

Measuring Job Demands and Resources: Validation of the New Job Characteristics Questionnaire (JCQ)*

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For the purpose of measuring job demands and resources, the Job characteristics questionnaire (JCQ) was created. The main aim of this study was initial validation of the JCQ and testing its psychometric properties. A total of 1201 respondents in five independent samples completed the JCQ along with the Work burnout scale (Kristensen et al., 2005), The Utrecht work engagement scale (Schaufeli et al., 2006), the Organisational citizenship behaviour scale (Popov, 2013), and the Intentions to leave the organisation scale (Berat et al., 2016). EFA and CFA performed on the two randomly created subsamples indicated an interpretable 9 factor solution of the JCQ. All extracted dimensions showed the expected intercorrelations, and for the most part meaningful correlations with other relevant variables. Based on the results of this preliminary analysis, the JCQ proved to be a comprehensive, valid and efficient instrument for measuring important job and organisational characteristics. It could be used in both academic and non-academic settings.

Keywords: job demands, job resources, psychometric properties, validation, IRT

Highlights:

- New Job characteristics questionnaire (JCQ) was developed to measure job demands and resources.
- EFA and CFA indicated an interpretable 9-factor model.
- Subscales showed the expected intercorrelations and correlations with other variables in the study.
- The JCQ is a comprehensive yet efficient instrument to be used in various settings.

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The last few decades have brought with them a host of changes in the labour market which have themselves precipitated changes in the business environment and had a direct impact on the demands placed on employees by this environment. The working environment today in most cases involves working with information (mental demands) and working with clients (emotional demands). These changes have also contributed to a growth in flexibility in regard to job descriptions, working hours and the locations in which work assignments are carried out. On the other hand, employees in the manufacturing sector face diminishing opportunities for choice and control, greater job insecurity, and significant challenges in adapting to shift work. The effort to explain the impact of the characteristics and demands of the job on the well-being of employees has given rise to a range of models, to be described in this paper.

According to the Demands-Control Model (Karasek, 1979), a combination of high job demands (primarily in terms of quantity of work and time pressure) and low control (over tasks and behaviours during work time) gives rise to job strain. The model posits that an employee will not experience job strain (including anxiety, health problems, exhaustion and job dissatisfaction) if they have control in deciding how they will meet the demands of the job (Bakker & Demerouti, 2007). According to the Vitamin Model (Warr, 1987), job characteristics impact mental health in a way which is similar to that in which vitamins affect physical health. This model holds that six characteristics (autonomy, job demands, social support, utilisation of skills, variety of skills and task feedback) have a similar impact to vitamins A and D (toxic when taken in large quantities), while the another three characteristics of the job (salary, safety and task significance) have an effect similar to vitamins C and E (a constant effect – health does not decline but neither does it improve) (De Jonge & Schaufeli, 1998). The Job Characteristics Model (Hackman & Oldham, 1980) talks about employees' internal work motivation. According to this theory, the presence of certain job characteristics (i.e., autonomy, feedback, task significance, task identity and skill variety) motivates employees and promotes their satisfaction and performance. In view of the fact that the models described relate to a limited set of variables, questions may be raised as to whether they are applicable to all occupations, and whether some other combination of demands and resources is responsible for the well-being of employees in other occupations. Job Demands-Resources (JD-R; Demerouti et al., 2001) seeks to answer this question as it is applicable to a large number of occupations, including different working conditions, and focuses both on negative and on positive employee well-being indicators (Bakker & Demerouti, 2007).

At the core of the JD-R model is the assumption that, although every occupation has its own specific characteristics which impact workplace well-being, these factors may be grouped in two general categories, those of job demands and job resources. Job demands relate to the physical, psychological (e.g., work under pressure, the emotional demands of interacting with clients), social and organisational aspects (unfavourable working environment) of the job,

those which require constant physical or psychological (emotional or cognitive) effort from the employee and hence are connected with certain physiological or psychological costs (Bakker & Demerouti, 2007). In other words, job demands are those aspects of the job which can potentially cause job strain in the event that they exceed the adaptive capacity of the employee. Job resources are the physical, psychological, social and organisational aspects of the job which: are functional in achieving objectives, reduce the demands of the job and the psychological and physiological costs in relation to them, and stimulate personal growth, learning and development. Job resources can be found at the level of the organisation as a whole (salary, career opportunities, job security), interpersonal and social relationships (support from supervisors and colleagues, team climate), organisation of work (role clarity, participation in decision-making) or at the task level, where they most often concern skill variety, task significance, autonomy and feedback on performance (Bakker & Demerouti, 2007). When there is a lack of resources in the external environment, employees are unable to minimise the potential negative impact of high job demands, meet business objectives, or further develop in their job.

In reviewing existing methods for measuring demands and resources, and the instruments developed for this purpose, we observe two approaches. The first is that in research into the assumptions of the JD-R model, instruments are selected which specifically investigate those indicators of demands and resources to which the researchers wish to draw attention in their hypotheses. This approach reflects the heuristic nature of the JD-R model, and hence the constructs – and therefore the instruments used to measure them – differ greatly depending on the research topic (Bakker & Demerouti, 2017). The other approach involves efforts by researchers to create a uniform instrument that might serve as a basis for investigating the claims of the JD-R model by recognising the most common job demands and resources indicators, which they can then bring together and standardise within a single questionnaire. There is a noticeable lack of such efforts, and validated instruments that have been developed on the basis of various stress models, especially the JD-R model, have been few and far between. Psychosocial workplace factors have been investigated using various instruments developed mostly in north-western Europe, which include: the Management Standards Indicator Tool (MSIT; Cousins et al., 2004), the Copenhagen Psychosocial Questionnaire (COPSOQ; Kristensen et al., 2005) and the General Nordic Questionnaire for psychological and social factors at work (QPSNordic; Wännström et al., 2009). Although all of these questionnaires encompass a variety of business demands and resources, critics note that they are not based on the JD-R model or any other stress model, but rather have been derived from a specific conceptual framework by induction, which impedes the interpretation of data obtained by measuring them (Schaufeli, 2017).

As far as these authors are aware, one of the few instruments created with the objective of comprehensively evaluating job demands and resources according to the JD-R model is the EnergyCompass instrument (EC; Schaufeli,

2017). In addition to being founded on an empirically validated conceptual framework, the authors claim that in comparison to other questionnaires this instrument uses shorter scales and suffers less from negativity bias because it includes more positive constructs in formulating items. In developing the instrument, the researchers (Taris & Schaufeli, 2015) identified 30 potential job demands, 31 job resources, 22 outcomes, and 12 personal resources, which after analysis of overlaps between these constructs were narrowed down to 12 job demands, 22 job resources, 9 outcomes and 8 personal resources. Although no detailed analysis of this instrument has yet been published, the authors claim confirmation of the expected factor structure and correlation with the other variables under the JD-R model. However, the major shortcoming of this instrument is its length – a total of 133 items (of which 77 address job demands and resources), as well as the fact that the instrument is not in the open domain.

There is another instrument, developed for educators in the North West province of South Africa in order to measure their specific job demands and resources (Job Demands-Resources Scale, JDRS; Jackson & Rothmann, 2005). Although this 48-item instrument demonstrates satisfactory characteristics with respect to the local sample, its implementation in other countries has not been recorded in any available research. In psychometric validation of the instrument, seven factors were extracted: growth opportunities, organisational support, overload, job insecurity, relationship with colleagues, control and rewards (Jackson & Rothmann, 2005). The primary limitation of the instrument is that there is lack of research on participants in other professions (Rothmann et al., 2006). This limitation has partially been mitigated by a small number of studies in which the instrument demonstrated satisfactory psychometric characteristics in regard to health workers (Du Preez & D’Emiljo, 2017; Liebenberg et al., 2022). However, further validation of this instrument is needed in various professions.

In view of the facts as considered above, and out of a need for an appropriate evaluation of key job characteristics that would facilitate testing of different stress models, especially the JD-R model, the Job Characteristics Questionnaire (JCQ) was developed. The objective of this paper is to investigate the psychometric characteristics of the JCQ. First, factor structure was tested with the expectation of extracting 11 factors according to the JD-R model. Second, Item Response Theory (IRT) analysis was applied in order to check item misfit, discrimination parameter and information. The main contribution of the IRT model is in determining the item and test information, i.e., how precisely an item or scale can measure the underlying trait across the whole continuum of the latent trait. Based on the information curve we can conclude whether item or scale discrimination is achieved across the entire range of the scores for the latent trait or only within certain score ranges. Finally, criterion validity was investigated through correlation with work engagement, workplace burnout and organisational citizenship behaviour.

Method

Participants

This psychometric study is based on five independent non-probabilistic samples drawn from the general population of employees. The JCQ questionnaire was administered to each sample, together with other questionnaires. The samples were collected for the purpose of writing final master's theses. The full list of master's theses whose datasets were used in this study can be found in the Appendix 2. The authors of this paper acquired permission to use these datasets from the respective authors of the master's theses. Participants included in the total sample ($N = 1201$, of which 60.5% were women) were aged 38 on average ($SD = 10.4$) and had an average of 13.2 years of work experience ($SD = 9.99$). Roughly half of the sample (52.3%) completed either elementary or secondary school, while the rest of the participants hold master's or higher degrees. The majority of the sample (64.6%) occupied non-managerial positions, with 19.1% holding managerial roles, and 16.3% opting not to respond to this question.

Instruments

Job Characteristics Questionnaire (JCQ). The JCQ is a newly-developed questionnaire, the primary objective of which is to measure the presence of certain situations and working conditions in an organisation which might have stress potential for employees, as well as those which might assist employees in overcoming these unfavourable conditions and work situations. The questionnaire was based on MSIT (Cousins et al., 2004; Edwards et al., 2008), the job content questionnaire (Karasek et al., 1998) and previously described questionnaires developed under the demands-resources model. Since this is the first questionnaire of its kind in Serbia, we decided to further extend the initial group of items and constructs such that the initial version of the questionnaire comprises 46 items eliciting responses on a 5-point Likert-type scale (from 1 = *almost never* to 5 = *almost always*). Items are grouped under 11 dimensions:

1. *Quantitative demands* ($n = 3$) relate to the quantity of work that the employee is required to perform within a specific time, the speed with which the employee is required to work, and the lack of time they have to complete job tasks. There are three items in this category, including, for example, "You are set impossible deadlines".
2. *Cognitive demands* ($n = 3$) are demands that require the engagement of cognitive resources on the part of the employee, such as concentration, attention, processing various information and problem-solving. This category has three items, including, for example, "Your job requires that you be very careful and focused while you are working."
3. *Emotional demands* ($n = 3$) relate to situations in which the employee is in direct contact with others. This process often involves concealing or suppressing one's "real" emotions so as to appear friendly and/or polite. This category has three items, including, for example, "The job requires you to behave politely (when talking to customers, clients etc.) even when you don't feel like it."
4. *Job variety* ($n = 3$) relates to the extent to which the job requires the employee to perform different tasks using a wide variety of skills. This dimension is represented by three items, for example, "The job requires you to use a wide range of different skills".
5. *Physical demands* ($n = 3$) relate to job demands placed on workers that require physical effort, such as lifting heavy weights or working in unnatural body postures. This construct is represented by three items, such as, "Your job requires that you stand or walk for long periods while you are working."

6. *Job control* ($n = 5$) relates to the ability of the employee to influence various aspects of the job, such as through flexible working hours, the number of breaks, approaches to performing work, and others. The scale consists of four items, such as, "You decide for yourself when you will take a break during working hours".
7. *Support from manager* ($n = 6$) relates to the extent to which the employee receives feedback, help and support from their manager. This category comprises six items, such as, "The effort you invest is valued by your superior."
8. *Support from colleagues* ($n = 6$) relates to the extent to which colleagues are supportive towards the employee and provide them with assistance and support. This category is represented by six items, for example, "You receive assistance and support from your colleagues."
9. *Role conflict* ($n = 5$) relates to the degree to which the employee is clear about what is expected of them in the course of their work. The "role conflict" construct also addresses any conflicting instructions and information received by the employee from various people and sources. This sub-scale comprises five items, for example, "In your job you face contradictory instructions and demands."
10. *Change* ($n = 5$) relates to the degree or frequency of changes in working conditions, as well as the way in which these changes are managed. Additionally, these items investigate the quality of communication employees have with management in relation to changes happening in the organisation. This dimension has five items, such as, "In your organisation employees are always consulted about any changes in the workplace."
11. *Working environment* ($n = 4$) relates to the quality of conditions in which the employee performs their job, such as lighting, noise, air-conditioning etc. This aspect is represented by four items, such as "Your workplace is protected from excessive noise."

Items have been formulated and oriented such that quantitative, emotional, cognitive and physical demands, role conflict, changes and working environment operate as demands, circumstances or conditions faced by employees which incur mental or physical job strain. The job variety scale, support from colleagues and managers, and control, are resources which the employee can bring to bear in order to offset the demands, as well as the mental and physical costs relating to them.

A further four questionnaires were used in the research in addition to the JCQ. Table 1 lists which questionnaires were used with which sub-sample, and there follows an overview of the instruments with a more detailed overview of the JCQ questionnaire.

The Utrecht work engagement scale (UWES-9; Schaufeli et al., 2006, for Serbian adaptation see Popov, 2013). UWES-9 measures the extent to which employees experience a positive, fulfilling state of vigour, dedication and absorption in regard to their work (e.g., "At my job, I feel strong and vigorous"). The scale comprises nine items, and the task of the respondent is to assess the frequency of certain emotions on a seven-item Likert scale (from 0 = *never* to 6 = *every day*). The alpha coefficient obtained in this study is .93 (Cf. de Bruin & Henn, 2013).

The work burnout scale from the Copenhagen burnout inventory (WB; Kristensen et al., 2005 – for Serbian adaptation see Berat et al., 2016). The WB scale comprises 7 claims which measure the extent to which employees have been exhausted and frustrated in carrying out their work in the last four weeks (e.g., "Is your work emotionally exhausting?"). Responses are provided using a five-item Likert-type scale (from 1 = *to a very low degree/ almost never* to 5 = *to a very high degree/always*). The alpha coefficient obtained in this study is .87.

Organisational citizenship behaviour scale (OCBS; Popov, 2013). The OCBS comprises statements which describe the degree to which employees behave in a prosocial and responsible manner in their workplace (e.g., “I help my colleagues even when it isn’t strictly part of my job description”). This scale encompasses seven dimensions of organisational citizenship behaviour, these being: helping behaviour, sportsmanship, organisational compliance, organisational loyalty, individual initiative, civic virtue, and self-development (Podsakoff et al., 2000). A single statement has been formulated for each dimension, resulting in a 7-item OCB scale. Responses are collected via a four-item Likert scale (from 1 = *never or almost never* to 4 = *always, or almost always*). The alpha coefficient obtained in this study aligns with those obtained in certain previous studies that employed a unidimensional approach to measure OCB (.69 and .75 respectively; Pond III et al., 1997).

Intentions to leave the organisation (ILO; Berat et al., 2016). ILO is a 3-item scale that measures turnover intentions. Its main purpose is to assess how strong the employee’s intention is to leave the organisation in which he or she works (e.g., “How often have you seriously thought about leaving the job in the past month?”). A five-level response format is used, ranging from 1 = *almost never* to 5 = *very often*. The alpha coefficient obtained in this study is .87.

Table 1

Instruments used in the research across samples

Sample (N)	JCQ	WB	UWES	OCBS	ILO
1 (n=217)	X		X		
2 (n=194)	X	X	X	X	
3 (n=169)	X				X
4 (n=414)	X	X	X		
5 (n=207)	X	X	X		

Note. JCQ – Job characteristics questionnaire; WB – Work burnout; UWES – Utrecht work engagement scale; OCBS – Organisational citizenship behaviour scale; ILO – Intention to leave the organisation.

Data Analysis

First, the factor structure of the JCQ was tested. Since we proposed an 11-factor structure, we conducted confirmatory factor analysis (CFA) on the total sample. As the multivariate normal distribution assumption was violated, we employed the diagonally weighted least squares (DWLS) method. The model’s adequacy was evaluated using several fit indices: Bentler’s comparative fit index (CFI) and the Tucker-Lewis index (TLI), both of which were required to be $\geq .90$; the root mean square error of approximation (RMSEA) and standardised root mean square residual (SRMR) which were required to be $\leq .08$ for satisfactory fit, or CFI and TLI $\geq .95$ and RMSEA and SRMR $\leq .06$ for good model fit (Hu & Bentler, 1999). The results showed that the 11-factor model’s fit did not meet the criteria (DWLS $\chi^2(934) = 4642.58$, $p < .001$, CFI = .826, TLI = .807, RMSEA = .057, CI 90% [.056, .059], SRMR = .071) and indicated an issue with negative variance. Thus, in order to explore the factor structure of the JCQ, we apply a method which includes a combination of exploratory factor analysis (EFA) and CFA. The whole sample was randomly divided into two subsamples. On the first subsample ($n = 589$) parallel analysis was applied to determine the number of factors, followed by EFA. Since multivariate normal distribution was violated, the weighted least squares (WLS) method was used. The second subsample ($n = 612$) was used to validate the factor structure obtained from the EFA using CFA. A minimum loading of .32 was used as significant in both analyses (Tabachnick & Fidell, 2013). Parallel analysis, EFA and CFA were performed in JASP v0.16.3. (JASP Team, 2022). Second, IRT analysis (a graded

response model was used, which is appropriate for Likert-type items) was performed on the second subsample by using the “ltm” R package (Rizopoulos, 2007). Conditions for IRT were tested through CFA, specifically by evaluating the model fit for one-factor solution for each scale and low residual correlations between items, which are indicators of local independence. Finally, criterion validity was tested by calculating Pearson correlations between the JCQ’s scales and the other variables.

Results

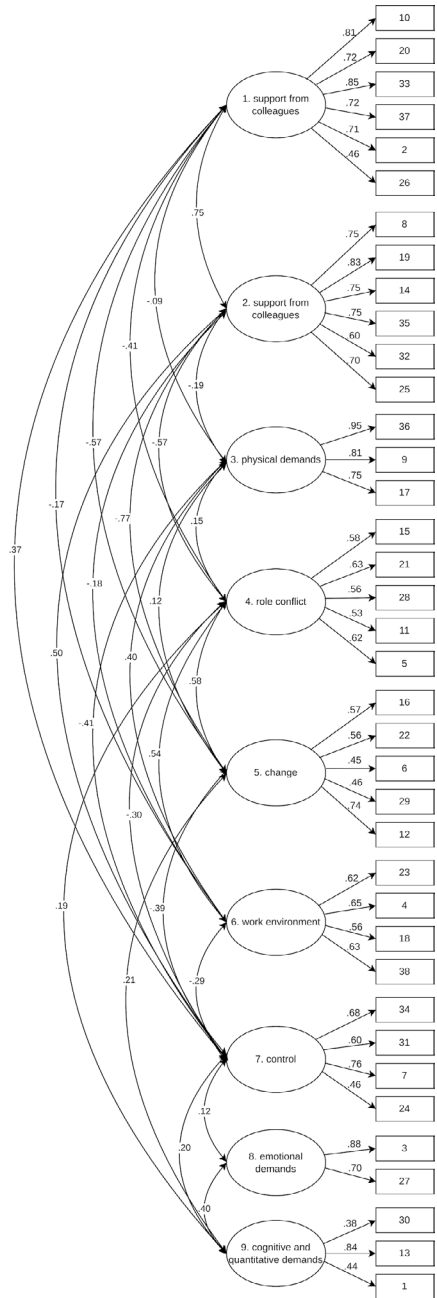
Factor Structure of the JCQ

The results of the parallel analysis on the first subsample indicated 9 factors. Consequently, EFA with 9 factors was conducted. Examination of the factor structure led to the conclusion that job variety items constituted a common factor together with cognitive and quantitative demands, and they were removed from the analysis in order to obtain a factor structure that was interpretable and theoretically justified. Repeated parallel analysis indicated 8 factors, and EFA with 8 factors was performed. However, only two out of five role conflict items constituted a factor, while the remaining three items constituted a factor together with items from cognitive and quantitative demands. Thus, these three items were removed. Parallel analysis performed on the reduced set of items indicated 9 factors. Based on the pattern matrix from EFA with 9 factors (Table A in the Appendix 1), the factors were interpreted as follows: support from colleagues, support from manager, physical demands, role conflict, change, working environment, control, emotional demands, and cognitive and quantitative demands. Two items had no significant loading on any factor and they were removed, leaving a final 38 items. It is noted that the emotional demands factor comprises only two items. Although the usual minimal number of items per factor is three, a factor with two items is acceptable for more narrowly-defined factors if those two items are highly correlated with each other, and have a low correlation with the remaining items (Worthington & Whittaker, 2006). This condition was met in the emotional demand factor, and the two items had a correlation of .60 while their highest correlation with other items was .34.

Subsequently, we conducted the CFA on the second subsample to test the validity of the final 9-factor model with correlated factors obtained from the EFA. This model exhibited good fit indices ($DWLS\chi^2(629) = 1559.08, p < .001$, CFI = .949, TLI = .943, RMSEA = .049, CI 90% [.046, .052], SRMR = .064). Factor loadings were significant and in most cases high, ranging from .38 to .95 (see Figure 1). Correlations between factors ranged from $-.77$ to $.75$, with an average absolute correlation of .26. Given the presence of 12 non-significant correlations among factors, a model incorporating a higher-order factor was deemed unsuitable for application. Consequently, the 9-factor solution was retained as the final model.

Figure 1

Factor loadings of the final model of JCQ in confirmatory factor analysis (n = 612)



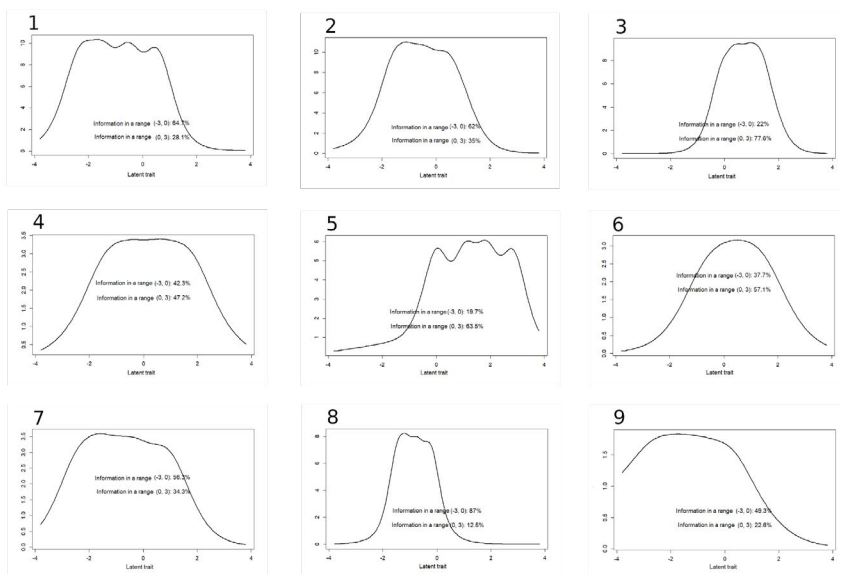
Note. For the sake of clarity, only significant factor correlations are presented.

IRT Analysis of the JCQ

Conditions for IRT analysis on the second subsample were met, with residual correlations not exceeding .20 (see Table B in the Appendix 1 for model fit indices). The IRT analysis showed that there was a negligible percentage of misfit item combinations – only two triplets in the colleague support scale and change scale. Furthermore, items within the role conflict and change scales tended to be perceived as “difficult” to endorse, while items in the support from colleagues, support from manager, control, emotional demands, and cognitive and quantitative demands scales were characterised as “easy” to endorse (see Table B in the Appendix 1). Discrimination parameters were generally high, and only three items had a value of below 1 (6, 26, 29), while item 27 had the highest discrimination parameter (4.82, see Table B in the Appendix 1). Information in the range –3 to 3 logits ranged from 71.9% for the cognitive and quantitative demands scale, to 99.6% for the physical demands scale. The colleague support, managerial support, emotional demands, cognitive and quantitative demands scale and, to a lesser extent, the working environment scale, were more informative at the average and below-average scores, i.e., they showed better discrimination in these levels of the latent trait (Figure 2). On the other hand, the physical job demands, changes and, to a lesser extent, the working environment scale, were more informative at the average and above-average scores, while the role conflict scale was equally informative in the broader range of the latent trait (Figure 2).

Figure 2

Test information for the JCQ scales ($n = 612$)



Note. 1 – support from colleagues, 2 – support from manager, 3 – physical demands, 4 – role conflict, 5 – change, 6 – work environment, 7 – control, 8 – emotional demands, 9 – cognitive and quantitative demands.

Descriptives, Alpha Reliabilities and Intercorrelations

Cronbach's alpha on the total sample ranged from .56 for the cognitive and quantitative demands scale up to .87 for the manager support and physical demands scale (Table 2). Correlations based on raw scores showed that the emotional demands scale had the lowest correlation with other scales and the only significant correlation with the cognitive and quantitative demands scale (Table 2). The other scales mostly showed low to moderate correlation with one another, except the colleague support and managerial support scales, which demonstrated a high intercorrelation.

Table 2
Descriptives and intercorrelations of the JCQ scales (N = 1201)

	<i>M/No. items</i>	<i>SD</i>	<i>Sk</i>	<i>Ku</i>	1	2	3	4	5	6	7	8	9
1. Support from colleagues	3.87(6)	4.68	-0.53	-0.14	.85								
2. Support from manager	3.63(6)	5.74	-0.50	-0.45	.64**	.87							
3. Physical demands	2.16(3)	3.84	0.79	-0.71	-.09**	-.12**	.87						
4. Role conflict	2.38(5)	3.70	0.39	-0.14	-.48**	-.59**	.07*	.73					
5. Change	2.84(5)	4.28	0.18	-0.39	-.32**	-.44**	.17*	.42**	.72				
6. Work environment	2.55(4)	4.37	0.38	-0.76	-.14**	-.14**	.31**	.04	.36**	.71			
7. Control	3.68(4)	3.39	-0.54	0.06	.27**	.33**	-.35**	-.20**	-.19**	-.24**	.67		
8. Emotional demands	3.93(2)	2.53	-1.03	-0.16	.05	.00	.01	-.04	-.00	-.00	.09**	.77	
9. Cognitive and quantitative demands	4.10(3)	2.07	-0.81	0.80	.02	-.07*	-.03	.16**	.15**	.01	.13**	.28**	.56

Note. M – mean; No. – number of Items; SD – standard deviation; Sk – skewness; Ku – kurtosis; Cronbach's alphas are in diagonal. * $p < .05$, ** $p < .01$.

Criterion Validity of the JCQ Scale

Correlations with the criterion variables were in most cases moderate, statistically significant and meaningful (Table 3), with the exception of cognitive and quantitative and emotional demands which positively correlated with work engagement, an unexpected finding. Additionally, the physical demands scale showed a lack of significant correlation with work engagement and the intention to leave the organisation.

Table 3
Correlations of the JCQ scales with validity variables

Samples	Instruments	1	2	3	4	5	6	7	8	9
Sample 1 (n = 217)	UWES	.29**	.43**	-.12	-.30**	-.37**	-.27**	.36**	.34**	.25**
	WB	-.46**	-.51**	.30**	.46**	.51**	.31**	-.23**	-.04	.25**
Sample 2 (n = 193)	UWES	.48**	.54**	-.24**	-.39**	-.51**	-.32**	.40**	.17*	.12
	OCB	.36**	.48**	-.16*	-.37**	-.45**	-.22**	.25**	.14*	.08
Sample 3 (n = 169)	ILO	-.35**	-.51**	.11	.48**	.52**	.20**	-.23**	.05	.15*
Samples 4 i 5 (n = 621)	WB	-.37**	-.46**	.19**	.45**	.54**	.26**	-.38**	.18**	.33**
	UWES	.27**	.35**	-.18**	-.29**	-.38**	-.20**	.40**	-.01	.12**

Note. 1 – support from colleagues, 2 – support from manager, 3 – physical demands, 4 – role conflict, 5 – change, 6 – work environment, 7 – control, 8 – emotional demands, 9 – cognitive and quantitative demands.

* $p < .05$, ** $p < .01$.

Discussion

The objective of the research we conducted was to investigate the psychometric characteristics of the newly-created Job Characteristics Questionnaire (JCQ) in response to the increasing need on the part of researchers for an effective and comprehensive instrument created in our region. The results of the factor analysis showed a 9-factor model in the final solution. This model had satisfactory fit indices, and is theoretically justified, clear and interpretable. Although extraction of 11 factors was originally expected, the presumed job variety factor could not clearly be extracted in the analysis. Also, a starting assumption was that the general factor of job demands would be possible to empirically describe using four dimensions: quantitative demands, cognitive demands, emotional demands and physical demands. Of these, the ideas of physical and emotional demands clearly emerged as separate factors, with the physical demands factor emerging in its original form (three items), and the emotional demands factor encompassing only two items, moderately correlated. However, the cognitive and quantitative job demands merged into a single factor, which is not unusual when we consider that some similar instruments use either only one job demands dimension – most often quantitative demands (e.g., Cousins et al., 2004) – or group the various job demands into one overarching dimension (e.g., Kristensen et al., 2005). That this factor encompasses greater variety is also indicated by somewhat lower alpha reliability in relation to the other dimensions (.56), although this is satisfactory given the small number of items. The reliability of the other scales ranged between .66 and .87.

The results of the IRT showed that the information of the scales were satisfactory to good, but when interpreting the scores one would need to take into account that colleague support, managerial support, job demands, cognitive and quantitative job demands and, to a lesser extent, the working environment

scale, would be more appropriate for employees who had lower scores on them, while the reverse was true for the physical demands, change and, to a lesser extent, working environment scales, which were better suited to employees with higher scores on them.

Intercorrelation of the Scales

According to the JD-R model, the job dimensions represented by the cognitive and quantitative job demands, emotional demands, physical job demands, changes, stressors relating to role conflict, and unfavourable working conditions scales, are factors which hinder the work of employees and give rise to strain, as well as raising levels of burnout and intention to leave the organisation. In the terminology of the JD-R model, these scales could be grouped under the category of demands. The job dimensions represented by the factors of colleague support, managerial support and control, constitute resources, or protective factors, and reduce burn-out, thereby increasing work engagement, i.e. they comprise the resource scales in the terminology of the JD-R model. The intercorrelations of the scales varying between non-significant and moderate, with the greatest intercorrelation obtained between support from colleagues and support from managers (.64). This result points to good discrimination validity for the scales.

The correlation between colleague support and managerial support is meaningful and theoretically justified, indicating the existence of a common factor of organisational culture and climate relating to social support and relationships amongst colleagues. In their research, Bakker et al. (2005) obtained a very similar correlation between the social support and quality of relationship with superiors variables (.56). Similar correlations were also obtained between the related variables of feedback and quality of relationship with superior (.60), and those of feedback and social support (.55). Additionally, our research found a significant and moderately high correlation between cognitive and quantitative factors on the one hand, and emotional demands on the other (.30), which is also theoretically justified and expected (see Hu et al., 2011). Neither of these two demands was correlated with the physical demands factor. This points to the dual nature of job demands and accords with the common-sense assumption that mental and physical strain at work need not be (and most often are not) interconnected.

Criterion Validity

The correlations between the dimensions of the JCQ and the outcome variables were in most cases meaningful and expected. Nevertheless, given the dual nature of demands and resources in the J-DR model (Bakker & Demerouti, 2007), it would be reasonable to expect that “negative” characteristics such as cognitive and quantitative and emotional demands, role conflict and stressors relating to change would correlate more with “negative” employee well-being

indicators, such as burn-out, and less with “positive” indicators such as work engagement – and vice-versa. However, this expectation was largely unsupported by the results of this research. Although typical “negative” characteristics such as stressors relating to changes and roles did indeed display meaningful correlations with outcome variables, there was no pattern of correlation that indicated that “negative” job characteristics were related to “negative” outcomes. The situation was similar where typical “positive” characteristics, or resources, to use the terminology of the JD-R model, were concerned.

We would like to examine the relationship between job demands and work engagement in a little more detail. In order to properly understand this correlation, we need to look in a little more depth at some assumptions of the theoretical models we began with. The demands-resources model is in essence an extension of the demands-control model (Karasek, 1979), which recognises the category of what it calls “active” jobs – those which feature both high demands and high control (Karasek & Theorell, 1990) and which, under the assumptions of the model, give rise to employee well-being and person growth and development. In this context one can understand the existence of a positive connection between some job demands and work engagement, and this has been confirmed by numerous studies to date (Breevaart & Bakker, 2018; Mauno et al., 2007; Schaufeli & Bakker, 2004), although there have also been contrary findings (Nahrgang et al., 2011; Skaalvik & Skaalvik, 2018; Upadyaya et al., 2016). The relationships between job demands and work engagement have thus not yet been fully clarified, and it seems that they depend on the nature of the demands, as presumed by Crawford et al (2010). They concluded that demands perceived as hindrances by employees will display a negative relationship with work engagement, while those demands that are perceived as challenges will display a positive correlation. As far as can be ascertained, the dimensions of cognitive and quantitative job demands as formulated in the JCQ were perceived by the subjects as challenges, not as hindrances. These presumptions would need to be evaluated in future research.

Limitations and Recommendations

The study is subject to several limitations. Firstly, the study was conducted on a convenient general sample of employees, without accounting for specific contextual factors and industry peculiarities. Therefore, future research should aim to validate the JCQ across diverse industries and occupations. Secondly, all the validation criteria employed in this study relied on self-report methods, which are subjected to social desirability bias. Subsequent research should incorporate various data collection techniques and validate the JCQ against behavioural measures such as in-role job performance. Lastly, while the inclusion of 2 items per factor is justified in this study, future research could enhance comprehensiveness by incorporating additional indicators for the emotional demands scale.

Conclusion

The proposed Job Characteristics Questionnaire showed an interpretable and replicable 9-factor solution with satisfactory psychometric characteristics. All of the extracted dimensions demonstrated the expected, theoretically grounded intercorrelations, and for the most part the expected correlations with other relevant constructs. However, there is room for further improvement of items relating to the job demands scales (cognitive, quantitative, and emotional), which would facilitate better empirical separation of these aspects of the job demands. JCQ is a comprehensive and efficient instrument for measuring important job and organisational characteristics and we would recommend it for use both for research and practical purposes.

References

- Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, 22, 273–285. <https://doi.org/10.1037/ocp0000056>
- Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources model: State of the art. *Journal of Managerial Psychology*, 22(3), 309–328. <https://doi.org/10.1108/02683940710733115>
- Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005). Job Resources Buffer the Impact of Job Demands on Burnout. *Journal of Occupational Health Psychology*, 10, 170–180. <https://doi.org/10.1037/1076-8998.10.2.170>
- Berat, N., Jelić, D. & Popov, B. (2016). Serbian version of the work burnout scale from the Copenhagen Burnout Inventory: Adaptation and psychometric properties. *Primenjena Psihologija*, 9(2). <https://doi.org/10.19090/pp.2016.2.177-198>
- Breevaart, K., & Bakker, A. B. (2018). Daily job demands and employee work engagement: The role of daily transformational leadership behavior. *Journal of Occupational Health Psychology*, 23, 338–349. <https://doi.org/10.1037/ocp0000082>
- Cousins, R., MacKay, C. J., Clarke, S. D., Kelly, C., Kelly, P. J., & McCaig, R. H. (2004). ‘Management Standards’ work-related stress in the UK: Practical development. *Work & Stress*, 18(2), 113–136. <https://doi.org/10.1080/02678370410001734322>
- Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: A theoretical extension and meta-analytic test. *Journal of Applied Psychology*, 95, 834–848. <https://doi.org/10.1037/a0019364>
- de Bruin, G. P., & Henn, C. M. (2013). Dimensionality of the 9-Item Utrecht Work Engagement Scale (UWES-9). *Psychological Reports*, 112(3), 788–799. <https://doi.org/10.2466/01.03.PR0.112.3.788-799>
- De Jonge, J., & Schaufeli, W. B. (1998). Job characteristics and employee well-being: A test of Warr’s Vitamin Model in health care workers using structural equation modelling. *Journal of Organizational Behavior*, 19(4), 387–407. [https://doi.org/10.1002/\(SICI\)1099-1379\(199807\)19:4<387::AID-JOB851>3.0.CO;2-9](https://doi.org/10.1002/(SICI)1099-1379(199807)19:4<387::AID-JOB851>3.0.CO;2-9)
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86, 499–512. <https://doi.org/10.1037/0021-9010.86.3.499>
- Du Preez, R., & D’Emiljo, A. (2017). Job demands and resources as antecedents of work engagement: A diagnostic survey of nursing practitioners. *Africa Journal of Nursing and Midwifery*, 19(1), 69–87. <https://doi.org/10.25159/2520-5293/475>

- Edwards, J. A., Webster, S., Van Laar, D., & Easton, S. (2008). Psychometric analysis of the UK Health and Safety Executive's Management Standards work-related stress Indicator Tool. *Work & Stress*, 22(2), 96–107. <https://doi.org/10.1080/02678370802166599>
- Hackman, J. R., & Oldham, G. R. (1980). *Work Redesign*. Addison-Wesley.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Hu, Q., Schaufeli, W. B., & Taris, T. W. (2011). The Job Demands–Resources model: An analysis of additive and joint effects of demands and resources. *Journal of Vocational Behavior*, 79(1), 181–190. <https://doi.org/10.1016/j.jvb.2010.12.009>
- Jackson, L., & Rothmann, S. (2005). Work-related well-being of educators in a district of the North-West Province: Research article. *Perspectives in Education*, 23(1), 107–122. <https://doi.org/10.10520/EJC87328>
- JASP Team (2022). JASP (Version 0.16.3)[Computer software].
- Karasek, R. A. (1979). Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. *Administrative Science Quarterly*, 24(2), 285–308. <https://doi.org/10.2307/2392498>
- Karasek, R., Brisson, C., Kawakami, N., Houtman, I., Bongers, P., & Amick, B. (1998). The Job Content Questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job characteristics. *Journal of Occupational Health Psychology*, 3, 322–355. <https://doi.org/10.1037/1076-8998.3.4.322>
- Karasek, R., & Theorell, T. (1990). *Healthy Work: Stress, Productivity, and the Reconstruction of Working Life*. Basic Books.
- Kristensen, T. S., Borritz, M., Villadsen, E., & Christensen, K. B. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192–207. <https://doi.org/10.1080/02678370500297720>
- Liebenberg, J.-M., Scholtz, S. E., & De Beer, L. T. (2022). The Daily Basic Psychological Need Satisfaction and Work Engagement of Nurses: A 'Shortitudinal' Diary Study. *Healthcare*, 10(5), Article 5. <https://doi.org/10.3390/healthcare10050863>
- Mauno, S., Kinnunen, U., & Ruokolainen, M. (2007). Job demands and resources as antecedents of work engagement: A longitudinal study. *Journal of Vocational Behavior*, 70(1), 149–171. <https://doi.org/10.1016/j.jvb.2006.09.002>
- Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). Safety at work: A meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology*, 96, 71–94. <https://doi.org/10.1037/a0021484>
- Podsakoff, P. M., MacKenzie, S. B., Paine, J. B., & Bachrach, D. G. (2000). Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. *Journal of Management*, 26(3), 513–563. [https://doi.org/10.1016/S0149-2063\(00\)00047-7](https://doi.org/10.1016/S0149-2063(00)00047-7)
- Pond III, S. B., Nacoste, R. W., Mohr, M. F., & Rodriguez, C. M. (1997). The Measurement of Organizational Citizenship Behavior: Are We Assuming Too Much?. *Journal of Applied Social Psychology*, 27(17), 1527–1544. <https://doi.org/10.1111/j.1559-1816.1997.tb01611.x>
- Popov, B. (2013). Uslovi na radu i individualna uverenja zaposlenih kao prediktori organizacijskog zdravlja [Unpublished doctoral dissertation]. University of Novi Sad.
- Revelle, W. (2019). *psych: Procedures for Psychological, Psychometric, and Personality Research*. Northwestern University, Evanston, Illinois. R package version 1.9.12. Retrieved from <https://CRAN.R-project.org/package=psych>.
- Rizopoulos, D. (2007). ltm: An R Package for Latent Variable Modeling and Item Response Analysis. *Journal of Statistical Software*, 17, 1–25. <https://doi.org/10.18637/jss.v017.i05>

- Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, 48(2), 1–36. Retrieved from <http://www.jstatsoft.org/v48/i02/>.
- Rothmann, S., Mostert, K., & Strydom, M. (2006). A psychometric evaluation of the Job Demands-Resources Scale in South Africa. *SA Journal of Industrial Psychology*, 32(4), 76–86. <https://doi.org/10.10520/EJC89107>
- Schaufeli, W. B. (2017). Applying the Job Demands-Resources model. *Organizational Dynamics*, 46(2), 120–132. <https://doi.org/10.1016/j.orgdyn.2017.04.008>
- Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, 25(3), 293–315. <https://doi.org/10.1002/job.248>
- Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The Measurement of Work Engagement With a Short Questionnaire: A Cross-National Study. *Educational and Psychological Measurement*, 66(4), 701–716. <https://doi.org/10.1177/0013164405282471>
- Skaalvik, E. M., & Skaalvik, S. (2018). Job demands and job resources as predictors of teacher motivation and well-being. *Social Psychology of Education*, 21(5), 1251–1275. <https://doi.org/10.1007/s11218-018-9464-8>
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics* (6th ed.). Pearson.
- Taris, T. W., & Schaufeli, W. B. (2015). Individual Well-being and Performance at Work: A conceptual and theoretical overview. In M. van Veldhoven & R. Peccei (Eds.), *Well-being and performance at work: The role of context* (pp. 15–34). Psychology Press.
- Upadaya, K., Vartiainen, M., & Salmela-Aro, K. (2016). From job demands and resources to work engagement, burnout, life satisfaction, depressive symptoms, and occupational health. *Burnout Research*, 3(4), 101–108. <https://doi.org/10.1016/j.burn.2016.10.001>
- Warr, P. (1987). *Work, unemployment, and mental health*. Oxford University Press.
- Wännström, I., Peterson, U., Åsberg, M., Nygren, Å., & Gustavsson, J. P. (2009). Psychometric properties of scales in the General Nordic Questionnaire for Psychological and Social Factors at Work (QPSNordic): Confirmatory factor analysis and prediction of certified long-term sickness absence. *Scandinavian Journal of Psychology*, 50(3), 231–244. <https://doi.org/10.1111/j.1467-9450.2008.00697.x>
- Worthington, R. L., & Whittaker, T. A. (2006). Scale Development Research: A Content Analysis and Recommendations for Best Practices. *The Counseling Psychologist*, 34(6), 806–838. <https://doi.org/10.1177/0011000006288127>

Merenje zahteva posla i resursa: validacija novog upitnika o karakteristikama posla (UKP)

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Za potrebe merenja zahteva i resursa posla kreiran je Upitnik o karakteristikama posla (UKP). Glavni cilj ove studije je bila početna validacija UKP-a i testiranje njegovih psihometrijskih svojstava. Ukupno 1201 ispitanik u pet nezavisnih uzoraka popunio je UKP zajedno sa skalom izgaranja na poslu (eng. Work burnout scale, Kristensen et al., 2005), Utreht skalom radnog angažovanja (The Utrecht work engagement scale, Schaufeli et al., 2006), Skalom ponašanja organizacijskog građanstva (Organisational citizenship behaviour scale, Popov, 2013), i Skalom namere da se napusti organizacija (the Intentions to leave the organisation scale, Berat et al., 2016). Eksplorativna i konfirmativna faktorska analiza izvedene na dva poduzorka

formirana slučajnim biranjem ukazuju na interpretabilno 9-faktorsko rešenje latentne strukture UKP-a. Sve ekstrahovane dimenzije su pokazale očekivane međukorelacije, a korelacije sa drugim relevantnim varijablama su bile najvećim delom smislene. Na osnovu rezultata ove preliminarne analize, UKP se pokazao kao sveobuhvatan, validan i efikasan instrument za merenje važnih radnih i organizacionih karakteristika i mogao bi se koristiti i u akademskim i neakademskim okruženjima.

Ključne reči: zahtevi posla, resursi posla, psihometrijska svojstva, validacija, TSO

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Appendix 1

Table A*Factor loadings in exploratory factor analysis of the JCQ (n = 589)*

Item	Scale 1: support from colleagues		Loading
2	Dobijate pomoć i podršku od svojih kolega.	You receive assistance and support from your colleagues.	.71
10	Prisutna je dobra radna atmosfera među kolegama na poslu.	There is a good working atmosphere among colleagues at work.	.81
20	Kada je teško na poslu, kolege Vam pomažu.	When it's hard at work, your colleagues help you out.	.72
26*	Kolege Vas kritikuju kada god im se ukaže prilika za to.	Your colleagues criticise you whenever they get the chance.	.36
33	Međuljudski odnosi na poslu su korektni.	Workplace relationships are good.	.83
37	Vaše kolege su spremne da saslušaju probleme vezane za posao koji obavljate.	Your colleagues are ready to listen to you talk about problems with your job.	.73
Scale 2: support from manager			
8	Vaš nadređeni dobro rešava konflikte među saradnicima na poslu.	Your manager is good at resolving workplace conflicts.	.76
14	Vaš nadređeni vrednuje Vaš uloženi trud.	The effort you invest is valued by your manager.	.75
19	Nadređeni je spreman da saslušava Vaše probleme vezane za posao koji obavljate. Povratna informacija koju dobijete	Your manager is ready to listen to you talk about problems with your job.	.83
25	od strane nadređenog Vam je jasna i precizna.	The feedback you receive from your manager is clear and precise.	.70
32*	Dešava se da nadređeni plane i bude grub prema Vama bez posebnog razloga.	On occasion your manager flares up and snaps at you for no particular reason.	.48
35	Nadređeni se odnosi jednako prema svim zaposlenima.	Your manager behaves the same towards all employees.	.75
Scale 3: physical demands			
9	Vaš posao podrazumeva podizanje teških tereta.	Your job involves lifting heavy loads.	.83
17	Vaš posao podrazumeva stajanje i hodanje u dužim vremenskim razdobljima tokom rada.	Your job involves standing and walking for long periods whilst working.	.63
36	Vaš posao zahteva puno fizičkog naprezanja.	Your job involves a lot of physical effort.	.97
Scale 4: role conflict			
5	Dešava se da Vam budu dodeljeni zadaci koji nisu u opisu Vašeg posla.	On occasion you are given tasks which are not part of your job description.	.48
11	Događa Vam se da dobijate kontradiktorne instrukcije i zahteve na poslu.	On occasion you are given contradictory instructions and demands in your job.	.77
15*	Potpuno Vam je jasno koji su Vaši zadaci i odgovornosti na poslu.	You are completely clear about what your tasks and responsibilities at work are.	.34
21*	Tačno znate šta se od Vas očekuje na poslu.	You know exactly what's expected of you at work.	.36
28	Dešava se da dobijete zadatak za koji niste dovoljno kompetentni.	On occasion you are given tasks for which you are not sufficiently competent.	.46

Scale 5: change			
6*	Imate dovoljno mogućnosti da sa rukovodstvom razgovarate o promenama na poslu.	You have sufficient opportunity to discuss changes at work with management.	.63
12*	U Vašoj organizaciji zaposleni su uvek konsultovani o eventualnim promenama na poslu.	In your organisation, employees are always consulted about any changes in the workplace.	.52
16	U Vašoj organizaciji se dešavaju nenajavljene promene.	Unannounced changes happen in your organisation.	.58
22	Promene u Vašoj organizaciji se dešavaju toliko često, da ih je postalo teško pratiti.	Changes happen so often in your organisation that it's become difficult to keep track of them.	.64
29	Ne znate šta će Vas sutra dočekati na poslu.	You don't know what will be waiting for you at work tomorrow.	.57
Scale 6: work environment			
4	Posao se odvija u okruženju u kom postoji ozbiljan rizik od povređivanja ili nezgoda (na primer, opasne materije, rad na visini, opasnost od požara i sl.).	The job is performed in an environment in which there is a serious risk of injury or accident (e.g. hazardous materials, work at height, fire hazards etc.)	.64
18*	Vaše radno mesto je zaštićeno od preterane buke.	Your workplace is protected from excessive noise.	.55
23*	Radno okruženje Vam je optimalno klimatizovano, u smislu temperature i vlažnosti vazduha.	Your work environment has optimal climate control in terms of temperature and humidity.	.62
38	Osvetljenje na Vašem radnom mestu je neadekvatno (previše svetlo ili previše mračno).	The lighting in your place of work is inadequate (too bright or too dark).	.65
Scale 7: control			
7	Možete da utičete na to na koji način ćete obaviti svoj posao.	You have an influence over how you will perform your job.	.75
24	Sami određujete kada ćete u toku radnog vremena napraviti pauzu.	You decide for yourself when you will take a break during working hours.	.45
31	Imate uticaj na to kojim ćete redosledom obavljati radne zadatke.	You have an influence over the order in which you perform tasks in your job.	.60
34	Posao Vam omogućava da tokom rada sami donosite većinu odluka.	The job allows you to make most work-related decisions yourself.	.67
Scale 8: emotional demands			
3	Vaš posao uključuje direktan kontakt sa klijentima (na primer, kupcima, pacijentima ili studentima).	Your job involves direct contact with clients (e.g., customers, patients or students).	.88
27	Posao od Vas zahteva da se ponašate ljubazno (u razgovoru sa kupcima, klijentima i sl.) i onda kada se ne osećate tako.	The job requires you to behave politely (when talking to customers, clients etc.) even when you don't feel like it.	.69
Scale 9: cognitive and quantitative demands			
1	Vaš posao zahteva da radite veoma brzo.	Your job requires you to work very fast.	.56
13	Posao od Vas zahteva da obrađujete veliki broj informacija.	Your job requires you to process large quantities of information.	.67
30	Vaš posao zahteva da budete jako pažljivi i skoncentrisani tokom rada.	Your job requires you to be very careful and focused while you are working.	.40

Note. Percentages refer to the common variance in EFA.

Table B
Item parameters from the IRT analysis of JCQ (n = 612)

Item	b_1	b_2	b_3	b_4	a
1 support from colleagues					
DWLS $\chi^2(9) = 25.29$, $p = .003$, CFI = .992, TLI = .986, RMSEA = .054, CI 90% .030 – .080, SRMR = .051					
20	-2.28	-1.50	-0.52	0.48	2.74
10	-2.18	-1.38	-0.47	0.62	3.02
33	-2.35	-1.54	-0.62	0.44	2.73
37	-2.64	-1.59	-0.52	0.61	2.29
2	-2.55	-1.70	-0.48	0.63	2.53
26	-4.03	-2.70	-1.37	0.41	0.93
2 support from manager					
DWLS $\chi^2(9) = 5.08$, $p = .828$, CFI = 1.000, TLI = 1.000, RMSEA = .000, CI 90% .000 – .027, SRMR = .023					
19	-1.61	-1.10	-0.44	0.38	3.42
8	-1.41	-0.81	-0.05	0.88	2.57
14	-1.51	-0.82	-0.02	0.87	2.40
35	-1.40	-0.86	-0.09	0.79	2.47
25	-2.10	-1.42	-0.53	0.54	2.21
32	-2.91	-1.77	-1.00	0.03	1.31
3 physical demands					
Model is just-identified with $df = 0$, CFI = 1.000, TLI = 1.000, RMSEA = .000, CI 90% .000 – .000, SRMR = .000					
36	-0.13	0.39	0.94	1.34	4.00
9	0.31	0.73	1.29	1.71	3.05
17	-0.16	0.25	0.65	1.16	2.50
4 role conflict					
DWLS $\chi^2(5) = 30.84$, $p < .001$, CFI = .962, TLI = .925, RMSEA = .092, CI 90% .062 – .124, SRMR = .060					
15	-1.48	-0.53	0.57	1.55	1.94
21	-1.11	-0.14	0.80	1.86	1.86
28	-1.28	-0.36	0.69	1.66	1.35
11	-1.96	-0.57	0.81	2.01	1.05
5	-1.82	-0.27	-0.98	2.39	1.02
5 change					
DWLS $\chi^2(5) = 78.41$, $p < .001$, CFI = .913, TLI = .827, RMSEA = .119, CI 90% .090 – .151, SRMR = .111					
16	0.05	1.09	1.86	2.87	3.42
22	-0.14	1.04	1.87	2.73	2.73
6	-3.39	-1.18	0.99	3.54	0.62
29	-1.90	-0.21	1.65	3.61	0.84
12	-1.70	-0.31	1.23	2.66	1.15
6 working environment					

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DWLS $\chi^2(2) = 2.84, p = .242, CFI = .998, TLI = .995, RMSEA = .026, CI\ 90\% .000 - .089, SRMR = .021$

23	-0.64	0.17	0.71	1.31	1.83
4	-0.15	0.31	0.65	1.24	1.51
18	-0.93	-0.03	0.59	1.43	1.46
38	-0.36	0.23	1.04	1.72	1.49

7 control

DWLS $\chi^2(2) = 0.28, p = .868, CFI = 1.000, TLI = 1.000, RMSEA = .000, CI\ 90\% .000 - .041, SRMR = .008$

34	-2.08	-1.33	-0.22	1.12	1.91
31	-2.40	-1.68	-0.64	0.59	1.86
7	-2.54	-1.56	-0.40	0.96	1.95
24	-1.51	-1.07	-0.38	0.41	1.07

8 emotional demands

Model could not be estimated because there is no df due to scale comprises of only 2 items. However, loadings of items in EFA are high, .78, indicating appropriateness of one-factor solution.

3	-1.41	-1.02	-0.63	-0.14	2.00
27	-1.47	-1.16	-0.72	-0.22	4.82

9 cognitive and quantitative demands

Model is just-identified with $df = 0, CFI = 1.000, TLI = 1.000, RMSEA = .000, CI\ 90\% .000 - .000, SRMR = .000$

30	-4.18	-3.24	-1.74	-0.23	1.31
13	-2.59	-1.81	-0.94	0.22	1.72
1	-4.11	-2.78	-0.99	0.83	1.18

Note. b_{1-a} – thresholds, a – discrimination parameter.

Appendix 2

The full list of the master theses whose datasets were used in the study

- Bučalina, I. (2018). Relationship between personality traits and the indicators of well-being from the organizational health framework (*Unpublished master's thesis*). Univerzitet u Novom Sadu, Filozofski fakultet.
- Manojlović, A. (2017). *The effects of humor styles in relationship between sources of stress and positive indicators of stress at work (Unpublished master's thesis)*. Univerzitet u Novom Sadu, Filozofski fakultet.
- Mrđen, I. (2018). The impact of job performance on openness to a job change: moderator effect of control locus (*Unpublished master's thesis*). Univerzitet u Novom Sadu, Filozofski fakultet.
- Muminović, E. (2018). *Sources of stressors and irrational beliefs as predictors of dysfunctional emotions and burnout (Unpublished master's thesis)*. Univerzitet u Novom Sadu, Filozofski fakultet.
- Radošević, V. (2017). *Job demands, control, and social support as predictors of employee well-being (Unpublished master's thesis)*. Univerzitet u Novom Sadu, Filozofski fakultet.