.4% were managers. Mean job tenure in the organizations was 11.83 years (*SD* = 57.72), and mean total time employed was 15.00 years (*SD* = 10.01), with both ranging from 1 to 50 years.

Instrument. The WDQ was translated into Portuguese by a team of researchers from the Northeast region, based on the original instrument published in English (Morgeson & Humphrey, 2006). The resulting translation was then validated by a team from the Central-West region, who compared the translation with translations to other languages (Bayona, Caballer, & Peiró, 2015; Bertolino, Angel, & Steiner, 2011; Gonçalves, 2015; Stegmann et al., 2010). The original 5-point scale from 1 (*completely disagree*) to 5 (*completely agree*) was retained. The Brazilian Portuguese version of the instrument included two main sections, one including items concerning sociodemographic and occupational information and the other including the items translated and adapted from the original English version of the WDQ.

Results

Initial analyses indicated an excellent fit of the data for detecting a latent structure (KMO = .901), confirmed by Bartlett's test of sphericity ($|^2$ = 44511.559, *df* = 2926, *p* < .000). EFA was conducted using the maximum likelihood extraction method with promax rotation (Finch, 2006), resulting in 18 factors equivalent to the subcategories of Morgeson and Humphrey's (2006) proposed taxonomy. All had eigenvalues greater than 1, explaining 70% of the total variance of the data. The factorial structure is presented in Tables 1-4, corresponding to the four main categories proposed for the work design taxonomy (task characteristics, knowledge characteristics, social characteristics, and work context characteristics). Items with factor loadings of less than 0.40 were eliminated.

In the task characteristics category, the items in the original subcategories of decision-making autonomy and working method autonomy were clustered into a single subcategory (Table 1). All other subcategories emerged as predicted by the original model (Morgeson & Humphrey, 2006).

Table 1
Structure and Factor Loadings of the Task Characteristics Category

Factors and items (items in Brazilian Portuguese were again translated to English below, but they may not entirely correspond to the items in the original English version of the WDQ, since they were culturally decentered)	**Loading**	h^2
Work scheduling autonomy (α = .85)		
1. The job allows me to decide how to schedule my work.	.56	.64
2. The job allows me to decide the order in which tasks are completed.	.66	.71
3. The job allows me to plan how I do my work.	.63	.73
Decision-making/working method autonomy (α = .91)		
4. The job allows me to use my personal initiative or judgment in carrying out my work.	.57	.61
5. The job allows me to make many decisions on my own.	.86	.74
6. The job provides me with significant autonomy in decision-making.	.86	.77
7. The job allows me to decide what methods I use to complete my work.	.74	.71
8. The job allows me considerable independence and freedom in how I do my work.	.79	.75
9. The job allows me to decide independently how to conduct my work.	.79	.69
Task variety (α = .93)		
10. The job involves a wide variety of tasks.	.80	.80
11. The job involves doing a number of different things.	.85	.82
12. The job requires a wide range of tasks.	.89	.82
13. The job involves performing a variety of tasks.	.95	.87
Task significance (α = .83)		
14. The results of my work are likely to significantly affect the lives of other people.	.42	.59
15. The job itself is very significant and important in a broader context.	.45	.65
16. The job has a large impact on people outside the organization.	.95	.83
17. The work performed on the job has a significant impact on people outside the organization.	.94	.81
Task identity (α = .87)		
18. The job involves completing activities with a clear beginning and ending.	.53	.62
19. The job is arranged so that I can perform an entire task from beginning to end.	.74	.74
20. The job allows me to finish tasks I begin.	1.01	.82
21. The job allows me to complete work I start.	.92	.79
Feedback from job (α = .87)		
22. The work activities themselves provide direct and clear information about the effectiveness of my job performance (e.g., quality and quantity).	.53	.69
23. The job itself provides feedback on my performance.	.89	.79
24. The job itself provides me with information on my performance.	.87	.77

Good fits were also recorded in the knowledge characteristics category (Table 2). Three items (25, 33, and 36) with factor loadings below .40 and one item (30) in information processing that was loaded ambiguously on another factor (problem-solving) were eliminated. The results were very consistent with the original knowledge characteristics category and, in general, appeared as proposed in the original model, except for the merging of problem-solving and skill variety into a single subcategory.

Table 2
Structure and Factor Loadings of the Knowledge Characteristics Category

Factors and items (items in Brazilian Portuguese were again translated to English below, but they may not entirely correspond to the items in the original English version of the WDQ, since they were culturally decentered)	**Loading**	h^2
Complexity [a] **(α = .88)**		
25. The job requires that I perform only one task or activity at a time.	-	-
26. The tasks on the job are simple and uncomplicated.	.84	.79
27. The job is comprised of relatively uncomplicated tasks.	.92	.82
28. The job involves performing relatively simple tasks.	.79	.73
Information processing (α = .85)		
29. The job requires me to monitor a large amount of information.	.40	.60
30. The job demands significant mental effort.	.41	.62
31. The job requires me to keep track of more than one thing at a time.	.67	.71
32. The job requires me to analyze a lot of information.	.61	.72
Problem-solving/skill variety (α = .87)		
33. The job involves solving problems with no obvious correct answer.	-	-
34. The job requires me to be creative.	.46	.51
35. The job often involves dealing with problems I have not encountered before.	.47	.57
36. The job requires unique ideas or solutions to problems.	-	-
37. The job requires a variety of skills.	.89	.71
38. The job requires me to use many different skills.	1.00	.74
39. The job requires me to use a number of complex or high-level skills.	.67	.70
40. The job requires the use of many skills.	.92	.71
Specialization (α = .85)		
41. The job is highly specialized in terms of purpose, tasks, or activities.	.53	.73
42. The tools, procedures, materials, and so forth used on the job are highly specialized.	.53	.66
43. The job requires specialized knowledge and skills.	.76	.78
44. The job requires deep knowledge and expertise.	.52	.64

[a] Reverse-scored subcategory.

Table 3 shows the results for the social characteristics category. Item 51 was eliminated because its factor loading was below 0.40. As in the previous categories, the proposed structure for the social characteristics category was close to expectations; however, the original subcategories of initiated and received interdependence were clustered into a single subcategory.

Table 3
Structure and Factor Loadings of the Social Characteristics Category

Factors and items (items in Brazilian Portuguese were again translated to English below, but they may not entirely correspond to the items in the original English version of the WDQ, since they were culturally decentered)	**Loading**	h^2
Social support (α = .82)		
45. I can develop friendships in my job.	.83	.70
46. I can get to know other people in my job.	.78	.72
47. I can meet with others in my work.	.63	.67
48. My supervisor is concerned about the welfare of the people that work for him/her.	.45	.58
49. People I work with take a personal interest in me.	.66	.68
50. People I work with are friendly.	.64	.63
Initiated interdependence/received interdependence (α = .82)		
51. The job requires me to accomplish my work before others complete theirs.	-	-
52. Other jobs depend directly on mine.	.57	.69
53. Unless my job gets done, other jobs cannot be completed.	.67	.70
54. Completion of the job's activities is greatly affected by the work of other people.	.76	.67
55. The job's completion depends on the work of many different people.	.75	.75
56. My job cannot be done unless others do their work.	.77	.69
Interaction outside the organization (α = .87)		
57. The job requires spending a lot of time with people outside my organization.	.61	.62
58. The job involves interacting with people who are outside my organization.	.76	.74
59. On the job, I frequently communicate with people outside my organization.	.88	.78
60. The job involves a great deal of interaction with people outside my organization.	.92	.83
Feedback from others (α = .89)		
61. I receive a lot of information about my job performance from my manager and coworkers.	.71	.75
62. Other people in the organization, such as managers and coworkers, provide information on the effectiveness of my job performance (e.g., quality and quantity).	.87	.81
63. I receive feedback on my performance from other people in my organization (e.g., my manager or coworkers).	.87	.81

Table 4 shows the results for the final category, work context characteristics. Most items were clustered in the subcategories corresponding to the original model. However, item 66, originally allocated to the work conditions subcategory, migrated to the ergonomics subcategory and was ultimately eliminated. Item 71 was eliminated because its factor loading was below .40.

Table 4
Structure and Factor Loadings of the Work Context Characteristics Category

Factors and items (items in Brazilian Portuguese were again translated to English below, but they may not entirely correspond to the items in the original English version of the WDQ, since they were culturally decentered)	**Loading**	h^2
Ergonomics (α = .82)		
64. The seating arrangements at the workplace are adequate (e.g., comfort and availability of chairs, good postural support).	.78	.71
65. The workplace accommodates people of all sizes (e.g., free space, eye level, leg room, etc.).	.92	.76
66. The job involves excessive reaching. [a]	-	-
Physical demands (α = .94)		
67. The job requires great muscular endurance.	.93	.88
68. The job requires great muscular strength.	.95	.88
69. The job requires great physical effort.	.89	.84
Work conditions (α = .77)		
70. The workplace is free from excessive noise.	.47	.53
71. The climate at the workplace is comfortable in terms of temperature and humidity.	-	-
72. The job has a low risk of accident.	.78	.69
73. The job is performed in an environment free from health hazards (e.g., chemicals, fumes, etc.).	.85	.74
74. The job is performed in a clean environment.	.59	.62
Equipment use (α = .70)		
75. The job involves using several different types of equipment.	.63	.69
76. The job involves using complex equipment or technology.	.93	.78
77. Significant time was required to learn how to operate the equipment used on the job.	.56	.62

[a] Reverse scored.

Discussion

The Brazilian Portuguese version of the WDQ showed good psychometric properties generally consistent with those described by Morgeson and Humphrey (2006). Despite the large number of items and factors, the EFA resulted in an 18-factor structure very similar to one of the four structures proposed by the original authors. Discrepancies may be explained by cultural (Nicholson, 2010; Schwartz, 1992), occupational, or organizational differences (Morgeson et al., 2010), or by problems in the translation or wording of items, which justifies performing an EFA. Despite discrepancies, the results supported the robustness of the taxonomic model on which the original version of the WDQ was based.

Questions regarding the best subcategory structure for the different aspects of autonomy were raised by Morgeson and Humphrey (2006). In the present Study 1, the subcategory of work scheduling autonomy, which expresses the worker's level of control over the time and planning of work, remained separate from the subcategory of decision-making and working method autonomy. Because the original idea behind the subcategory was related to scheduling, it was labeled "work planning autonomy" in the adapted version.

The clustering of items in the original decision-making and working method subcategories might be explained by the small differentiation among them. In this subcategory cluster, the aspects of decision-making and execution of work tasks prevail, distinguishing it from "planning"; the subcategory was thus labeled "decision and execution autonomy" in the adapted version.

The knowledge characteristics subcategories clustered as expected, except for problem-solving and skill variety, which did not separate. This merging may have occurred because problem-solving requires a variety of different skills, as proposed in the intellectual skill hierarchy of Gagné (1977). Taking this theoretical-conceptual proposal into account, the subcategory that resulted from the merging of problem-solving and skill variety was labeled "problem-solving" in the adapted version.

In the social characteristics category, the clustering of items in the two original subcategories of initiated and received interdependence suggested the inseparability of causing and deriving interdependence in the work environment. Thus, the merged subcategory was labeled simply "interdependence" in the adapted version.

In the work context characteristics category, the third item in the original ergonomics subcategory was loaded in the physical demands subcategory. This item was reverse-scored relative to the items in the original subcategory, but not to the items in the physical demands subcategory. the difficulty and fragility of the ergonomics subcategory was recognized by Morgeson and Humphrey (2006). The ergonomics items obtained through EFA refer to "comfort" and they are very narrow in scope (if compared to the French literature on ergonomics, for instance). Ultimately, the third item in the ergonomics subcategory was eliminated to keep the structure of the measure as close to the original as possible, leaving only two items, as in the French version of the WDQ (Bigot et al., 2014). The resulting subcategory was labeled "comfort at work." The original items in the work conditions subcategory were preserved with the exception of item 71, which was eliminated (as in the French version) owing to a low factor loading value. This may have been affected by the specificities of the workplaces in the sample. Given the climatic characteristics of the regions where data were collected, there was little external or internal variability in temperature and humidity.

Other items and factors related to the taxonomy subcategories behaved similarly to the original model. Excellent factor loadings were observed, although two had lower alphas. Given the inconsistent results for some of the items and the dissimilarity of clustering of some factors compared to the original model, a second study was necessary. The decentering process was conducted by researchers from a university in the Southeast region of Brazil. Because the previous translation and revision of items was completed in the Northeast and Central-West regions, respectively, the researchers in the Southeast region sought to adapt the wording to cultural elements that favored understanding by a wider audience.

Study 2

Method

Participants. Between 2017 and 2018, over 7,000 workers from four of Brazil's five regions answered the questionnaire. Data from the North region, which has a much lower population than the other regions, could not be collected. Filters were applied to reduce bias and balance the demographic and occupational characteristics of the sample. As a result, 1,224 cases were obtained in 191 different jobs, the majority of whom were civil service employees (64.8%), followed by private-sector employees (25.9%) and managers (12.3%). Most participants were women (58.0%) with an average age of 39.95 years (*SD* = 30.18). The largest number of participants had an undergraduate level of education (44.9%), followed by a graduate level (*stricto sensu* or *lato sensu*; 39.5%), a high school level (15.3%), and an elementary level of education (0.2%). Job tenure and total time employed ranged from 1 to 50 years, with respective averages of 11.83 years (*SD* = 57.72) and 15.00 years (*SD* = 10.01).

Data analysis procedures. Study 2 performed CFA testing 4-, 18- and 21-factor models. The first test assessed the fit of each of the four major categories. The second (18-factor model) was identified as the most promising model in Study 1. The final model tested (21-factor model) was identified as the best in the original WDQ study and was adopted as a reference in adaptations made in other countries (Bayona et al., 2015; Bigot et al., 2014; Fernández Rios et al., 2017; Stegmann et al., 2010). All items of each major category were included in the 4-factor test, following Fernández Rios et al. (2017). The 18-factor test used the same structure as Study 1, with only 71 items; the 21-factor test considered all items of the original instrument. The results were compared with the models obtained in the original study and in the German, Spanish, and French adaptation studies. Using socio-professional variables, ANOVAs and post hoc analyses were conducted and Pearson correlations and alpha and omega reliabilities were calculated (McNeish, 2018).

Results

Adjustments for the 4-, 18-, and 21-factor models and for the categories are presented in Table 5. The 21- and 18-factor models showed no differences in fit indexes (CFI = 0.90 and TLI = 0.89 for both) or residuals (SRMR = 0.05 and RMSEA = 0.04 for both). Thus, considering the EFA results obtained in Study 1 and the good adjustment indicators observed in the large categories that encompass the 18- factor model confirmed in Study 2's CFA, this more parsimonious model was selected.

Table 5
CFA Results for Adaptation of the WDQ to Brazilian Portuguese

Model	x^2	*df*	x^2/*df* ratio	SRMR	RMSEA	CFI	TLI
4-factor model	30785	2768	11.12	.12	.09	.46	.45
18-factor model	7193	2261	3.18	.05	.04	.90	.89
21-factor model	7791	2564	3.04	.05	.04	.90	.89
Task characteristics (6 factors)	1516	237	6.39	.06	.06	.93	.91
Knowledge characteristics (4 factors)	726	113	6.42	.05	.06	.95	.94
Social characteristics (4 factors)	1370	129	10.62	.06	.09	.88	.86
Work context characteristics (4 factors)	434	59	7.35	.07	.07	.94	.92

Notes. N = 1,224; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index.

The analysis per subcategory was well adjusted in most parameters, except for the chi-square by degrees of freedom ratio. In general, the items comprising the subcategories consistently saturated and displayed good loadings for the factor expected, with the items of the work context characteristics category having the smallest factor loadings on average. The internal consistency indicators were adequate, ranging from .70 to .94. As shown in Table 6, comparison of the fit indexes obtained in this study (18- and 21-factor models) to those obtained in other contexts corroborates the conclusion that the 18-factor model is better adjusted for the Brazilian context, as it presents slightly better fit indexes than those found in other countries adopting the 21-factor model as standard.

The 18-factor model guided the estimation of the fit indexes, considering the four taxonomic categories proposed by Morgeson and Humphrey (2006), as well as the fit for the subcategories. Additionally, five subcategories were partially or entirely renamed, as discussed in Study 1: "work planning autonomy," "decision and execution autonomy," "problem-solving," "interdependence," and "comfort at work."

The final subcategory structure was compared with education level and management position to test if the model distinguishes different occupational groups. The results are presented in Table 7.

No significant differences ($p < .01$) between at least two of the three education levels were found for the subcategories of feedback from job, feedback from others, social support, interaction outside the organization, comfort at work, and equipment use. No significant differences between managers and non-managers were found for the subcategories of task significance, task identity, feedback from job, comfort at work, work conditions, and equipment use. Significant differences in the mean were found among the three education groups ($p < .01$), increasing with education level, for three of the four subcategories of knowledge characteristics (job complexity, problem-solving, and specialization). Significant differences between managers and non-managers were frequent among the subcategories of social characteristics and knowledge characteristics, suggesting that the model was able to distinguish between the two occupational groups.

Table 8 shows the relationships between the work design subcategories. Many significant correlations ($p < .01$) with medium effect sizes ($r > .30$; Field, 2013) were identified among subcategories. Few correlations with age, total time employed, and job tenure were significant, with low effect sizes ($r < .10$). Only the interdependence subcategory lacked correlation with other subcategories.

Discussion

The 18-factor model identified in Study 1 demonstrated adequate fit for the sample in Study 2, which included fewer managers and was more representative of the Brazilian regions, reducing potential biases in the sample from Study 1 due to composition. However, although Study 2's sample resolved some issues identified in Study 1, some potential limitations remained. For instance, compared to the sample in the original WDQ study, Study 2's sample included higher-educated employees, and fewer occupations in the public sector. This may have reduced the variability of the work design subcategories and affected the fit of the model.

The fit indexes of the four main categories suggested similar subcategories. Two significant correlations ($p < .01$) and medium effect ($r > .30$) patterns were observed among the subcategories. Task characteristics subcategories were associated with each other and with knowledge and social characteristics subcategories. Knowledge characteristics subcategories were associated only with each other and with task characteristics subcategories. Social characteristics subcategories were associated less with each other and more with task characteristics subcategories. Finally, working context characteristics subcategories were the least associated with the other three categories ($p < .01$, $r > .30$). These correlation patterns could assist in selecting work design subcategories for inclusion as predictors of human behavior variables at work (e.g., performance, stress, corruption, engagement, citizenship), as argued by Johns (2010) and Parker (2014). This choice would obviously need to consider the specific theoretical frameworks of each construct. Due to the characteristics demonstrated, including two highly correlated work design subcategories in prediction models might be inadvisable.

The work design subcategories showed no relevant correlations ($p < .01$, $r > .30$) with job tenure, total employment time, or age, failing to confirm the assumption regarding differences among generational cohorts related to work characteristics (Hernaus & Vokic, 2014). However, two other socio-professional variables showed substantial differentiation: education level and management or non-management position. Compared to participants with an undergraduate or graduate education, participants with a high school education had the lower means for work planning autonomy, decision and execution autonomy, information processing,

Table 6
Comparison of Fit Indexes for WDQ from Different Countries

Models	χ^2/*df* ratio						SRMR						RMSEA						CFI				
	BRA	GER	SPN1	SPN2	USA	FR	BRA	GER	SPN1	SPN2	USA	BRA	GER	SPN1	SPN2	USA	FR	BRA	GER	SPN1	SPN2	USA	FR
4-factor	11.12	5.08	8.33	7.58	6.70	3.90	.12	.13	.16	.12	.12	.09	.10	.08	.09	.12	.10	.46	.49	.52	.49	.40	.50
18-factor	3.18	2.43	4.23	2.59	2.12	1.74	.05	.07	.15	.06	.06	.04	.06	.06	.04	.05	.05	.90	.83	.79	.88	.89	.88
21-factor	3.04	2.00	3.98	2.40	1.92	1.69	.05	.06	.15	.06	.06	.04	.05	.05	.04	.04	.05	.90	.89	.81	.90	.91	.89

Notes. BRA = Brazilian sample; GER = German sample; SPN1 = Fernández Rios Spanish sample; SPN2 = Bayona Spanish sample; USA = United States sample; FR = French sample, Study 2; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CFI = comparative fit index.

Table 7
Comparison of ANOVA and Post-hoc Tukey Test Results among Work Design Subcategories, Considering Education Level and Management Position

		Education level			Management position	
Subcategories	***N* = 1,224**	**High school (*n* = 187)**	**Undergraduate (*n* = 550)**	**Graduate (*n* = 483)**	**Yes (*n* = 150)**	**No (n = 499)**
Work planning autonomy	3.43 (1.01)	3.04+ (1.13)	3.42 (1.02)	3.59 (.92)	3.59* (.83)	3.22 (1.00)
Decision and execution autonomy	3.28 (.98)	2.88+ (.97)	3.28 (1.00)	3.44 (.91)	3.54* (.80)	3.06 (.95)
Task variety	4.09 (.90)	3.85+ (1.02)	4.07 (.93)	4.21 (.80)	4.28* (.64)	4.01 (.87)
Task significance	3.98 (.88)	3.69+ (.90)	3.96 (.93)	4.11 (.77)	4.05 (.80)	3.89 (.85)
Task identity	3.72 (.91)	3.77 (.87)	3.79* (.91)	3.62* (.91)	3.58 (.90)	3.60 (.90)
Feedback from job	3.44 (1.09)	3.44 (1.15)	3.51 (1.09)	3.37 (1.06)	3.37 (1.08)	3.37 (1.12)
Job complexity	3.55 (1.07)	3.10+ (1.21)	3.49+ (1.06)	3.79+ (.96)	3.70* (.99)	3.43 (1.07)
Information processing	4.13 (.79)	3.81+ (.99)	4.14 (.77)	4.26 (.68)	4.32* (.59)	4.00 (.80)
Problem-solving	3.88 (.84)	3.48+ (.96)	3.87+ (.84)	4.06+ (.73)	4.14* (.63)	3.75 (.80)
Specialization	3.47 (.99)	3.07+ (1.05)	3.41+ (.98)	3.69+ (.91)	3.64* (.90)	3.35 (.98)
Social support	4.04 (.68)	4.03 (.65)	4.04 (.73)	4.05 (.64)	4.15* (.58)	3.97 (.64)
Interdependence	3.04 (.99)	2.85 (.98)	2.99* (1.05)	3.16* (.90)	3.27* (.89)	2.98 (.91)
Interaction outside the organization	3.23 (1.11)	3.25+ (1.14)	3.14+ (1.14)	3.32+ (1.07)	3.53* (0.94)	3.22 (1.06)
Feedback from others	2.98 (1.08)	3.18+ (1.11)	2.94+ (1.10)	2.94+ (1.03)	3.30* (0.93)	3.00 (1.05)
Comfort at work	3.05 (1.20)	3.06 (1.17)	3.01 (1.25)	3.11 (1.15)	3.11 (1.11)	3.11 (1.17)
Physical demands	2.21 (1.17)	2.50 (1.30)	2.30 (1.23)	1.99+ (.98)	1.92* (0.98)	2.30 (1.15)
Work conditions	3.40 (.95)	3.40 (.86)	3.26* (.99)	3.55* (.91)	3.56 (.86)	3.35 (.95)
Equipment use	2.60 (.99)	2.50+ (.97)	2.55+ (.96)	2.68+ (1.03)	2.64 (.99)	2.55 (.95)

Notes. *$p < .01$; + distribution difference between the two groups $p < .01$.

problem-solving, and task significance. These findings suggest that different levels of job responsibility are attributed to employees with different levels of education. Graduates showed the lowest means in physical demand and task identity, and the highest means in interdependence, suggesting that a graduate education can lead a person to occupy central nodes in work networks and undertake more knowledge-intensive tasks. Participants with higher levels of education had higher means in the all subcategories of knowledge characteristics except for information processing. This set of findings revealed a clear association between education level, knowledge, and its use.

Managers experienced less physical demand, more autonomy, and greater task variety. Their work proved more complex and specialized and demanded higher levels of information processing and problem-solving. They reported interacting with people more, experiencing more interdependence, and receiving more support and feedback from others. This set of findings was also not surprising. Indirectly, it might illustrate the competencies included as goals of management training programs. The prediction and identification of relationships in Study 2 between the work design subcategories and education level and management responsibility were the same as those expected and reported by Morgeson and Humphrey (2006). Study 2's findings thus reinforced the evidence that the model can distinguish between occupation types, albeit with fewer evidence than presented by the original authors of the English version of the WDQ.

Discussion

The goal of the two present studies was to validate the WDQ and propose a version for use in Brazil. Study 1 translated the instrument into Brazilian Portuguese and conducted EFA using data from two regions of the country. Study 2 advanced this research by decentering the items, including data from more regions, and confirming the fit of the proposed model using CFA. Three subcategories from the original WDQ were merged in the proposed model: decision-making autonomy with working methods autonomy; skill variety with problem-solving; and initiated interdependence with received interdependence. These merged clusters might be explained by specificities in the form of organization and conception of work typical of a national culture (Erez, 2010).

The merging of the two autonomy subcategories and of the skill variety and problem-solving subcategories might also be explained by power distance, which has already been reported by cross-cultural reviews of work design practices (Tannenbaum, 1980). This inequality is also reflected in labor relations. Those who perform intellectual work ("white-collar workers") decide what will be done and how. This interpretation is empirically supported by Study 2, as both clustered subcategories showed higher means for those in managerial positions and were correlated ($r = .35$, $p < .01$).

The merging of the initiated and received interdependence subcategories might be explained by a more collectivist character of Brazilian society (Torelli & Shavitt, 2010; Torres & Pérez-Nebra,

Table 8
Pearson Correlation among Work Design Subcategories

Subcategories	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Work planning autonomy	1																
2 Decision and execution autonomy	.66*	1															
3 Task variety	.18*	.29*	1														
4 Task significance	.16*	.22*	.36*	1													
5 Task identity	.32*	.31*	.11*	.20*	1												
6 Feedback from job	.29*	.33*	.18*	.23*	.49*	1											
7 Job complexity	-.03	.03	.26*	.17*	-.16*	-.16*	1										
8 Information processing	.20*	.25*	.58*	.46*	.12*	.20*	.36*	1									
9 Problem-solving	.21*	.35*	.57*	.46*	.09*	.16*	.38*	.68*	1								
10 Specialization	.24*	.34*	.37*	.44*	.19*	.24*	.28*	.51*	.63*	1							
11 Social support	.31*	.32*	.23*	.25*	.34*	.34*	-.07	.23*	.22*	.21*	1						
12 Interdependence	.01	.00	.17*	.20*	-.02	.06	.12*	.29*	.17*	.20*	.09*	1					
13 Interaction outside organization	.04	.13*	.25*	.31*	.01	.09*	.03	.21*	.23*	.19*	.17*	.21*	1				
14 Feedback from others	.18*	.27*	.14*	.20*	.28*	.46*	-.10*	.17*	.21*	.28*	.39*	.14*	.22*	1			
15 Comfort at work	.21*	.18*	.10*	.04	.20*	.14*	-.09*	.06	.04	.10*	.17*	.05	.09*	.18*	1		
16 Physical demands	-.12*	-.07	.03	.06	-.02	.10*	-.15*	.01	.08*	.06	-.04	.03	.09*	.08*	-.15*	1	
17 Work conditions	.23*	.16*	.04	.02	.14*	.11*	-.06*	.06	-.01	.05	.18*	.03	.07*	.09*	.42*	-.31*	1
18 Equipment use	.11*	.16*	.24*	.18*	.04	.11*	.12*	.24*	.33*	.45*	.08*	.21*	.16*	.17*	.05	.22*	-.13*

**Correlation* significant at .01 (two-tailed).

2015). Strong interdependence is expected in such a context, unlike in individualistic cultures such as the USA, in which the original study was conducted, where people have fewer social interactions in the workplace (Erez, 2010) and typology can be more well-defined. The merging might also stem from the prevalence of service sector occupations in the Study 2 sample.

Despite the breadth and quality of the data, the present studies have some limitations that must be considered. First, the samples did not include some important industries, particularly those associated with the primary and secondary sectors, notwithstanding the growing importance of the services sector. Similarly, the prevalence of the public sector was very large. Additionally, considering the continental size of Brazil, it is imperative to expand the scope and application of the instrument to the Central-West and North regions of the country, which were not proportionally represented in the present studies' samples.

The Brazilian Portuguese version of the WDQ, now made available, can be used for intervention and research. In the former case, it can be employed for diagnostic purposes, with the aim of promoting changes in work design. In this case, it would best be used with all its items. This would enable a comprehensive and complete survey before the implementation of any intervention, including an analysis of the relationships among categories and subcategories of work design and their relationship with individual and organizational performance indicators. For research purposes, certain subcategories can be selected for inclusion in predictive models of human behavior at work and its relationship to the behaviors and results desired by organizations. For example, tests could investigate the relationship between a change in the nature, quantity, or organizational form of tasks and responsibilities and the desired organizational results, whether in terms of performance and productivity or in terms of impact on employees' quality of life and well-being. The categories or subcategories of knowledge or social characteristics might be hypothesized as predictors of learning and creativity; the categories or subcategories of task or work context characteristics as predictors of well-being variables; or the categories or subcategories of task and social characteristics as predictors of affective commitment, motivation, or satisfaction. Given the scarcity of Brazilian studies on this topic, the dimensions and subcategories that most impact these results, and their influence on the work of organizations and the formulation of public policy, must be identified. The evidence of validity presented by Studies 1 and 2 offers a wide range of practical or research applications previously unfeasible owing to lack of adequate work design measures. Reminding Batatinha, the typesetter and samba composer, to the inventor of work, may there be less blame… *that his invention causes such terror* (lyrics translated from the original soundtrack in Brazilian Portuguese: … *por seu invento causar pavor*).

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Appendix

CFA Standardized *Factor Loadings for Items in the Final Version of the Brazilian Portuguese WDQ and Reliability Indexes (71 items, alphas and omegas in parentheses)*

Factor/item (italics refer to factors and items in Brazilian Portuguese; they were again translated to English below, but they may not entirely correspond to the items in the original English version of the WDQ, since they were culturally decentered)	**Loading**	**Error**	***Z***
Task characteristics ***Características da Tarefa***			
Work planning autonomy (α = .79, ϖ = .79) *Autonomia na planificação do trabalho*			
The job allows me to decide how to schedule my work. *O meu trabalho possibilita que eu decida sobre quando fazer minhas atividades.*	.74	.02	44.90
The job allows me to decide the order in which tasks are completed. *O meu trabalho possibilita que eu decida a ordem em que as coisas são feitas.*	.80	.02	54.00
The job allows me to plan how I do my work. *O meu trabalho possibilita que eu planeje como fazer minhas atividades.*	.71	.02	40.87
Decision and execution autonomy (α = .90, ϖ = .90) *Autonomia de decisão e realização*			
The job allows me to use my personal initiative or judgment in carrying out my work. *O meu trabalho me dá a oportunidade de usar minha iniciativa pessoal ou julgamento na sua realização*	.73	.02	48.22
The job allows me to make many decisions on my own. *O meu trabalho me permite tomar muitas decisões por conta própria.*	.76	.01	56.27
The job provides me with significant autonomy in decision-making. *O meu trabalho me proporciona autonomia para tomar decisões.*	.79	.01	63.06
The job allows me to decide what methods I use to complete my work. *O meu trabalho me permite tomar decisões sobre os métodos que uso para realizá-lo.*	.80	.01	67.64
The job allows me considerable independence and freedom in how I do my work. *O meu trabalho me dá independência e liberdade de escolher como realizá-lo.*	.81	.01	70.53
The job allows me to decide independently how to conduct my work. *O meu trabalho me dá autonomia para decidir por conta própria como executá-lo.*	.77	.01	58.05
Task variety (α = .92, ϖ = .92) *Variedade de tarefas*			
The job involves a wide variety of tasks. *O meu trabalho envolve uma grande variedade de tarefas.*	.84	.01	86.92
The job involves doing a number of different things. *O meu trabalho consiste em fazer muitas coisas diferentes.*	.84	.01	84.76
The job requires a wide range of tasks. *O meu trabalho exige a realização de um amplo conjunto de tarefas.*	.89	.01	118.22
The job involves performing a variety of tasks. *O meu trabalho envolve a realização de uma variedade de tarefas.*	.89	.01	116.45
Task significance (α = .84, ϖ = .84) *Significado da tarefa*			
The results of my work are likely to significantly affect the lives of other people. É provável que os resultados do meu trabalho afetem de forma significativa a vida de outras pessoas.	.57	.02	27.57
The job itself is very significant and important in a broader context. *O meu trabalho em si é muito significativo e importante em um contexto mais amplo.*	.57	.02	27.85
The job has a large impact on people outside the organization. *O meu trabalho tem um grande impacto sobre as pessoas de fora da organização.*	.92	.01	106.92
The work performed on the job has a significant impact on people outside the organization. *O meu trabalho tem um impacto significativo sobre as pessoas de fora da organização.*	.91	.01	105.68
Task identity (α = .83, ϖ = .84) *Identificação da tarefa*			

The job involves completing activities with a clear beginning and ending. *O meu trabalho envolve completar uma parte da tarefa que tem começo e fim claros.*	.41	.03	16.54
The job is arranged so that I can perform an entire task from beginning to end. *O meu trabalho está organizado de forma que eu possa realizar atividades completas do início ao fim.*	.73	.02	49.56
The job allows me to finish tasks I begin. *O meu trabalho me dá a possibilidade de terminar completamente as atividades que comecei.*	.92	.01	110.17
The job allows me to complete work I start. *O meu trabalho me possibilita concluir o que comecei.*	.90	.01	100.34
Feedback from job (α = .89, ϖ = .90) *Feedback do trabalho*			
The work activities themselves provide direct and clear information about the effectiveness of my job performance (e.g., quality and quantity). *As atividades do meu trabalho fornecem, por si só, informações diretas e claras sobre a efetividade (por exemplo, qualidade e quantidade) do meu desempenho.*	.80	.01	63.97
The job itself provides feedback on my performance. *O meu trabalho, por si só, fornece feedback sobre o meu desempenho.*	.90	.01	101.09
The job itself provides me with information about my performance. *O meu trabalho, por si só, me fornece informação sobre meu desempenho.*	.88	.01	95.23
Knowledge characteristics ***Características do Conhecimento***			
Complexity (α = .86, ϖ = .86)[3] *Complexidade do trabalho*			
The tasks on the job are simple and uncomplicated. *As tarefas do meu trabalho são simples e descomplicadas.*	.83	.01	67.35
The job is comprised of relatively uncomplicated tasks. *O meu trabalho abrange tarefas relativamente descomplicadas.*	.83	.01	66.59
The job involves performing relatively simple tasks. *O meu trabalho abrange tarefas relativamente simples.*	.81	.01	61.02
Information processing (α = .83, ϖ = .84) *Processamento de informação*			
The job requires me to monitor a large amount of information. *O meu trabalho exige que eu monitore uma grande quantidade de informações.*	.76	.01	52.47
The job demands significant mental effort. *O meu trabalho exige que eu pense muito.*	.80	.01	54.27
The job requires me to keep track of more than one thing at a time. *O meu trabalho exige que eu esteja atento a mais de uma tarefa ao mesmo tempo.*	.61	.02	30.89
The job requires me to analyze a lot of information. *O meu trabalho exige que eu analise muitas informações.*	.82	.01	68.32
Problem-solving (α = .80, ϖ = .89) *Solução de problemas*			
The job requires me to be creative. *O meu trabalho exige que eu seja criativo.*	.62	.02	33.25
The job often involves dealing with problems I have not encountered before. *O meu trabalho faz com que eu tenha que lidar, muitas vezes, com problemas que eu nunca tinha visto antes.*	.53	.02	24.01
The job requires a variety of skills. *O meu trabalho exige uma variedade de habilidades.*	.86	.01	92.91
The job requires me to utilize many different skills. *O meu trabalho exige que eu utilize várias habilidades diferentes para a sua realização.*	.86	.01	97.75
The job requires me to use a number of complex or high-level skills. *O meu trabalho exige que eu utilize várias habilidades complexas ou de alto nível.*	.78	.01	62.59
The job requires the use of many skills. *O meu trabalho exige o uso de uma variedade de habilidades.*	.84	.01	85.24
Specialization (α = .86, ϖ = .87) *Especialização*			
The job is highly specialized in terms of purpose, tasks, or activities. *O meu trabalho é altamente especializado em relação ao seu propósito, tarefas ou atividades.*	.78	.01	59.43
The tools, procedures, materials, and so forth used on the job are highly specialized. *As ferramentas, procedimentos, materiais, etc. utilizados no meu trabalho são altamente especializados.*	.63	.02	33.29
The job requires specialized knowledge and skills. *O meu trabalho exige conhecimentos e habilidades muito especializados.*	.89	.01	101.38
The job requires deep knowledge and expertise. *O meu trabalho exige conhecimento profundo e experiência.*	.84	.01	77.31
Social characteristics ***Características Sociais***			
Social support (α = .83, ϖ = .83) *Suporte social*			
I can develop friendships in my job. *Eu tenho oportunidade de construir amizades em meu trabalho.*	.79	.01	55.84
I can get to know other people in my job. *Eu tenho a possibilidade de conhecer outras pessoas em meu trabalho.*	.77	.02	52.49
I can meet with others in my work. *Eu tenho a oportunidade de encontrar com outras pessoas em meu trabalho.*	.74	.02	46.51
My supervisor is concerned about the welfare of the people that work for him/her. *Meu (minha) superior (a) imediato (a) se preocupa com o bem-estar das pessoas que trabalham com ele(a).*	.46	.03	18.72
People I work with take a personal interest in me. *Os meus colegas de trabalho se preocupam comigo.*	.61	.02	29.76
People I work with are friendly. *Os meus colegas de trabalho são amigáveis.*	.61	.02	30.14
Interdependence (α = .83, ϖ = .83) *Interdependência*			
Other jobs depend directly on mine. *O trabalho dos meus colegas depende diretamente do meu.*	.68	.02	35.95
Unless my job gets done, other jobs cannot be completed. *Se o meu trabalho não for feito, outros trabalhos não poderão ser concluídos.*	.70	.02	38.20
Completion of the job's activities is greatly affected by the work of other people. *As minhas atividades são muito afetadas pelo trabalho dos meus colegas.*	.72	.02	42.05
The job's completion depends on the work of many different people. *A conclusão do meu trabalho depende do trabalho de muitas pessoas diferentes.*	.74	.02	43.81

[3] Reverse-scored subcategory

My job cannot be done unless others do their work. *O meu trabalho não pode ser feito a menos que outras pessoas façam o seu.*	.70	.02	39.25
Interaction outside the organization (α = .87, ϖ = .87) *Interação fora da organização*			
The job requires spending a lot of time with people outside my organization. *O meu trabalho exige que eu dedique muito tempo a pessoas de fora da organização.*	.59	.02	29.16
The job involves interacting with people who are outside my organization. *No meu trabalho tenho interação com pessoas que não são membros da organização onde trabalho.*	.82	.01	70.45
On the job, I frequently communicate with people outside my organization. *No meu trabalho, frequentemente me comunico com pessoas que não trabalham para a mesma organização que eu.*	.87	.01	87.95
The job involves a great deal of interaction with people outside my organization. *O meu trabalho inclui um grande número de interações com pessoas de fora da minha organização.*	.88	.01	92.60
Feedback from others (α = .87, ϖ = .88) *Feedback dos outros*			
I receive a lot of information about my job performance from my manager and coworkers. *Eu recebo muitas informações do meu chefe imediato e dos meus colegas sobre o meu desempenho no trabalho.*	.77	.01	53.93
Other people in the organization, such as managers and coworkers, provide information about the effectiveness of my job performance (e.g., quality and quantity). *Outras pessoas da organização, como superiores e colegas, me fornecem informações sobre a efetividade (por exemplo, qualidade e quantidade) do meu trabalho.*	.88	.01	83.45
I receive feedback on my performance from other people in my organization (e.g., my manager or coworkers). *Eu recebo feedback de outras pessoas sobre meu desempenho (como meus superiores ou colegas).*	.86	.01	76.57
Work context ***Contexto de Trabalho***			
Comfort at work (α = .73, ϖ = .73) *Conforto no trabalho*			
The seating arrangements at the workplace are adequate (e.g., comfort and availability of chairs, good postural support). *As cadeiras no meu trabalho são adequadas (por exemplo, conforto, quantidade e suporte postural).*	.80	.03	31.57
The workplace accommodates people of all sizes (free space, eye level, leg room, etc.). *O meu local de trabalho acomoda pessoas de qualquer tamanho (espaço livre, altura dos olhos, espaço para pernas etc.).*	.71	.03	28.50
Physical demands (α = 0.94, ϖ = 0.94) *Demandas físicas*			
The job involves excessive reaching. *Preciso me esticar excessivamente para alcançar objetos necessários para o meu trabalho.*	.93	.01	164.41
The job requires great muscular endurance. *O meu trabalho exige uma grande resistência muscular.*	.93	.01	165.16
The job requires great muscular strength. *O meu trabalho exige uma grande força muscular.*	.90	.01	130.52
Work conditions (α = 0.70, ϖ = 0.71) *Condições de trabalho*			
The workplace is free from excessive noise. *O meu local de trabalho é livre de ruído excessivo.*	.48	.03	17.89
The job has a low risk of accident. *O meu trabalho tem um baixo risco de acidente.*	.65	.02	29.25
The job is performed in an environment free from health hazards (e.g., chemicals, fumes, etc.). *O meu trabalho ocorre em um ambiente livre de riscos para a saúde (por exemplo, produtos químicos, gases etc.).*	.73	.02	35.65
The job is performed in a clean environment. *O meu ambiente de trabalho é limpo.*	.60	.02	25.64
Equipment use (α = 0.70, ϖ = 0.71) *Uso de equipamentos*			
The job involves using several different types of equipment. *O meu trabalho inclui a utilização de vários equipamentos diferentes.*	.65	.02	28.48
The job involves using complex equipment or technology. *O meu trabalho inclui o uso de equipamentos ou tecnologias complexas.*	.78	.02	37.20
Significant time was required to learn how to operate the equipment used on the job. *Foi necessário muito tempo para aprender a utilizar os equipamentos no meu trabalho.*	.58	.02	24.08

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