Brief Report

Testing the Robustness of the Job Demands–Resources Model

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According to the job demands–resources (JD–R) model, job demands and resources evoke two relatively independent processes: health impairment and employee motivation. The robustness of the JD–R model was tested in two different occupational samples, the first of 654 Spanish employees and the second of 477 Dutch employees. Structural equation modeling analyses provided partial evidence for the two processes. Multigroup analyses showed that the structural paths of the model were invariant across countries, although the strength of the relationships differed. We conclude that the basic structure of the JD–R model is maintained, even when applied in different national and occupational contexts, when using different ways of gathering data (computerized versus paper and pencil), and when using slightly different measures to assess the key variables of the model.

Keywords: JD–R model, burnout, engagement, organizational commitment

Recently, the job demands–resources (JD–R) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) has been proposed to explain how employees' working conditions influence their health and commitment to the organization through two largely independent processes: health impairment and motivation. The JD–R model is a heuristic, overarching model that may be applied to various occupational settings, irrespective of the particular demands and resources involved. It has been tested in various countries including Germany (Demerouti et al., 2001), the Netherlands (e.g., Bakker, Demerouti, De Boer, & Schaufeli, 2003; Schaufeli & Bakker, 2004), Finland (Hakanen, Bakker, & Schaufeli, 2006), and Spain (Salanova, Cifre, Grau, Llorens, & Martínez, 2005), as well as in various occupational groups such as nurses (Demerouti, Bakker, Nachreiner, & Schaufeli, 2000), home care professionals (Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003), white-collar workers (Schaufeli & Bakker, 2004), blue-collar workers (Bakker, Demerouti, De Boer, et al., 2003), teachers (Bakker, Demerouti, & Euwema, 2005), and call-center employees (Bakker, Demerouti, & Schaufeli, 2003). However, a *simultaneous* test of the model in different occupational samples from different countries still stands out. The current study fills this gap by examining the JD–R model simultaneously in two countries (the Netherlands and Spain) using different occupational samples (a heterogeneous sample and an Information and Communication Technology [ICT] sample), slightly different measures, and different methods of data collection (computerized and paper and pencil). If, despite these differences, the basic premises of the JD–R model hold across both samples, this would make a strong case for its robustness.

BACKGROUND

The Job Demands–Resources Model

The JD–R model specifies how health impairment (e.g., burnout) and motivation (e.g., engagement) may be produced by two types of working conditions: job demands and job resources, respectively (Demerouti et al., 2001). *Job demands* refers to physical, social, or organizational aspects of the job that require sustained physical and/or mental effort and that are thus associated with certain physiological and psychological costs. On the other hand, *job resources* refers to physical, social, or organizational aspects of the job that are functional in achieving work goals, reduce job demands, or stimulate personal growth, learning, and development. The central proposition of the JD–R model is that job demands and job resources evoke two psychological processes: (a) the *health impairment process* begins with

chronic job demands, which may deplete employees' energy resources and may thus lead to burnout, deterioration of health (Hakanen et al., 2006; Schaufeli & Bakker, 2004), and sick leave (Bakker, Demerouti, De Boer, et al., 2003); (2) the *motivation process* begins with the availability of job resources that stimulates employee's motivation (Hackman & Oldham, 1980) in the form of work engagement and positive work outcomes such as organizational commitment and employee performance (Salanova, Agut, & Peiró, 2005). Specifically, Schaufeli and Bakker (2004) lend support to this motivation process by showing that engagement is only predicted by job resources and that engagement acts as a mediator between job resources and turnover intentions in four different occupational groups. Recently, these results have been replicated in a large sample of Finnish teachers using organizational commitment instead of turnover intentions as an outcome variable of the motivational process (Hakanen et al., 2006).

Burnout, Work Engagement, and Organizational Commitment

Burnout and work engagement are two psychological states that, in the JD–R model, play a key role in the health impairment process and the motivation process, respectively. Although originally burnout was said to be composed of three dimensions, empirical studies have revealed that the core of burnout is constituted by exhaustion and cynicism (Schaufeli & Buunk, 2003). Exhaustion refers to feeling of strain, particularly chronic fatigue resulting from overtaxing work, whereas cynicism refers to an indifferent or detached attitude toward one's work, losing interest in one's work, and feeling that one's work has lost its meaning (Maslach, Schaufeli, & Leiter, 2001).

Work engagement is defined as the positive opposite of burnout, namely as a positive affective-motivational state of fulfillment in employees (Maslach & Leiter, 1997). It is characterized by *vigor*, which refers to high levels of energy and mental resilience while working, the willingness to invest effort in one's work, the ability to not be easily fatigued, and persistence in the face of difficulties; *dedication*, which refers to a strong involvement in one's work, accompanied by feelings of enthusiasm and significance and by a sense of pride and inspiration; and *absorption*, which refers to being fully engrossed in one's work and having difficulties detaching oneself from it. Although originally three dimensions of engagement were distinguished (Schaufeli, Salanova, González-Romá, & Bakker, 2002), recent empirical research suggests that, in fact, vigor and dedication constitute its core (Llorens, Salanova, Schaufeli, & Bakker, in press). These two dimensions are the direct opposites of exhaustion and cynicism, respectively (González-

Romá, Schaufeli, Bakker, & Lloret, 2006). In the current study, we used only the two core dimensions of burnout and work engagement.

Organizational commitment is used as an outcome that may be negatively influenced by burnout through the health impairment process or positively influenced by work engagement through the motivation process. Organizational commitment has been defined as "a strong belief in and acceptance of the organization's goals and values, a willingness to exert considerable effort on behalf of the organization, and a definite desire to maintain organizational membership" (Porter, Steers, Mowday, & Boulian, 1974, p. 604). It has been convincingly demonstrated that burnout is related to poor organizational commitment (for an overview, see Schaufeli & Buunk, 2003), whereas Meyer and Allen (1991) provide evidence to suggest that commitment is associated with positive organizational behavior, including organizational citizenship, a concept that is close to work engagement. In addition, negative relationships have been found between organizational commitment and job demands, and positive relationships with job resources (for a meta-analyses, see Mathieu & Zajac, 1990).

The Present Study

The research findings on organizational commitment can be integrated into the JD–R model; namely, commitment seems to be negatively related to job demands *through burnout* (health impairment process), whereas it seems to be positively related to job resources *through work engagement* (motivational process). A recent empirical test of the JD–R model among Finnish teachers indeed confirmed this mediating role of burnout and engagement (Hakanen et al., 2006). The current study sets out to investigate the robustness of the JD–R model with organizational commitment as an outcome across different occupational and different national contexts. In the Finnish study, this outcome variable was measured with only two items with poor internal consistency ($\alpha = .65$), which underscores the need for replication.

Accordingly, the hypotheses of the study were the following:

1. Job demands are *negatively* related to organizational commitment through their impact on burnout (health impairment process). That is, burnout mediates the relationship between job demands and organizational commitment.
2. Job resources are *positively* related to organizational commitment through their impact on work engagement (motivational process). That is, engagement mediates the relationship between job resources and organizational commitment.

Both hypotheses were tested simultaneously by fitting the JD–R model to the data of two samples using structural equation modeling. Although it is expected that the JD–R model fits to the data of both samples, the factor loadings, covariances, and path coefficients among the latent variables of the model may differ between samples. The reason for this is that sample characteristics (i.e., nationality and occupational group) as well as measures of study variables differ. In other words, we expect that the *structure* of the JD–R model is similar across both samples, whereas the *sizes* of the model estimates may differ.

METHOD

Participants and Procedure

The study was conducted using two convenience samples of Spanish and Dutch employees. The *Spanish sample* consisted of 654 employees (response = approximately 80%; 48% females and 52% males; mean age 31.8 years; $SD = 8.2$) from different public and private Spanish companies working in white-collar and blue-collar jobs, education, and human services. Risk-prevention experts or Human Resources Officers (HR-officers) distributed and collected the paper-and-pencil questionnaires.

The *Dutch sample* consisted of 477 customer service employees working in a call center of a telecom company (response = 88%; 57% females and 43% males; mean age 30 years, $SD = 8.8$). Employees filled out an electronic questionnaire during work time, in a silent, separate room. In both countries, the purpose of the study was explained, voluntary participation was emphasized, and anonymity was guaranteed.

Instruments

Demands

In the Spanish sample, the 3-item *quantitative overload* scale of Beehr, Walsh, and Taber (1976) was used with scoring categories ranging from (1) *completely disagree* to (5) *completely agree*. In the Dutch sample, quantitative overload was assessed with three items based upon Karasek's (1985) job content questionnaire (1 = *never*, 5 = *always*). *Emotional overload* in Spain was measured with a 3-item self-construed scale (Equip WoNT Prevenció Psicosocial, 1999) (e.g., "My job requires me to be emotionally involved"; 1 = *completely disagree*, 5 = *completely agree*). In the Dutch sample,

emotional overload was based on a scale developed by Van Veldhoven and Meijman (1994) and included 6 items (e.g., "Is your work emotionally demanding?"; 1 = *never*, 5 = *always*).

Job Resources

In Spain, *job control* was assessed with 5 items of Jackson, Wall, Martin, and Davis's (1993) job control instrument (1 = *not at all*, 5 = *very much*). In the Netherlands, job control was based on a Dutch version of Karasek's (1985) job content questionnaire that included 3 items (1 = *never*, 5 = *always*). *Social support* was measured in Spain with a 5-item scale from the Four Organizational Culture Survey (FOCUS) (van Muijen, Koopman, De Witte, De Cock, Susanj, Lemoine, et al., 1999) (1 = *never/nobody*, 5 = *always/everybody*). In the Netherlands, social support was measured with six items of the scale developed by Van Veldhoven and Meijman (1994) (e.g., "Can you ask your colleagues for help if necessary?"; 1 = *never*, 5 = *always*). *Performance feedback* was measured in the Spanish sample with 3 items of Hackman and Oldham's (1975) instrument (1 = *totally disagree*, 5 = *totally agree*). In the Dutch sample, performance feedback was assessed with 3 items, based upon Karasek's (1985) job content questionnaire (1 = *never*, 5 = *always*).

Burnout was assessed with two scales of the Spanish and Dutch versions of the Maslach Burnout Inventory-General Survey (MBI-GS; Schaufeli, Leiter, Maslach, & Jackson, 1996): exhaustion (5 items) and cynicism (4 items).

Engagement was assessed with two scales of the Spanish and Dutch versions of the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2002): vigor (5 items) and dedication (5 items). All burnout and engagement items are scored on a 7-point rating scale (0 = *never*, 6 = *every day*).

Organizational commitment in the Spanish sample was assessed by 4 items from Cook and Wall's (1980) instrument (1 = *completely disagree*, 5 = *completely agree*). In the Dutch sample, organizational commitment was measured with the 3 items from Mowday, Steers, and Porter's (1979) affective commitment scale (1 = *completely disagree*, 5 = *completely agree*).

RESULTS

Table 1 shows the descriptive analyses (i.e., mean values, standard deviations, internal consistencies, and intercorrelations) of the study vari-

Table 1. Means, standard deviations, correlations and Cronbach's α (Spanish/Dutch employees on the diagonal) of the study variables in the Spanish ($N = 654$) and Dutch samples ($N = 477$)

| | Spanish | | Dutch | | Correlations and internal consistencies | | | | | | | | | |
	M	SD	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Quantitative overload	2.77	1.15	2.81	.88	.90/.72	.35**	−.01	−.12**	.05	.26**	.19**	.01	−.01	−.15**
2. Emotional overload	2.38	1.21	2.24	.60	.35**	.88/.74	−.15**	−.07	−.01	.30**	.25**	−.05	−.03	−.10*
3. Job control	3.62	.99	2.81	.83	.02	.09*	.90/.77	.37**	.31**	−.19**	−.29**	.31**	.40**	.34**
4. Social support	3.37	1.03	3.41	.71	−.07	.14**	.19**	.84/.73	.33**	−.22**	−.21**	.26**	.27**	.28**
5. Feedback	3.51	.75	2.66	.85	−.14**	.09*	.15**	.32**	.60/.83	−.18**	−.84**	.27**	.38**	.38**
6. Exhaustion	2.25	1.21	1.64	1.26	.37**	.30**	−.14**	−.19**	−.15**	.86/.85	.65**	.38**	−.31**	.36**
7. Cynicism	1.62	1.28	1.46	1.31	.20**	.12***	−.15**	−.33**	−.29**	.54**	.84/.78	−.40**	−.57**	−.55**
8. Vigor	3.92	.95	4.37	1.23	−.04	.12**	.20**	.30**	.19**	−.26**	−.48**	.77/.80	.73**	.52**
9. Dedication	3.79	1.25	4.13	1.56	−.01	.16**	.24**	.35**	.27**	−.23**	−.54**	.70**	.89/.90	.64**
10. Organizational commitment	4.48	.69	3.35	.67	−.05	.12**	.13**	.36**	.12**	−.21**	−.48**	.41**	.46**	.77/.88

Notes. Correlations for the Spanish sample below the diagonal.
*$p < .05$.   **$p < .001$.

ables. The internal consistencies (Cronbach's α) of all scales—except feedback in the Spanish sample—exceed the value of .70, which is generally used as a rule of thumb for sufficient reliability (Nunnaly & Bernstein, 1994).

To test both hypotheses, three plausible models were compared using structural equation modeling (SEM) methods, as implemented by the AMOS computer program (Arbuckle, 1997): the proposed *full mediation model* (M1) included only indirect paths from job demands and resources to organizational commitment through burnout and engagement, respectively. Additionally, an alternative *cross-linked model* (M2) was tested, which includes two additional paths from job demands to engagement and from job resources to burnout. Finally, the *partial mediation model* (M3) included all paths from M1 and M2, together with the direct paths connecting job demands and job resources with organizational commitment.

Multigroup analyses were used in order to test whether the models are invariant *across* both samples. Results of SEM analyses for both samples are presented in Table 2. To avoid identification problems, the error variance of organizational commitment was constrained using the formula $(1 - \alpha) \times \sigma^2$. Furthermore, in accordance with earlier studies, the errors of cynicism and dedication were allowed to correlate (Hakanen et al., 2006; Schaufeli et al., 2002; Schaufeli & Bakker, 2004).

As can be seen from Table 2, the model with both additional cross-links (M2) fits significantly better to the data than M1, with the Root Mean Square Error of Approximation (RMSEA) meeting its criterion of $< .08$, and the Normed-Fit Index (NFI) and the Comparative-Fit Index (CFI) meeting their criterion of $> .90$ (Hoyle, 1995). Both cross-links are significant, except for the one from job demands to engagement in the Dutch sample. However, the fit of the partial mediation model (M3) is superior to that of M2. The path running directly from resources to organizational commitment in M3 is significant in both samples, whereas the direct path from job demands to

Table 2. Results of Multi-group analyses of the Job Demands–Resources model including the Spanish ($N = 654$) and Dutch ($N = 477$) samples

Model	χ^2	df	GFI	AGFI	RMSEA	NFI	CFI	$\Delta\chi^2$	Δdf
M1. Original model	529.22	62	.92	.85	.08	.84	.85		
M2. Including cross-links	330.86	58	.95	.90	.06	.90	.91	198.36**	4
M3. Partial mediation (free)	308.84	56	.95	.90	.06	.91	.92	22.02**	2
M4. Fully constrained	407.84	69	.94	.90	.06	.87	.89	99.00**	13
M5. Equal loadings	367.02	61	.94	.90	.07	.89	.90	58.18**	8
M6. Equal regression weights	327.12	62	.95	.91	.06	.90	.92	18.28**	1
M7. Equal covariance	316.78	58	.95	.90	.06	.90	.92	7.94*	2
M8. Final model	315.52	65	.95	.92	.05	.90	.92	6.68	9

Notes. GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; NFI = Normed-Fit Index; CFI = Comparative Fit Index.
$**p < .001$. $*p < .01$.

commitment is significant *only* in the Dutch sample. This means that burnout fully mediates the relationship between demands and commitment in the Dutch sample and plays a partially mediating role in the Spanish sample. Hypothesis 1 is in part confirmed. Moreover, instead of a full mediator, engagement is a partial mediator in the relationship between resources and commitment, and so hypothesis 2 is confirmed in part as well. More particularly, except for burnout in the Dutch sample (which plays a fully mediating role), the indirect, mediating effects are of about the same size as the direct effects (for burnout and engagement in the Spanish sample: .10 and .14, and .14 and .18 for the indirect and the direct effects, respectively; and for engagement in the Dutch sample, .28 and .21).

Next, the invariance of the JD–R model across both samples was studied by placing constraints on particular parameters (see Byrne, 2001). In the first step, all factor loadings, path coefficients, and covariances were constrained to be equal across both samples (M4). It appeared that the model fit deteriorated significantly compared to the freely estimated model (M3) (Table 2), meaning that invariance was *not* achieved. To find out which of these three parameters is responsible for this negative result, three models were additionally tested in which only the factor loadings (M5), path coefficients (M6), and covariances (M7) were constrained to be equal, respectively. As can be seen from Table 2, the fit of each of these three constrained models is significantly worse than the fit of M3. Again, no invariance was achieved.

Finally, an iterative process was used in which one parameter was constrained to be equal across samples, and the resulting fit was compared with that of M3. When the fit did *not* deteriorate significantly and invariance was achieved, another constrained parameter was added, and so on. Using this procedure, a final model (M8) emerged in which the following parameters are invariant across samples: (a) the *factor loadings* of feedback, exhaustion, and dedication; (b) the *path coefficients* linking demands to burnout, resources to engagement, resources to organizational commitment, and burnout and engagement to organizational commitment; and (c) the *covariance* of the errors of burnout and engagement.

To summarize, results of a series of SEM analyses provided partial evidence for hypothesis 1 and hypothesis 2: burnout mediates the effect of job demands on organizational commitment (hypothesis 1), and work engagement mediates the effect of job resources on organizational commitment (hypothesis 2). However, these results must be qualified because in addition *direct* effects of job demands and job resources on commitment were observed, which were about the size as the indirect, mediating effects. Instead of *fully* mediating, burnout and engagement both play *partially* mediating roles, except for burnout in the Dutch sample, which fully mediated the demands–commitment relationship. In

addition, cross-links, particularly between job resources and burnout (negative), were observed. Finally, it appears that the sizes of most factor loadings, error covariances, and the cross-links differ between samples. However, the sizes of five out of the six path coefficients that constitute the health impairment and motivation processes are invariant across samples.

DISCUSSION

The current study aimed to investigate the robustness of the JD–R model. This model assumes two different processes: (a) a *health impairment process* that starts with high job demands (emotional and quantitative overload), which may lead to burnout (exhaustion and cynicism) and consequently to poor organizational commitment; and (b) a *motivational process* that starts with job resources (job control, social support, and performance feedback), which may lead to work engagement (vigor and dedication) and consequently to high levels of organizational commitment. Two hypotheses were tested, which assumed the mediating role of burnout in the health impairment process (hypothesis 1) and of engagement in the motivation process (hypothesis 2).

Although the JD–R model has been tested previously in different countries, using different samples, so far the generalizability of the model has not been studied across different countries and occupations *simultaneously*. The current study used a heterogeneous Spanish employee sample and a homogeneous Dutch ICT sample in which the measures of the study variables and the way the data were gathered (paper and pencil vs. computerized assessment) differed. Results of SEM analyses revealed that the JD–R model fits to the data and that its basic structure is similar across samples, despite differences in nationalities, occupations, operationalizations, and ways of data gathering. Hence, the robustness of the model is demonstrated. The fact that the sizes of most factor loadings and error variances differed between both samples is most likely due to sample bias, differences in operationalizations, and ways in which the data were gathered. Nevertheless, the important fact remains that these differences did *not* affect the basic structure of the JD–R model and that the sizes of the path coefficients were *invariant* across both samples.

In addition, a strong case is made for the equivalence of a traditional paper-and-pencil questionnaire (Spanish sample) and an electronic questionnaire (Dutch sample), because both samples produced similar results. This agrees with the general finding of equivalence of such test forms reported in the literature (Bartram & Bayliss, 1984; Schwarzer, Mueller, & Greenglass, 1999).

However, both hypotheses were not confirmed completely because partial mediation of burnout and engagement was observed in three of the four cases instead of the hypothesized full mediation. The observed additional direct effects of demands and resources agree with research findings that identified, for instance, role overload and job stress (job demands) and feedback and control (job resources) as antecedents of organizational commitment (for a meta-analyses, see Mathieu & Zajac, 1990).

In addition, links between the health impairment and motivation processes were observed: in particular, resources were (negatively) linked to burnout, whereas the relationship between demands and engagement was very either weak (.11 in the Spanish sample) or nonsignificant (in the Dutch sample). The observed negative association between job resources and burnout agrees with other findings that document that lack of resources such as poor job control, lack of social support, and inadequate feedback are associated with high levels of burnout (for an overview, see Schaufeli & Buunk, 2003). Also, in previous studies on the JD–R model, the negative path from job resources to burnout appeared to be significant (Hakanen et al., 2006; Schaufeli & Bakker, 2004). The existence of this path underscores another mediating role of burnout between (lack of) job resources and commitment. Hence, our results suggest that job resources influence commitment via two different avenues: (a) directly and indirectly through increased engagement and (b) indirectly through reducing burnout. To put it differently, the availability of resources not only increases motivation but also protects from health impairment. This is in accordance with recent findings showing that job resources moderate the effect of job demands on burnout (Bakker et al., 2005) and on engagement (Hakanen, Bakker, & Demerouti, 2005).

In sum, our results confirm the robustness of the JD–R model in different national and occupational contexts, using different instruments and different ways of data gathering. In addition to the hypothesized mediating relationships of burnout and engagement, direct effects of demands and resources on commitment were observed as well as cross-links.

Limitations

The most obvious limitation of this study is its cross-sectional design, which implies that the observed relationships need to be interpreted with caution and no causal inferences should be made. Therefore, future research should test the model longitudinally. Another limitation is the fact that the data has been collected by self-report questionnaires (either computerized or paper and pencil), and so results may be contaminated by common method variance. This calls for including in future research behavioral measures such

as absenteeism and work performance as indicators of employee health and motivation, respectively.

Practical Implications

We can only speculate about practical implications based on our cross-sectional findings. The results of the current study suggest that job demands and job resources may play a *different* role when it comes to their impact on burnout, engagement, and organizational commitment. For management, this would imply that reducing demands (targeting the health impairment process) and increasing resources (targeting the motivational process) are likely to yield different effects. Reducing job demands would decrease levels of burnout and also—indirectly—increase levels of commitment. On the other hand, increasing job resources would not only lead to more engagement but would *also* protect from burnout. Furthermore, it would increase commitment directly as well as indirectly via engagement and burnout. Thus from a managerial perspective, investing in job resources (i.e., stimulating employee motivation) may pay off more than focusing on the reduction of job demands (i.e., slowing down the health impairment process). Or formulated slightly differently, human resource management policies aiming at employee growth and development are likely to be more successful in increasing engagement and commitment *and* decreasing burnout than the traditional occupational health approach, which predominantly focuses on reducing job demands (Schaufeli & Salanova, in press). This is not to say that the occupational health perspective should be abandoned; rather, it should be supplemented by a more positive approach that focuses on employee strength, motivation, and optimal functioning.

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