



Empirical evidence for the Validity of the Job Crafting Scale (JCS) in a Portuguese setting

Journal:	<i>Management Research, The Journal of the Iberoamerican Academy of Management</i>
Manuscript ID	MRJIAM-11-2023-1484.R2
Manuscript Type:	Research Paper
Keywords:	Job crafting, Validity, Proactivity, Reliability, Employees

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Manuscripts

Viseu, J., Santos, J., Semedo, C., Bakker, A., Tims, M., Agrela, S., & Lagareiro, B. (2024). Empirical evidence for the validity of the Job Crafting Scale (JCS) in a Portuguese setting. *Management Research*. Advance online publication. <https://doi.org/10.1027/1618-3169/a000440>

Table 1.

Descriptive Statistics of the Items of the JCS (N=315)

Item	<i>M</i>	<i>SD</i>	<i>Mdn</i>	α	Factor				Variance explained
					1	2	3	4	
<i>Increasing structural job resources</i>									25.08%
1	4.73	.55	5	.865	.89				
2	4.71	.57	5		.91				
3	4.72	.55	5		.84				
4	4.51	.64	5		.53				
<i>Decreasing hindering job demands</i>									14.54%
6	2.93	1.22	3	.838		.66			
7	3.16	1.10	3		.64				
8	3.14	1.24	3		.73				
9	3.27	1.23	3		.65				
10	2.91	1.20	3		.73				
11	2.87	1.19	3		.69				
<i>Increasing social job resources</i>									8.06%
12	2.89	1.19	3	.795			.73		
13	2.30	1.23	2		.76				
14	2.66	1.34	3		.78				
15	3.23	1.15	3		.52				
16	3.96	.90	4		.45				
<i>Increasing challenging job demands</i>									4.61%
17	3.82	.95	4	.868			.81		
18	3.98	.93	4		.78				
19	3.69	1.06	4		.74				
20	4.00	1.04	4		.65				
21	3.88	.95	4		.74				
									52.69%

Table 2.

Fit Indices for the Factor Solutions

Factor solution	χ^2	df	GFI	RMSEA	RMSEA 90%CI	SRMR	CFI	TLI	χ^2/df
Second-order model	400.231***	131	.884	.079	[.070-.088]	.155	.867	.845	3.055
Four-correlated factors model	259.806***	125	.922	.057	[.047-.067]	.064	.933	.918	2.078

Notes: ***Statistically significant value for $p < .001$.

Table 3.

Factor Validity, Convergent Validity, and Reliability for the JCS

	Standardized		
	factor	α and CR	AVE
	loadings*		
Job Crafting Scale		.787;.933	.443
Increasing structural job resources		.821;.835	.566
Item 1	.824		
Item 2	.838		
Item 3	.781		
Item 4	.521		
Increasing social job resources		.781;.781	.422
Item 12	.589		
Item 13	.780		
Item 14	.545		
Item 15	.735		
Item 16	.565		
Decreasing hindering job demands		.725;.672	.341
Item 8	.588		
Item 9	.495		
Item 10	.641		
Item 11	.602		
Increasing challenging job demands		.803;.801	.450
Item 17	.640		
Item 18	.663		
Item 19	.719		
Item 20	.536		
Item 21	.772		

Notes: *Statistically significant value for $p < .05$. The translation of the items into Portuguese is available upon request from the first author.

Table 4.

Discriminant Validity for the JCS

	1.	2.	3.
1. Job crafting	.443		
2. Personal growth	.054	.439	
3. Proactive personality	.190	.190	.426

Notes: Bolded are the AVE values. The remaining values are the squared correlation coefficients.

Table 5.Criterion Validity for the JCS ($N=329$)

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Job crafting	(.787)								
2. Increasing structural job resources	.595**	(.821)							
3. Increasing social job resources	.718**	.239**	(.781)						
4. Decreasing hindering job demands	.432**	-.028	.058	(.725)					
5. Increasing challenging job demands	.743**	.546**	.335**	.012	(.803)				
6. Job satisfaction	.304**	.264**	.318**	-.052	.237**	(.874)			
7. Perceived organizational support	.180**	.232**	.274**	-.178**	.135*	.698**	(.919)		
8. Work engagement	.336**	.350**	.202**	-.103	.437**	.630**	.448**	(.934)	
9. Job performance	.344**	.340**	.176**	-.064	.456**	.415**	.294**	.559**	(.741)

Notes: The reliability values assessed through Cronbach's alpha coefficient are in parenthesis. *Statistically significant value for $p<.05$;

**Statistically significant value for $p<.01$

Empirical evidence for the Validity of the Job Crafting Scale (JCS) in a Portuguese setting

Abstract

Purpose – This study aimed to adapt and validate the Job Crafting Scale (JCS), a measure based on the conceptualization of job crafting of the Job Demands-Resources Theory, for a sample of Portuguese workers and to test its psychometric properties regarding validity (factor, convergent, discriminant, and criterion) and reliability.

Design/methodology/approach – Two subsamples ($n_1=315$ and $n_2=329$) of Portuguese workers aged 18 years old and over participated in this research. Exploratory factor analysis and confirmatory factor analysis were used to assess the factor structure.

Findings – The results indicated that the Portuguese version of the JCS, with 18 items, has a factor structure composed of four-correlated factors. Furthermore, the results demonstrated the existence of factor, discriminant, and criterion validity, as well as reliability.

Originality – This study provides a job crafting measure adapted to the Portuguese language that can serve as a diagnostic tool for workers and organizations.

Keywords: Job crafting, Validity, Proactivity, Reliability, Employees

Paper type – Research paper

Evidencia empírica de la validez de la Job Crafting Scale (JCS) en una muestra de trabajadores portugueses

Resumen

Propósito – Este estudio tuvo como objetivo adaptar y validar la Job Crafting Scale (JCS), una medida basada en la conceptualización de job crafting de la Teoría de Demandas-Recursos, para una muestra de trabajadores portugueses y probar sus propiedades psicométricas en cuanto a validez (factor, convergente, discriminante y de criterio) y confiabilidad.

Diseño/metodología/enfoque – En esta investigación participaron dos submuestras ($n_1=315$ y $n_2=329$) de trabajadores portugueses de 18 años o más. Se utilizó un análisis factorial exploratorio y un análisis factorial confirmatorio para evaluar la estructura factorial.

Hallazgos – Los resultados indicaron que la versión portuguesa del JCS, con 18 ítems, tiene una estructura factorial compuesta por cuatro factores correlacionados. Además, los resultados demostraron la existencia de validez factorial, discriminante y de criterio, así como confiabilidad.

Originalidad – Este estudio proporciona una medida de job crafting adaptada a la lengua portuguesa que puede servir como herramienta de diagnóstico para trabajadores y organizaciones.

Palabras clave: Job crafting, Validez, Proactividad, Confiabilidad, Trabajadores

Tipo de artículo – Artículo de investigación

Evidência empírica de validade da versão portuguesa da Job Crafting Scale (JCS)

Resumo

Objetivo – Este estudo teve como objetivo adaptar e validar a Job Crafting Scale (JCS), uma medida baseada na conceptualização de job crafting da Teoria das Exigências-Recursos, numa amostra de trabalhadores portugueses e testar as suas propriedades psicométricas quanto à validade (fatorial, convergente, discriminante e de critério) e fiabilidade.

Desenho/Metodologia/Abordagem – Duas subamostras ($n_1=315$ e $n_2=329$) compostas por trabalhadores portugueses com 18 ou mais anos foram recolhidas. Foram utilizadas uma análise fatorial exploratória e uma análise fatorial confirmatória para analisar a estrutura fatorial.

Resultados – Os resultados obtidos indicaram que a versão portuguesa da JCS, composta por 18 itens, possui uma estrutura fatorial composta por quatro fatores correlacionados. Além disso, os resultados demonstraram a existência de validade fatorial, discriminante e de critério, bem como de fiabilidade.

Originalidade/Valor – Este estudo fornece uma medida de job crafting adaptada para a língua portuguesa que pode servir como ferramenta de diagnóstico para trabalhadores e organizações.

Palavras-chave: Job crafting, Validade, Proatividade, Fiabilidade, Trabalhadores

Tipo de artigo – Artigo de pesquisa

Introduction

Creating a job that is a source of motivation, satisfaction, and flourishing has been a great challenge for Work, Organizational, and Personnel Psychology. Throughout history, there has been a development of the work design concept, which has two components, one related to the tasks performed and another associated with the social environment (Morgeson and Humphrey, 2008). Parker *et al.* (2017) identified, analyzed, and characterized the evolution of the main work design perspectives.

The first perspective concerned the Scientific Management of work, i.e. task simplification; it did not value workers' job control, leading to monotony, absenteeism, and turnover (Parker *et al.*, 2017). The second perspective, Sociotechnical Systems (Cherns, 1976), argued that organizations are composed of two subsystems, technical and social, which interact in a balanced way to achieve desirable outcomes (Parker *et al.*, 2017). The third perspective was based on the Job Characteristics Model (JCM; Hackman and Oldham, 1975), which argued that a job should present a specific set of attributes (task variety, autonomy promotion, feedback, meaning, and task identity) to achieve desirable outcomes (e.g. work motivation and job satisfaction). The fourth perspective concerned the Demand-Control Model (DCM; Karasek, 1979), which sought to understand the relationship between working conditions and health (physical and mental) from two dimensions: the extent of demands (i.e. workload) and decision latitude (i.e. workers' control over the work process). This model was updated with the inclusion of perceived social support, which is also fundamental to reducing the detrimental effects of demands (Karasek and Theorell, 1990). The fifth perspective emerged with the development of the Job Demands-Resources Theory (JD-R; Demerouti *et al.*, 2001), which included the characteristics of past models but also addressed their limitations. This theory considered that health impairment (through burnout) and motivational (through work engagement) processes occurred simultaneously and that job characteristics could be included in two groups: job demands and job resources (Bakker *et al.*, 2023). Finally, based on the Role Theory, the sixth perspective highlighted that role ambiguity and role conflict negatively affected workers' performance (Parker *et al.*, 2017).

Work design continues to assume great relevance, and at the beginning of the century, Wrzesniewski and Dutton (2001) proposed a new concept, job crafting, a bottom-up strategy based on workers' proactivity. The central proposition of this concept is that workers can change their job design to increase desirable job attitudes and behaviors, as well as job performance (Frederick and VanderWeele, 2020; Wrzesniewski and Dutton, 2001). This construct emerged in opposition to the most common ways of changing work design based on

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3 top-down strategies, e.g. job enrichment (Parker *et al.*, 2017). Job crafting has gained relevance
4 because, contrary to the most common work design strategies (i.e. top-down), it gives workers
5 a central role in constructing their work environment. When workers adopt a proactive stance
6 in aligning their tasks with their expectations and needs, they balance the different interfaces of
7 their work, increasing motivation and fostering desirable work-related outcomes (Tims and
8 Bakker, 2010). By proactively redesigning the workplace, workers can create consistency
9 between their personal and work identities, perform tasks with personal and social meaning,
10 and contribute to the common good (Wrzesniewski and Dutton, 2001).

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17 Several definitions of job crafting and measurement instruments have been proposed.
18 The main objective of this study was to adapt and validate the Job Crafting Scale (JCS; Tims
19 *et al.*, 2012) for a sample of Portuguese workers. The assessment of job crafting allows
20 understanding the extent to which workers craft their jobs by influencing their characteristics,
21 i.e. the extent to which workers have adjusted their tasks to their skills and expectations. By
22 knowing workers' job crafting levels, they can be trained to develop skills in this area, fostering
23 desirable work-related outcomes. For example, Tims *et al.* (2012) argued that optimizing job
24 demands can increase work engagement and performance. To achieve this goal, two studies
25 were performed; the first aimed to explore the JCS's factor structure and assess its reliability,
26 and the second sought to confirm the factor structure obtained and to test the psychometric
27 properties of the JCS further. Previous studies performed in Portugal that used the JCS (e.g.
28 Moreira *et al.*, 2022) did not use a validated version of this measure, which may have biased
29 the results. These authors only examined construct validity, convergent validity, and reliability.
30 However, when testing for construct validity, they did not present any competing models,
31 focusing solely on the most common factor structure, a second-order factor (job crafting) with
32 four first-order factors (increasing structural job resources, increasing social job resources,
33 increasing challenging job demands, and decreasing hindering job demands) (Tims *et al.*,
34 2012). According to Flake *et al.* (2017), using instruments that are not adapted and validated to
35 the cultural reality of a country is an increasingly common situation with negative
36 consequences. For example, using a non-validated measure may neglect the importance of
37 intercultural differences. Theoretically, this study presents the Portuguese version of the JCS,
38 the most common measure to assess job crafting, and tests alternative factor structures for this
39 construct. On a practical level, this measure can be useful for researchers and managers from
40 Portuguese-speaking countries since they can access an accurate and consistent measure, which
41 can serve as a research and intervention tool.
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Literature Review

Job crafting: History, definition, and measurement

Eurostat (2021) stated that most European workers work over 35 hours weekly. Thus, organizations should seek to create workplaces that provide meaning and fulfillment for workers (Frederick and VanderWeele, 2017). Initially, job crafting was defined as a process of job customization by the worker composed of three dimensions: task crafting (e.g. change in the number and diversity of tasks), relationship crafting (e.g. change in the pattern of interpersonal relationships), and cognitive crafting (e.g. valuing the job as a whole instead of considering each of its parts separately). Despite this customization, it is crucial to emphasize that job crafting is not about changing the job design as a whole; this change is partial and must respect the specificity of the tasks performed (Wrzesniewski and Dutton, 2001). Tims *et al.* (2012) proposed a second conceptualization of job crafting based on the JD-R Theory (Bakker *et al.*, 2023). This conceptualization is the most relevant in the literature due to the theoretical model on which it is based, which has solid theoretical and empirical corroboration, and due to the measure developed to assess job crafting, the most used in research (Lazazzara *et al.*, 2019). For these reasons, the present study adopted this conceptualization.

The JD-R Theory is an integrative approach to job design, integrating previous theoretical models' contributions (e.g. JCM, Hackman and Oldham, 1975 DCM, Karasek, 1979; Effort-Reward Imbalance, Siegrist, 1996). Therefore, it allows a more comprehensive understanding of the phenomena of ill-being and motivation in the work context and their outcomes (Bakker and Demerouti, 2017; Bakker *et al.*, 2023). This theory has a dynamic and flexible character (Bakker *et al.*, 2023). The dynamic character concerns the fact that it considers that health impairment and motivational processes co-occur; the flexible nature is related to job characteristics, which can be grouped into two groups: job demands (work-related factors that lead to ill-being) and job resources (work-related factors that lead to well-being) (Bakker and Demerouti, 2017; Bakker *et al.*, 2023). According to Bakker and Demerouti (2017), job demands lead to a health impairment process that results in emotional exhaustion; job resources lead to a motivational process that originates work engagement. Over time, this model has been expanded with new variables, e.g. job crafting (Bakker *et al.*, 2018). Job crafting emerges as a bottom-up approach where workers take the initiative to change their workstations and tasks to manage job demands and resources, increasing motivation and person-job fit (Bakker *et al.*, 2023; Demerouti and Bakker, 2023). By bringing together different job demands and resources, the JD-R theory allows workers to identify different work-related factors (i.e. job demands and job resources) and modify them by adopting a proactive

stance (Tims *et al.*, 2012). This modification allows an alignment between the needs and skills of workers and the tasks they perform (Tims and Bakker, 2010). In other words, according to JD-R theory, workers can craft their tasks by combining the nature of the demands and resources that exist in their work context (Tims *et al.*, 2012). This concept can be distinguished from others; job crafting aims to optimize job characteristics, and other constructs (e.g. personal initiative or proactive personality) have a global objective, which can lead to changes in the work context or involve negotiations with employers (Demerouti and Bakker, 2023; Rudolph *et al.*, 2017).

In their JCS development work, Tims *et al.* (2012) proposed four types of job crafting: increasing structural job resources, increasing social job resources, increasing challenging job demands, and decreasing hindering job demands. Increasing structural job resources is related to the job itself; individuals seek opportunities to develop themselves and perform their tasks autonomously (Lazazzara *et al.*, 2019). In turn, increasing social job resources has an interpersonal nature; workers strive to improve their support networks and search for feedback (Zhang and Parker, 2019). These actions optimize the job design and increase job resources and work engagement. Another way to foster work engagement is by increasing challenging job demands; workers can look for new projects to be involved in or develop new skills to face novel challenges (e.g. through training) (Frederick and VanderWeele, 2020). In this situation, job demands highlight the role of job resources in predicting work engagement, i.e. the presence of job demands intensifies the magnitude of the association between job resources and work engagement (Bakker *et al.*, 2023). Decreasing hindering job demands (e.g. by reducing mental workload) is aimed at attenuating the impact of job demands on workers (van Wingerden *et al.*, 2017a). The original study of the JCS demonstrated that this dimension was unrelated to work engagement (Tims *et al.*, 2012). van Wingerden *et al.* (2017b) argued that this situation occurred because job demands are involved in the ill-being process of the JD-R, which leads to emotional exhaustion and not to the motivational process, which leads to work engagement. Within the scope of the JD-R Theory, job crafting is part of a gain cycle. This situation is due to the relationship between this concept, job resources, personal resources, and work engagement (Bakker and Demerouti, 2017). For example, when workers are engaged, they seek to maintain this state; as such, they adopt crafting behaviors to increase their job resources and reduce the negative impact of demands through its optimization (Bakker *et al.*, 2023). Continuing these behaviors will contribute to higher job and personal resources useful to increase work engagement and decrease the detrimental effects of job demands (Bakker *et al.*, 2023).

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3 The meta-analysis by Rudolph *et al.* (2017), based on the job crafting conceptualization
4 of the JD-R, tested the role of three antecedents, individual differences, job characteristics, and
5 demographics, in overall job crafting and each of the dimensions of this concept. Regarding
6 individual differences, four dimensions of The Big Five model (Costa and McCrae, 1992),
7 agreeableness, conscientiousness, openness to experience, and extraversion, were positively
8 related to overall job crafting. The same happened for other individual differences, proactive
9 personality and general self-efficacy. In turn, neuroticism did not establish any relationship with
10 overall job crafting. In terms of dimensions, the role of extraversion should be highlighted,
11 which was positively related to increasing job resources, structural and social, and increasing
12 challenging job demands. Agreeableness was positively associated with all job crafting
13 dimensions. Openness to experience and conscientiousness were also related to all crafting
14 dimensions, positively with increasing job resources, social and structural, and increasing
15 challenging job demands, and negatively with decreasing hindering job demands. Neuroticism
16 was negatively related to increasing structural job resources and increasing challenging job
17 demands and positively associated with decreasing hindering job demands. As for proactive
18 personality and general self-efficacy, positive relationships were observed with increasing job
19 resources, structural and social, and increasing challenging job demands, and negative
20 associations with decreasing hindering job demands. Regarding job characteristics, autonomy
21 and workload established negative relationships with decreasing hindering job demands and
22 positive relationships with the remaining job crafting dimensions and overall job crafting.
23 Regarding sociodemographic variables, overall job crafting showed a positive relationship with
24 education and the number of hours worked and a negative association with age and job tenure.
25 Finally, job crafting behaviors were more common in women.

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43 The outcomes defined by Rudolph *et al.* (2017) were also divided into three groups: job
44 attitudes (job satisfaction and turnover intention), occupational well-being (work engagement
45 and strain), and performance (job and contextual performance). Regarding satisfaction and
46 work engagement, increasing job resources, structural and social, and increasing challenging
47 job demands established positive relationships with these concepts, and decreasing hindering
48 job demands established a negative relationship. Turnover intentions showed a negative
49 association with increasing structural job resources and a positive relationship with decreasing
50 hindering job demands. Job strain was negatively associated with increasing structural job
51 resources and increasing challenging job demands, and it was positively associated with
52 decreasing hindering job demands. The performance indicators followed the opposite pattern:
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3 a positive relationship with increasing structural job resources and challenging job demands
4 and a negative association with decreasing hindering job demands.
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8 **Study 1: Exploratory factor analysis of the JCS**

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10 This study aimed to explore the factor structure and reliability of the JCS. Past validation
11 studies (Bakker *et al.*, 2018; Chinelato *et al.*, 2015; Rogala and Cieslak, 2019) have not
12 performed an exploratory factor analysis (EFA). These studies solely performed a confirmatory
13 factor analysis (CFA) and were based on the JCS's original structure, i.e. four first-order factors
14 (increasing structural job resources, increasing social job resources, increasing challenging job
15 demands, and decreasing hindering job demands) integrated into a second-order factor (i.e. job
16 crafting) to test this measure's psychometric properties. By not performing an EFA, these
17 authors neglected the possibility of other factor structures emerging, distinct from the original
18 JCS structure. For example, Tims and Bakker (2010) initially defined job crafting as consisting
19 of three dimensions (increasing job resources, increasing challenging job demands, and
20 decreasing hindering job demands); after the development of JCS, Tims *et al.* (2012) obtained
21 a structure with four first-order factors integrated into a second-order factor. To ensure
22 obtaining a factor structure consistent with the nature of the data collected, it was considered
23 essential to observe in an exploratory way if a factor structure different from the one obtained
24 in the original validation study could emerge in the Portuguese sample used to perform the
25 EFA.
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39 **Method**

40 ***Participants***

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42 Nunnally and Bernstein's (1994) recommendations were followed to calculate the
43 minimum sample size. A sample of 315 individuals (78.4% females and 21.6% males) who
44 worked in the human services area was collected. The majority of participants were 45-54 years
45 old (40%; up to 24=.3%; 25-34=4.8%; 35-44=17.8%; 55-64=34%; and 65 or over=3.2%), were
46 married or living in a non-marital relationship (70.5%; single=14.9%; separated or
47 divorced=12.7%; and widowed=1.9%), and 96.5% had completed a university degree (without
48 university degree=3.5%). Furthermore, most workers worked in the public sector (88.6%;
49 private sector workers=9.2%), and 84.9% worked 30 or more hours weekly (less than 30 hours
50 worked weekly=15.1%). Regarding job tenure, 46.3% were in the current organization for 21
51 or more years (less than one year=5.1%; one to five years=18.7%; six to 10 years=7.6%; 11 to
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3 15 years=7.6%; 16 to 20 years=14.6%) and did not hold a leadership role (73.3%; participants
4 with a leadership role=26.7%).
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8 **Measures**

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10 Job crafting was assessed with the JCS (Tims *et al.*, 2012). This measure comprised 21
11 items (e.g. I try to develop myself professionally) with a five-point Likert scale (1-*Never*; 5-
12 *Often*). This concept is a multidimensional latent trait with four dimensions: increasing
13 structural job resources (five items; $\alpha=.82$), increasing social job resources (five items; $\alpha=.77$),
14 increasing challenging job demands (five items; $\alpha=.75$), and decreasing hindering job demands
15 (six items; $\alpha=.79$).
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21 A sociodemographic questionnaire was used to collect information about the
22 participants' sex, age, marital status, highest level of education, activity sector (i.e. public or
23 private), number of weekly hours worked, performance of leadership roles, and job tenure.
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27 **Data collection procedures**

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29 The Portuguese version of the JCS was obtained through a translation and back-
30 translation process. Thus, a translation from English to Portuguese was performed, and a back-
31 translation process from Portuguese to English was conducted. Then, both versions were
32 compared to correct possible inaccuracies. The final version of the JCS was presented to a group
33 of master's students to clarify potential doubts regarding the wording of items.
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38 This project was approved by the Ethics Committee of the University of Algarve
39 (Portugal). Data collection occurred during 2019-2021 using an online platform. In the
40 organizations that agreed to participate, the research team sent the online research protocol to
41 those responsible so that they could forward it to employees. This research followed a
42 quantitative method and used a non-probabilistic sampling technique following a snowball
43 technique. Before answering, participants were informed about the study's objectives and had
44 to read and agree with an informed consent statement, which guaranteed the anonymity and
45 confidentiality of the data. Also, respondents were informed that there were no rewards
46 associated with participation and that they could withdraw their involvement at any time.
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54 **Data analysis procedures**

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56 The analysis followed the original study's premises (Tims *et al.*, 2012). Through the
57 Statistical Package for the Social Sciences (SPSS) version 20, an EFA was conducted using the
58 maximum likelihood as an extraction method and a Direct Oblimin rotation. It was defined that
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only the factors with an eigenvalue higher than one and the items with factor loadings equal to or greater than .35 were maintained. When the items' factor loadings were equal to or higher than .35 and were included in different factors contrary to the expected, they were eliminated. Reliability was tested through Cronbach's alpha coefficient; values greater than .70 must be achieved (Field, 2018).

The abovementioned procedures were mentioned in the original JCS paper. However, a group of complementary analyses was performed: Kaiser-Meyer-Olkin (KMO) test, values higher than .70 are desired; and Bartlett's sphericity test, statistically significant values ($p < .05$) must be achieved (Field, 2018; Kaiser and Rice, 1974). Also, to observe the existence of multicollinearity, the determinant of the R matrix was assessed; values greater than .00001 are desired (Field, 2018).

Results

Table 1 presents the descriptive statistics of the JCS items, the reliability values obtained, and the factor loadings of the items in their factors. The result of the KMO test was .85, which is classified as meritorious (Kaiser and Rice, 1974), and Bartlett's sphericity test was statistically significant ($p < .001$). Also, the determinant of the R matrix was .0000207, indicating no multicollinearity issues.

(Table 1)

Item five was removed from the analysis since it did not achieve the cut-off for the factor loadings of the items. Four factors that explained 52.69% of the total variance were obtained. Lastly, reliability values were above .70.

Study 2: Confirmatory factor analysis and psychometric evidence

This study aimed to test the factor structure obtained in the exploratory analysis through a CFA. The factor structure obtained in the EFA was conceptualized in two competing models in the CFA: a second-order model, i.e. four first-order factors (increasing structural job resources, increasing social job resources, increasing challenging job demands, and decreasing hindering job demands) integrated into a second-order factor (job crafting); and a model with four-correlated factors (increasing structural job resources, increasing social job resources, increasing challenging job demands, and decreasing hindering job demands). The competing model that obtained a better fit would be subject to an analysis of its psychometric properties.

The convergent validity of the JCS dimensions was tested, as well as the discriminant validity using the personal growth and proactive personality constructs. Lastly, criterion validity was tested through the correlation between overall job crafting and the four dimensions of this concept and the constructs of job satisfaction, perceived organizational support, work engagement, and job performance.

Method

Participants

The sample size of this study was based on the work of Lloret-Segura *et al.* (2014), i.e. a sample of 200 participants is the minimum requirement to perform a CFA. A sample of 329 (62.3% females and 37.7% males) Portuguese workers with 18 years of age or older was collected. Most of the respondents were between 25-34 years old (46.4%; up to 24=14.6%; 35-44=18.9%; 45-54=13.3%; 55-64=6.5%; and 65 or more=.3%), single (51.5%; separated or divorced=22.4%; married or living in a non-marital relationship=25.8%; and widowed=.3%), and 68.1% had completed a university degree (without a university degree =31.9%). Also, the majority of the participants worked in the services sector (79%; agriculture-related workers=1%; industry workers=20%), had a full-time work contract (86.8%; part-time workers =13.2%), and worked more than 30 hours weekly (83.7%; less than 30 hours worked weekly=16.3%). Relatively to job tenure, most participants worked in the current organization for one to five years (32.9%; less than one year=28.5%; six to 10 years=11.2%; 11 to 15 years=6.4%; 16 to 20 years= 8%; 21 or more years=13.1%) and did not hold a leadership role (71%; participants with a leadership role=29%).

Measures

Job crafting was assessed using the JCS version that resulted from the EFA. This version comprised 20 items (e.g. I try to develop my capabilities) with a five-point Likert scale (*1-Never; 5-Often*). This concept is a multidimensional latent trait comprising four dimensions: increasing structural job resources (four items), decreasing hindering job demands (six items), increasing social job resources (five items), and increasing challenging job demands (five items). Reliability results from past studies (e.g. Salessi, 2020) were above .70.

Job satisfaction was measured using the Professional Satisfaction Scale proposed by Lima *et al.* (1995). This instrument is composed of eight items (e.g. Satisfaction regarding the organization and department where you work) with a seven-point Likert scale (*1-Extremely*

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3 *dissatisfied; 7-Extremely satisfied*). Past studies (e.g. Viseu *et al.*, 2021) achieved internal
4 consistency values above .80.

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6 Perceived Organizational Support was evaluated using the Perceived Organizational
7 Support Scale (Eisenberger *et al.*, 1986), adapted for Portuguese workers by Santos and
8 Gonçalves (2010). The Portuguese version is a short form of the original scale, presenting eight
9 items (e.g. The organization cares about my well-being) with a seven-point Likert scale (*1-*
10 *Strongly disagree; 7-Strongly agree*). Santos and Gonçalves (2010) registered reliability values
11 above .80.

12
13 Work engagement was assessed by the nine-item version of the Utrecht Work
14 Engagement Scale (UWES; Schaufeli and Bakker, 2003). The version used in this study was
15 adapted for Portuguese workers by Sinval *et al.* (2018) and is composed of nine items (e.g. I
16 am enthusiastic about my job) with a seven-point Likert scale (*0-Never; 6-Always/Every day*).
17 This concept is a multidimensional latent trait with three dimensions: vigor, dedication, and
18 absorption, with three items each. Sinval *et al.* (2018) reported reliability values above .80.

19
20 Self-reported job performance was measured by four items (e.g. My manager believes I
21 am an efficient worker) with a seven-point Likert scale (*1-Does not apply to me at all; 7-Applies*
22 *completely to me*) proposed in the work of Rego and Pina e Cunha (2008). These authors
23 registered reliability values above .80 in their study.

24
25 Proactive personality was evaluated using the short form of the Proactive Personality
26 Scale (Seibert *et al.*, 1999). This instrument comprised ten items (e.g. I am constantly on the
27 lookout for new ways to improve my life) with a seven-point Likert scale (*1-Strongly disagree;*
28 *7-Strongly agree*). Seibert *et al.* (1999) reported reliability values higher than .80.

29
30 The personal growth dimension was assessed by the Psychological Well-Being Scale of
31 Ryff (1989). This measure is composed of 20 items (e.g. In general, I feel I am in charge of the
32 situation in which I live) with a six-point answer scale (*1-Strongly disagree; 6-Strongly agree*);
33 personal growth possesses seven items, four of them reversed. The study of Ryff (1989)
34 reported a Cronbach's alpha value above .80.

35
36 The sociodemographic questionnaire had questions regarding the respondent's sex, age,
37 marital status, highest level of education, economic activity sector (i.e. agricultural-related,
38 industry, and services), workday format (i.e. full-time or part-time), number of weekly hours
39 worked, job tenure, and performance of leadership roles.

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Data collection procedures

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3 Data were collected between February and June 2020 through an online platform. The
4 research protocol was composed of self-report measures and a sociodemographic questionnaire.
5 Two inclusion criteria were defined: being 18 years old or over and being in an active work
6 situation. This study followed a quantitative method and used a non-probabilistic sampling
7 technique by convenience. Before answering the protocol, respondents were informed about
8 the study's objectives and had to read and agree with an informed consent statement. This
9 statement provided information regarding anonymity and confidentiality standards and
10 informed potential participants that no rewards were associated with the contribution. Also,
11 respondents were informed that they could withdraw their participation at any time.
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20 ***Data analysis procedures***

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22 The first step of the analysis was assessing the multivariate normal distribution. Curran
23 *et al.* (1996) argued that for the maximum likelihood estimation method, values of skewness
24 equal to or lower than two ($|sk| \leq 2$) and kurtosis equal to or lower than seven ($|ku| \leq 7$) indicate
25 respect for this assumption. After this procedure, the overall model fit was tested based on the
26 results of the EFA. The factor structure was operationalized in two ways: a second-order model
27 and a model with four-correlated factors. The selected model would be the one with the best fit.
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32 To assess the overall model fit, the following indices were selected: Chi-squared
33 Goodness-of-fit index (χ^2), *p-values* higher than .05 are expected, however statistically
34 significant values ($p < .05$) may occur in samples with large sample sizes; Goodness of Fit Index
35 (GFI), values between .90-.95 indicate a good fit and values higher than .95 indicate a very
36 good fit; Root Mean Square Error of Approximation (RMSEA), values between .05-.10 indicate
37 an acceptable fit and values below .05 indicate a good fit; Standardized Root Mean Square
38 Residual (SRMR), values between .05-.08 indicate an acceptable fit and values below .05
39 indicate a good fit; Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), values between
40 .90-.95 indicate a good fit and values higher than .95 indicate a very good fit; and ratio χ^2/df ,
41 values equal to or below five indicate an acceptable fit and values below two indicate a very
42 good fit (Anderson and Gerbing, 1982; Hu and Bentler, 1999; Marôco, 2021).
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51 Subsequently, measurement model fit was tested. Factor validity was evaluated through
52 the items' standardized factor loadings and their statistical significance ($p < .05$) (Marôco, 2021).
53 The standardized factor loadings were classified according to the premises of Comrey and Lee
54 (1992): excellent ($>.71$), very good ($>.63$), good ($>.55$), acceptable ($>.45$), and poor ($>.32$).
55 Convergent validity was assessed through the Average Variance Extracted coefficient, values
56 equal to or higher than .50 are desired (AVE $\geq .50$; Bagozzi and Yi, 1988). Discriminant validity
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was based on the Fornell and Larcker (1981) criterion; the AVE values and the squared correlation coefficients were compared. This comparison occurred for job crafting, personal growth, and proactive personality. Lastly, criterion validity was based on the analysis of Pearson's correlation coefficient (r) and its significance value ($p < .05$). Reliability was tested through two coefficients, Cronbach's alpha and Composite Reliability (CR), and values equal to or higher than .70 are desired (Hair *et al.*, 2014). The obtained values were classified according to the premises of Sharma (1996): excellent ($>.90$), very good (between .80-.90), acceptable (between .70-.80), and poor ($<.50$).

Results

The overall model fit of the two competing models was evaluated. The results obtained in the initial analysis demonstrated that both models had a poor fit. Therefore, the modification indices (MI) were assessed. This procedure aimed to identify covariances between the items' errors to improve the models' quality. This is a sequential process; the covariances between the measurement errors should be established from the highest to the lowest values and must obey a theoretical perspective (Marôco, 2021). After assessing the MI, four covariances were established between the errors of items: eight and nine, 12 and 14, 12 and 15, and 17 and 18.

After this procedure, there was an increase in the quality of both models. However, in the second-order model, only the RMSEA and χ^2/df indices achieved the cut-off values defined in the literature. The four-correlated factors model registered results for all the indices according to the cut-off values. The fit of this model varied from an acceptable to a good fit. As such, the four-correlated factors model was chosen to proceed with the analysis (Table 2). This factor structure indicates that job crafting dimensions are interdependent and act synergistically, i.e., a change in one of the dimensions implies a change in the remaining. The same factor structure was obtained in the validation study of Salessi (2020). However, this factor structure is different from the usual four first-order factors (i.e. increasing structural job resources, increasing social job resources, increasing challenging job demands, and decreasing hindering job demands) and a second-order factor (i.e. job crafting) (Bakker *et al.*, 2018; Comas and Viera, 2022).

(Table 2)

Items six and seven presented poor standardized factor loadings, being removed from the analysis so as not to compromise the model's quality. After this analysis, all items achieved the threshold value for factor validity and were statistically significant ($p < .05$). Item nine was

marginally below the cut-off, although it was decided to maintain it. According to the classification of Comrey and Lee (1992), the standardized factor loadings varied between acceptable and excellent. Regarding convergent validity, a twofold assessment was performed for global job crafting and each of this construct's dimensions. The results for global job crafting were marginally below the cut-off defined by the literature. As for the dimensions, only increasing structural job resources obtained a value above .50; increasing social job resources and increasing challenging job demands registered values slightly lower than the cut-off. Regarding decreasing hindering job demands, this dimension obtained a result that should be the subject of attention in future studies. Reliability values were above .70, except for the CR value for decreasing hindering job demands. Considering Sharma's (1996) classification, the results varied between acceptable and very good (Table 3).

(Table 3)

According to the Fornell and Larcker (1981) criterion, the results obtained indicate evidence of discriminant validity. Therefore, job crafting differs from the concept's proactive personality and personal growth (Table 4).

(Table 4)

Overall, job crafting and the dimensions of increasing structural job resources, increasing social job resources, and increasing challenging job demands correlated positively and significantly with job satisfaction, perceived organizational support, work engagement, and job performance. Decreasing hindering job demands did not establish any statistically significant relationship, except for the correlation with perceived organizational support, which registered a negative signal and statistical significance (Table 5).

(Table 5)

Discussion

Over the past few years, psychosocial working conditions have deteriorated, creating new challenges for organizations. Managers and human resources professionals must understand that workers seek motivating and meaningful jobs. A way to make jobs more appealing is based on job crafting, a bottom-up strategy based on workers' proactivity, which

allows an increase in job resources, structural and social, and challenging job demands, and a decrease in hindering job demands (Bakker *et al.*, 2023). To our knowledge, there is no adapted and validated version of the JCS for samples of Portuguese workers. Previous studies performed in Portugal (e.g. Moreira *et al.*, 2022) were based on the JCS's original factor structure, neglecting possible intercultural differences. For example, the operationalization of a construct differently may indicate that it behaves distinctively in a different culture, which is why adaptation and validation studies are crucial (Flake *et al.*, 2017). Thus, this study sought to adapt and validate the JCS for a sample of Portuguese workers.

The factor structure obtained, a model with four-correlated factors, differs from the structure registered in most previous studies (e.g. Bakker *et al.*, 2018; Tims *et al.*, 2012). The factor structure obtained in previous studies, i.e. four first-order factors (increasing structural job resources, increasing social job resources, increasing challenging job demands, and decreasing hindering job demands) integrated into a second-order factor (job crafting), assumed that the four dimensions were integrated into a higher-order construct, job crafting. In other words, job crafting would serve as an umbrella concept. The existence of four-correlated factors, the factor structure obtained in this study, indicates that the dimensions of job crafting establish an interdependent relationship, i.e. any variation in one of the dimensions will have repercussions on the others. Furthermore, this factor structure indicates that the considered dimensions act synergistically. Therefore, individuals who want to change their workplace proactively will redirect their efforts toward maximizing job resources, challenging job demands, and reducing hindering job demands. There was evidence of factor, discriminant, and criterion validity. As for convergent validity, an aspect should be highlighted. The AVE cut-off was only respected for the increasing structural job resources dimension. However, using the AVE coefficient has been criticized because of fixed cut-off values (Valentini and Damásio, 2016). Lastly, there was reliability evidence as the results for both coefficients were above the threshold value (.70).

Overall, the adaptation and validation of the Portuguese version of the JCS provided promising results in terms of factor validity, discriminant validity, criterion validity, and reliability, making it possible to state that it is a precise and consistent measure for use in research and organizational contexts. The Portuguese version of this measure consists of 18 items, answered on a five-point Likert scale (*1-Never; 5-often*), divided into four dimensions: increasing structural job resources (four items), increasing social job resources (five items), increasing challenging job demands (five items), and decreasing hindering job demands (four items). In conclusion, the practical potential of this research is not limited to the adaptation and

validation of the JCS but to the possibilities that this measure offers in terms of assessment, diagnostic, and intervention, which can bring positive outcomes for workers and organizations, namely for Portuguese-speaking countries. Also, this study filled some gaps in the analysis of the psychometric properties of the JCS in Latin American countries. For example, Chinelato *et al.* (2015) and Gutiérrez-Carvajal *et al.* (2022) did not present an EFA, nor did they evaluate different aspects related to validity (e.g. factor, convergent, and discriminant validity). The study by Comas and Viera (2022) did not assess convergent, discriminant, and criterion validity. Thus, the possibility of a validated instrument allows a better analysis of job crafting levels, amenable to comparison with other countries, and, in a subsequent step, a better understanding of different contexts will enable access to more detail to understand the various situations and scenarios that require workers to craft their jobs. Other sectors and cultural backgrounds could also be compared to identify the relationship between context-specific circumstances and job crafting (Park and Park, 2023).

Theoretical and practical implications

This study filled a gap in the literature: the absence of a properly validated version of the JCS for a sample of Portuguese workers. With this study, it was possible to obtain a measure duly adapted to the Portuguese work context, which can be used in different settings. Furthermore, a factor structure different from the most common may indicate intercultural variations in job crafting. Performing validation studies allows for obtaining accurate and consistent measures, but it also enables the improvement of the psychometric characteristics of existing instruments (Flake *et al.*, 2017).

On a practical level, the Portuguese version of the JCS can help know the job crafting skills of Portuguese workers, functioning as a diagnostic tool. However, more critical than this knowledge is the possibility that arises for the implementation of intervention programs aimed at developing job crafting skills. Previous intervention studies (e.g. van Wingerden *et al.*, 2017a, 2017b) have shown that promoting job crafting leads to desirable work-related outcomes (e.g. work engagement, development opportunities, self-efficacy, positive affect, and job performance). Past systematic reviews (e.g. Rudolph *et al.*, 2017; Zhang and Parker, 2019) indicated that job crafting is positively associated with job satisfaction, work engagement, performance-related indicators, psychological well-being, and person-job fit and negatively correlated with turnover and job strain. It can be concluded that job crafting is vital for workers, who can optimize their workplace in terms of job resources and demands, but also for organizations that can create a workforce that has, in the tasks performed, a source of motivation

and professional and personal fulfillment. Ultimately, exploring job crafting not only enhances organizational health but also cultivates the sustainable employability of its workforce, thereby bolstering the organization's resilience and ensuring its long-term success (Laguía *et al.*, 2024).

Limitations and future studies

This study has some limitations worth considering. For example, it was impossible to evaluate temporal invariance, which did not allow observing whether job crafting varies in the same group at different moments in time. Another limitation is related to the adopted research design, i.e. cross-sectional. Thus, it was impossible to observe probable reversed causality relationships, an aspect also mentioned by Tims *et al.* (2012). Evaluating reversed causality would be crucial to test the assumptions of the JD-R theory, e.g. high levels of work engagement favor the emergence of job crafting behaviors (Bakker *et al.*, 2023). Another aspect to consider concerns the concepts selected to test criterion validity; constructs with a negative nature were not selected. This would have been essential to demonstrate that job crafting is negatively associated with undesirable work-related aspects. Lastly, limitations regarding the sample's composition regarding gender and work sector (public or private) can be mentioned. In Portugal, there is an equal proportion of male and female workers (50%), and there is a predominance of workers from the private sector (85.7%) (PORDATA, 2021). In both studies, the percentage of females was greater than 60%, and in study one, most participants were from the public sector (88.6%).

Future studies can adopt a robust research design, allowing the evaluation of temporal invariance and reversed causality relationships, and try to present a sample that reflects the main characteristics of the Portuguese working population. Future works should also consider concepts with a negative nature to assess their relationship with job crafting and integrate recent constructs linked to work design, e.g. playful work design.

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