

The Role of Personal Resources in the Job Demands-Resources Model

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This study examined the role of three personal resources (self-efficacy, organizational-based self-esteem, and optimism) in the Job Demands-Resources (JD-R) model. The authors hypothesized that personal resources (1) moderate the relationship between job demands and exhaustion, (2) mediate the relationship between job resources and work engagement, and (3) relate to how employees perceive their work environment and well-being. Hypotheses were tested among 714 Dutch employees. Results showed that personal resources did not offset the relationship between job demands and exhaustion. Instead, personal resources mediated the relationship between job resources and engagement/exhaustion and influenced the perception of job resources. The implications of these findings for the JD-R model are discussed.

Keywords: exhaustion, job demands-resources model, personal resources, work engagement

Influenced by dominant work psychological models, like Karasek's (1979) demand-control model, the Job Demands-Resources (JD-R) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004) attributes employee well-being to the characteristics of work environments. Previous studies have supported the underlying predictions of the

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model, namely that job demands are the main predictors of negative job strain (Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003b; Bakker, Demerouti, & Verbeke, 2004), while job resources are the most important predictors of work engagement (Hakanen, Bakker, & Schaufeli, 2006). However, studies on the JD-R model have been restricted to work characteristics and, as a result, the role of employees' *personal resources*, which can be important determinants of their adaptation to work environments (Hobfoll, 1989; Judge, Locke, & Durham, 1997), has been neglected. To investigate the role of personal resources in the JD-R model, the present study uses insights from conservation of resources (COR) theory (Hobfoll, 1989, 2002).

BACKGROUND

The JD-R Model

According to the JD-R model (Demerouti et al., 2001), the characteristics of work environments can be classified in two general categories, job demands and job resources, which incorporate different specific demands and resources, depending on the context under study. *Job demands* are those physical, social, or organizational aspects of the job that require sustained physical and/or psychological effort and are, therefore, associated with physiological and/or psychological costs. *Job resources* are those physical, social, or organizational aspects of the job that (a) are functional in achieving work-related goals, (b) reduce job demands and the associated physiological and psychological costs, and (c) stimulate personal growth and development.

These two categories of work characteristics evoke two relatively independent psychological processes. According to the *health impairment* process, high job demands, which require sustained effort, may exhaust employees' resources and lead to energy depletion and health problems (see Caplan, Cobb, French, Harrison, & Pinneau, 1975). For example, specific job demands (e.g., workload or emotional demands) have been repeatedly found to predict *exhaustion* (i.e., severe fatigue) among various occupational groups (e.g., Bakker, Demerouti, & Euwema, 2005; Bakker, Demerouti, & Schaufeli, 2003a).

By contrast, according to the *motivational* process, the availability of job resources leads to organizational commitment and work engagement (Schaufeli & Bakker, 2004). Job resources, due to their (intrinsic and extrinsic) motivational potential, foster employees to meet their goals. In turn, employees may become more committed to their job, because they derive fulfillment from it (Hackman & Oldham, 1980). Previous studies (Bakker et

al., 2003a; Hakanen et al., 2006) have shown that several job resources (e.g., support or coaching) lead to *work engagement*, defined as “. . . the positive, fulfilling, and work-related state of mind that is characterized by vigor, dedication and absorption” (Schaufeli & Bakker, 2004, p. 295). In addition to these main effects, the JD-R model proposes that job resources *buffer* the relationship between job demands and exhaustion. Under demanding work conditions, employees who hold high levels of resources dispose more supplies and, thus, are more capable of dealing with these demands. As a result, they experience lower levels of exhaustion (Bakker et al., 2005).

Conservation of Resources (COR) Theory

According to COR theory, resources are defined as “. . . those entities that either are centrally valued in their own right, or act as means to obtain centrally valued ends” (Hobfoll, 2002, p. 307). Hobfoll (1989) recognizes four types of resources, namely objects, conditions, personal characteristics, and energies. The present study focuses on the two main assumptions of COR theory. The first is that individuals invest their resources in order to deal with threatening conditions and prevent themselves from negative outcomes (Hobfoll, 1989). Second, individuals not only strive to protect these resources, but also to accumulate them. Resources tend to generate other resources, thus creating resource caravans, which may result in positive outcomes like better coping and well-being (Hobfoll, 2002).

Taking the above assumptions into account, we identify some common ground between COR theory and the JD-R model. First, both theories assume a moderating role of resources in the relationship between threats/demands and negative outcomes. Furthermore, if we implement the second assumption of COR theory in the motivational process of the JD-R model, we would expect that the availability of job resources would lead to an accumulation of resources, and thus to more positive outcomes. Indeed, Llorens, Schaufeli, Bakker, and Salanova (2007) found that task resources foster efficacy beliefs, which in turn increase levels of engagement. In short, based on these two basic presumptions of COR theory, it is suggested that personal resources may play different roles in the JD-R model.

Personal Resources in the JD-R Model

The central aim of our study was to expand the JD-R model by examining how personal resources operate in relation to the model's processes. *Personal resources* are aspects of the self that are generally linked to

resiliency and refer to individuals' sense of their ability to control and impact upon their environment successfully (Hobfoll, Johnson, Ennis, & Jackson, 2003). We include three typical personal resources, namely, self-efficacy (Bandura, 1989), organizational-based self-esteem (Pierce, Gardner, Cummings, & Dunham, 1989), and optimism (Scheier & Carver, 1985), all of which have been recognized by Hobfoll (2002) as fundamental components of individual adaptability.

Instead of focusing on situation-specific *self-efficacy*, the present study examines a general dimension, which refers to individuals' perceptions of their ability to meet demands in a broad array of contexts (Chen, Gully, & Eden, 2001). Accumulation of successes, as well as persistent positive experiences, augments general self-efficacy (Chen et al., 2001). It has been shown that generalized and specific efficacy beliefs are correlated, and that the general tendency to feel efficacious may spill over into specific situations (Yeo & Neal, 2006). *Organizational-based self-esteem* (OBSE) is defined as "... the degree to which organizational members believe that they can satisfy their needs by participating in roles within the context of an organization" (Pierce et al., 1989, p. 625). Finally, *optimism* refers to the tendency to believe that one will generally experience good outcomes in life (Scheier & Carver, 1985), which increases the propensity to take action and deal with threats (Aspinwall & Taylor, 1997). In line with the core self-evaluations theory (Judge et al., 1997), we conceptualize these three personal resources as a unitary resiliency construct that plays a decisive role in employees' functioning at work.

Previous studies have shown that these personal resources are not only related to stress resilience, but also have positive effects on physical and emotional well-being (Chen et al., 2001; Pierce et al., 1989; Scheier & Carver, 1992). Although people's perception of and adaptation to environments is variable, depending on their levels of personal resources, these resource levels are cultivated by environmental factors (Bandura, 2000). In other words, it is proposed that personal resources may function either as *moderators* or as *mediators* in the relationship between environmental factors and (organizational) outcomes, or they may even determine the way people comprehend the environment, formulate it, and react to it (Judge et al., 1997).

Previous empirical studies have generally supported this triple role of the three personal resources. In relation to the role of personal resources as *moderators*, studies have mainly examined the relationship between unfavorable work characteristics and negative outcomes. For example, Van Yperen and Snijders (2000) have shown that general self-efficacy moderates the relationship between job demands and psychological health symptoms. Similarly, Pierce and Gardner (2004) concluded that OBSE offsets the effects of demanding conditions (e.g., organizational changes, role ambiguity) on depression, physical strain, and job dissatisfaction. Finally, under demanding

work conditions (i.e., high time pressure, high job insecurity, and poor organizational climate), optimistic employees were found to report lower levels of mental distress than their less optimistic colleagues (Mäkikangas & Kinnunen, 2003). These studies suggest that employees with high levels of personal resources have greater mastery that helps them to deal more effectively with demanding conditions, and in turn prevent them from negative outcomes (i.e., exhaustion). This suggestion combines COR theory (Hobfoll, 2002) with the buffer hypothesis of the JD-R model (Bakker et al., 2005), because it recognizes the potential moderating role of personal (and not only job) resources in the model's health impairment process.

Regarding the *mediating* role of personal resources, results of previous empirical studies have shown that individuals generalize their work learning experiences to their off-job situation (Kohn & Schooler, 1982). Specifically, Kohn and Schooler found that structural imperatives of work (e.g., responsibility) determine individuals' personality characteristics (e.g., self-directedness). Furthermore, Pierce and Gardner (2004) concluded that OBSE mediates the relationship between resourceful work characteristics (e.g., influence, fairness, support) and employee motivation, attitudes (e.g., satisfaction, commitment), and performance. In a similar vein, sense of coherence (a concept close to optimism) mediates the relationship between organizational climate and job security on the one hand and occupational well-being on the other (Feldt, Kinnunen, & Mauno, 2000). In line with the above, Luthans, Avey, Avolio, Norman, and Combs (2006) showed that a resourceful work environment activates employees' "psychological capital" (i.e., hope, optimism, efficacy, and resiliency development), which in turn may bring financial profit. These findings suggest that the existence of environmental (job) resources may activate personal resources and this, in turn, may result in positive psychological and organizational outcomes. In relation to the motivational process of the JD-R model, we expect that job resources, such as control over the way and pace tasks are performed, and opportunities for professional development will evoke a sense of significance to employees. Thus, employees with sufficient job resources will feel efficacious, important to the organization, optimistic about their future, and, consequently, stay engaged in their work.

Although the present study uses the JD-R model as a starting point, and thus, primarily focuses on work characteristics as *antecedents* of personal resources, exhaustion and work engagement, we also expect the reverse: personal resources may be *antecedents* of job demands and resources, and their respective outcomes (Judge et al., 1997). It can be argued that job and personal resources are reciprocal, since individuals, through learning experiences, can form stronger positive evaluations about themselves and in turn, they comprehend or create more resourceful work environments (Kohn & Schooler, 1982). In other words, not only may personal resources be pro-

moted by a manageable and comprehensive environment, but they may also determine the way people perceive or formulate this environment and how they react to it (Judge, Bono, & Locke, 2000; Judge et al., 1997). If we apply this perspective of reciprocity to the JD-R model, we may expect that self-efficacious or optimistic employees will focus more on job resources than on job demands, and as a result they will experience lower levels of exhaustion and higher levels of work engagement.

STUDY HYPOTHESES

On the basis of the previous theoretical analysis, we hypothesized:

Hypothesis 1: Personal resources would moderate the relationship between four specific job demands (workload, emotional demands, emotional dissonance, and organizational changes) and exhaustion. That is, the effect of job demands on exhaustion will be weaker when personal resources are high (vs. low).

Hypothesis 2: Personal resources would partially mediate the relationship between four job resources (autonomy, social support, supervisory coaching, and opportunities for professional development) and work engagement.

Hypothesis 3: Job demands would partially mediate the relationship between personal resources and exhaustion (3a), and job resources will partially mediate the relationship between personal resources and work engagement (3b).

Partial mediation was expected in Hypotheses 2 and 3 because our study does not include all possible mediators of the processes under study (Hackman & Oldham, 1980; Judge et al., 2000). The choice of the specific four job demands and four job resources was based on two criteria. First, we included those characteristics that are significant for the majority of jobs (e.g., workload and autonomy; Lee & Ashforth, 1996). Second, after discussions with representatives of the human relations department of the company, we traced other work characteristics that are crucial for the particular occupational setting (i.e., organizational changes). Finally, we recognized that additional hypotheses might be formed (e.g., personal resources may moderate the relationship between job resources and work engagement; Brockner, 1988). However, we exclusively focused on the theoretically most important effects that derive when integrating the principles of COR theory in the JD-R model.

METHOD

Participants and Procedure

The present study was conducted among employees of six divisions of an electrical engineering and electronics company in The Netherlands. All employees in these divisions ($N = 1.439$) received an e-mail, in which the purpose of the project was briefly described, and in which they were requested to participate. The confidentiality and anonymity of their answers was emphasized and assured. For those who wished to participate, a link to an electronic questionnaire (posted on the company's intranet) was included in the e-mail. A total of 714 employees completed the questionnaire (50% response rate). Response rates for the six divisions ranged from 42% to 73%. The majority of the participants were men ($N = 594$; 83%). Their mean age was 42 years ($SD = 9.4$), and their mean organizational tenure was 14 years ($SD = 10.2$). Participants were well educated, with 71% holding a college or university degree. The overwhelming majority of the participants (95%) worked full-time.

Measures

Job Demands

Workload was assessed with a four-item scale developed by Bakker et al. (2004). A typical item is "Do you have too much work to do?" *Emotional demands* were measured with the six-item scale of Bakker et al. (2003a), including "Do you face emotionally charged situations in your work?" *Emotional dissonance* was assessed with five items from the scale of Zapf, Vogt, Seifert, Mertini, and Isic (1999), such as "During your work, how often do you have to express positive feelings toward your clients while you actually feel indifferent?" *Organizational changes* were assessed with seven items based on a scale developed by Bakker et al. (2003a). An example item is: "Do you have to adjust to changes in the organization?" All job demands items were scored on a five-point scale, ranging from (1) *never* to (5) *always*.

Job Resources

Autonomy was assessed with a three-item scale developed by Bakker et al. (2004) (e.g., "Do you have flexibility in the execution of your job?"). *Social support* was also measured with a three-item scale developed by

Bakker et al. (2004), including “If necessary, can you ask your colleagues for help?” *Supervisory coaching* was assessed with a five-item Dutch adaptation (Le Blanc, 1994) of Graen and Uhl-Bien’s (1991) Leader-Member Exchange Scale (e.g., “My supervisor uses his or her influence to help me solve my problems at work.”). Finally, *opportunities for professional development* were assessed with three items from the scale constructed by Bakker et al. (2003b). A typical item is “My work offers me the possibility to learn new things.” All job resources items were scored on a five-point scale, ranging from (1) *never* to (5) *always*, except for the opportunities for professional development items, where the scale ranged from (1) *totally disagree* to (5) *totally agree*.

Personal Resources

Self-efficacy was assessed with the generalized self-efficacy scale (Schwarzer & Jerusalem, 1995). The scale consists of 10 items, such as: “I can always manage to solve difficult problems if I try hard enough.” Items were scored on a four-point scale, ranging from (1) *absolutely wrong* to (4) *absolutely right*.

Organizational-based self-esteem was assessed with a modified version of the scale developed by Pierce et al. (1989). The scale consists of 10 items, including: “I am important for the organization” (1 = *totally disagree*, 5 = *totally agree*). The wording “around here” that is used in the original scale was replaced by the wording “for the organization,” in all items. *Optimism* was measured with the Life Orientation Test–Revised (Scheier, Carver, & Bridges, 1994). This 10-item scale is comprised of six items that measure optimism and four filler items, which were excluded from the analyses. Out of the six main items of the scale, three are positively phrased (e.g., “In uncertain times, I usually expect the best”) and three are negatively phrased (e.g., “I hardly ever expect things to go my way”), with answers ranging from (1) *totally disagree* to (5) *totally agree*. All negative keyed items were recoded so that higher scores refer to higher levels of optimism.

Exhaustion was measured with the subscale of the Dutch version (Schaufeli & Van Dierendonck, 2000) of the Maslach Burnout Inventory–General Survey (Schaufeli, Leiter, Maslach, & Jackson, 1996). This subscale includes five items, such as “I feel emotionally drained from my work.”

Work engagement was measured with the nine-item version of the Utrecht Work Engagement Scale (Schaufeli, Bakker, & Salanova, 2006). The Utrecht Work Engagement Scale items reflect three underlying dimensions, which are measured with three items each: *vigor* (e.g., “At my work, I feel bursting with energy”), *dedication* (e.g., “My job inspires me”), and *absorp-*

tion (e.g., “I get carried away when I am working”). All items of the exhaustion and the work engagement subscales were scored on a seven-point scale, ranging from (0) *never* to (6) *always*.

Model Testing

In order to test the moderation effect of Hypothesis 1, we conducted moderated structural equation modeling (MSEM) analyses (Mathieu, Tannenbaum, & Salas, 1992). Because of the special treatment of the exogenous variables required in MSEM, these analyses could be only performed for the specific part of the JD-R model that our hypothesis refers to, namely the relation between job demands and exhaustion.

To Test Hypotheses 2 and 3 (a and b) we performed structural equation modeling (SEM) analyses, to the whole JD-R model this time. The model for these analyses included two exogenous latent factors, job demands and job resources, each operationalized by four indicators. The indicators of the job demands factor were workload, emotional demands, emotional dissonance, and organizational changes. The indicators of the job resources factor were autonomy, social support, supervisory coaching, and opportunities for professional development. To test whether self-efficacy, OBSE, and optimism could be represented as indicators of one personal resources latent factor, we performed confirmatory factor analyses (CFA). Specifically, we compared an uncorrelated, first-order CFA model, where self-efficacy, OBSE, and optimism were represented as independent constructs, with a second-order model. Results supported the representation of the three personal resources as one general latent factor, since the second-order CFA model fitted better to the data than the first-order model, $\Delta\chi^2(6) = 271.94, p < .001$. Furthermore, additional CFA clearly supported the distinction between the two types of resources tested, since the two-factor measurement model distinguishing between personal and job resources fitted significantly better to the data than the one-factor model, $\Delta\chi^2(1) = 44.73, p < .001$. Finally, the hypothesized model also included two latent endogenous factors, exhaustion and work engagement. The five items of the exhaustion scale were the indicators of the latent exhaustion factor, while the indicators of the work engagement factor were the vigor, dedication, and absorption scales.

The fit of the models was assessed with the χ^2 statistic, the Goodness-of-Fit Index (GFI), and the root mean square error of approximation (RMSEA). In addition, we used the Comparative Fit Index (CFI), the Incremental Fit Index (IFI), and the Non-Normed Fit Index (NNFI). For each of these statistics, values of 0.90 or higher are acceptable (Hoyle, 1995), except for the RMSEA for which values up to 0.08 indicate an acceptable fit to the

data (MacCallum, Browne, & Sugawara, 1996). Furthermore, we controlled for the 90% confidence intervals around the RMSEA. A narrow confidence interval is an indication for good precision of the RMSEA (MacCallum et al., 1996).

RESULTS

Descriptive Statistics

Means, standard deviations, and correlations between the variables, as well as the internal consistencies of the scales are presented in Table 1.

Results of MSEM Analyses

In order to test the moderating influence of personal resources on the relationship between job demands and exhaustion (*Hypothesis 1*), we carried out MSEM analyses in a separate model. We tested a model that included three exogenous (job demands, personal resources, and their interaction), and one endogenous latent factor (exhaustion). Each latent exogenous factor had only one indicator, namely its standardized factor score, obtained after respective factor analyses. Specifically, the indicator of the job demands factor was the factor score of all the job demands scales, that is, the combination of the workload, emotional demands, emotional dissonance, and organizational changes scales. Similarly, the indicator of the personal re-

Table 1. Means, Standard Deviations, Internal Consistencies (Cronbach's α s on the Diagonal), and Correlations Among the Variables ($N = 714$)

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. Workload	3.33	0.79	(0.86)					
2. Emotional demands	2.37	0.60	0.48**	(0.77)				
3. Emotional dissonance	2.26	0.63	0.32**	0.66**	(0.83)			
4. Organizational changes	2.87	0.75	0.22**	0.23**	0.27**	(0.82)		
5. Autonomy	3.53	0.79	-0.05	-0.15**	-0.20**	-0.07	(0.81)	
6. Social support	3.54	0.91	-0.16**	-0.15**	-0.15**	-0.09*	0.33**	(0.80)
7. Supervisory coaching	3.01	0.96	-0.10**	-0.16**	-0.17**	-0.14**	0.38**	0.43**
8. OPD	3.37	0.81	-0.04	-0.16**	-0.22**	-0.08*	0.44**	0.32**
9. Self-efficacy	3.31	0.40	0.13**	0.09*	.05	0.07*	0.21**	0.16**
10. OBSE	3.70	0.58	0.02	-0.05	-0.22**	-0.08*	0.34**	0.24**
11. Optimism	3.69	0.54	0.00	-0.06	-0.15**	0.00	0.24**	0.23**
12. Exhaustion	1.85	1.12	0.36**	0.41**	0.42**	0.27**	-0.22**	-0.27**
13. Vigor	3.47	1.03	0.03	-0.04	-0.17**	-0.09*	0.31**	0.31**
14. Dedication	3.76	1.16	0.09*	0.01	-0.13**	-0.04	0.37**	0.33**
15. Absorption	3.21	1.14	0.11**	0.09*	-0.03	0.00	0.22**	0.22**

sources factor was the factor score of the personal resources scales, which was the combination of the self-efficacy, OBSE, and optimism scales, and the indicator of the interaction factor was the multiplicative result of the factor score of the job demands and the factor score of the personal resources. The model included direct paths from the three exogenous factors to the endogenous factor. The latent job demands and personal resources factors were allowed to correlate, whereas correlations between job demands, personal resources, and their interaction term were expected to be zero. Finally, the paths from the exogenous variables to their indicators were fixed using the square roots of the scale reliabilities, while the error variances of each indicator were set equal to the product of their variances and one minus their reliabilities (Cortina, Chen, & Dunlap, 2001). For the calculation of the reliability score of the interaction term, we refer to Cortina et al. (2001). A significant interaction effect exists if the coefficient of the path from the latent job demands \times personal resources interaction factor to exhaustion is statistically significant. Results of MSEM analysis showed that although the model fits well to the data ($\chi^2 = 56.03$, $df = 19$, $GFI = 0.98$, $RMSEA = 0.05$, $LO90 = 0.04$, $HI90 = 0.07$, $CFI = 0.98$, $IFI = 0.98$, $NNFI = 0.97$), the path coefficient from the interaction term to exhaustion is nonsignificant ($\gamma = -.01$; *ns*), thus rejecting Hypothesis 1. Personal resources did not moderate the relationship between job demands and exhaustion. It is important to note that the results were not different when we tested the interaction effects between personal resources and each of the four job demands separately.

Table 1. (Continued)

7	8	9	10	11	12	13	14	15
(0.92)								
0.44**	(0.87)							
0.14**	0.14**	(0.86)						
0.41**	0.45**	0.28**	(0.88)					
0.21**	0.28**	0.40**	0.36**	(0.72)				
-0.23**	-0.27**	-0.13**	-0.24**	-0.28**	(0.88)			
0.31**	0.38**	0.28**	0.39**	0.33**	-0.34**	(0.83)		
0.36**	0.52**	0.25**	0.40**	0.30**	-0.22**	0.70**	(0.88)	
0.22**	0.33**	0.19**	0.32**	0.18**	-0.08*	0.63**	0.73**	(0.78)

Note. OPD = Opportunities for Professional Development; OBSE = Organizational-Based Self-Esteem.

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

Results of SEM Analyses

In order to test the mediation effects formulated in Hypothesis 2 and 3 (a and b), we followed Baron and Kenny's approach (1986), according to which there are four steps in establishing a significant mediation effect. First, there must be a significant relationship between the predictor and the outcome. Second, the predictor must be significantly related to the mediator. Third, the mediator should be significantly related to the outcome variable. Finally, there is a significant mediation effect when the relationship between the predictor and the outcome becomes significantly weaker (partial mediation) or nonsignificant (full mediation), after the inclusion of the mediator. The Sobel z test was used to examine the significance of the indirect effect.

Before testing whether personal resources are partial mediators of the relationship between job resources and work engagement (*Hypothesis 2*), we first checked for the three prerequisite conditions. Preliminary results indeed showed that job resources were related to both work engagement ($\gamma = 0.63$; $p < .001$) and personal resources ($\gamma = 0.76$; $p < .001$), and that personal resources were related to work engagement ($\gamma = 0.57$; $p < .001$), allowing us to proceed with the test of Hypothesis 2. Therefore, as presented in Table 2, we compared the Full Mediation model (M1) with the Partial Mediation model (this is M1 including an additional *direct* path from job resources to work engagement; M2), to see which model fits better to the data (Frazier, Tix, & Barron, 2004). Table 2 shows that the Full Mediation model (M1) has a satisfactory fit to the data. However, results of the χ^2 difference test suggest that the addition of the direct effect to M1 (Partial Mediation model; M2) leads to a significant improvement of the fit, $\Delta\chi^2(1) = 18.53$, $p < .001$. Furthermore, the path coefficients of M2 from job resources to personal resources ($\gamma = 0.76$; $p < .001$), from personal resources to work engagement ($\beta = 0.26$; $p < .01$), and from job resources to work engagement ($\gamma = 0.44$; $p < .001$) were all statistically significant and in the expected direction. Most important, the addition of the personal resources factor in the model reduced the magnitude of the direct association between job resources and work engagement significantly (from $\gamma = 0.63$ to $\gamma = 0.44$; $z = 2.72$; $p = .007$). Taken together, these findings support the partial mediation effect of Hypothesis 2.

Inspection of the modification indices suggested that the fit of the Partial Mediation model (M2) could be further improved by including a path from personal resources to *exhaustion*. Indeed, as can be seen from Table 2, the inclusion of this path (Alternative Model; M3) significantly improves the fit of M2, $\Delta\chi^2(1) = 60.68$, $p < .001$. This additional path indicates that personal resources also mediated the relationship between job resources and exhaustion. In order to examine the nature of this mediation effect, we

Table 2. Results of Structural Equation Modeling (Maximum Likelihood Estimates) for the Total Sample ($N = 714$): Personal Resources as Mediators and as Antecedents in the Job Demands-Resources Model

Model	χ^2	<i>df</i>	GFI	RMSEA	LO90	HI90	CFI	IFI	NNFI
Hypothesis 2: Personal Resources as Mediators									
M1 Full Mediation (JD→EX & JR→PR→WE)	700.02	147	0.91	0.07	0.07	0.08	0.90	0.90	0.88
M2 Partial Mediation (JD→EX & JR→PR→WE & JR→WE)	681.49	146	0.91	0.07	0.07	0.08	0.90	0.90	0.89
M3 Alternative Model (JD→EX & JR→PR→WE & JR→WE & PR→EX)	620.81	145	0.91	0.07	0.06	0.07	0.91	0.91	0.90
Hypothesis 3b: Personal Resources as Antecedents									
M4 Full Mediation (JD→EX & PR→JR→WE)	698.41	147	0.90	0.07	0.07	0.08	0.90	0.90	0.88
M5 Partial Mediation (JD→EX & PR→JR→WE & PR→WE)	683.68	146	0.90	0.07	0.07	0.08	0.90	0.90	0.89
M6 Alternative Model (JD→EX & PR→JR→WE & PR→WE & PR→EX)	612.57	145	0.92	0.07	0.06	0.07	0.92	0.92	0.90

Note. JD = job demands; EX = exhaustion; JR = job resources; PR = personal resources; WE = work engagement; GFI = goodness-of-fit index; RMSEA = root mean square error of approximation; LO90 = low 90% confidence interval; HI90 = high 90% confidence interval; CFI = comparative fit index; IFI = incremental fit index; NNFI = non-normed fit index.

compared M3 (which indicates full mediation) with a partial mediation model (with an additional direct path from job resources to exhaustion). The χ^2 difference test showed that these two models fit equally well to the data, $\Delta\chi^2(1) = .06, ns$. In addition, after including personal resources as mediators in the relationship between job resources and exhaustion, the direct effect from job resources to exhaustion became nonsignificant (from $\gamma = -.29, p < .001$ to $\gamma = -.02, p = .80, ns, z = 5.25, p < .001$). This indicates that personal resources fully mediated the relationship between job resources and exhaustion.

In the next step, we tested the reversed relationships, namely whether job demands partly mediated the relationship between personal resources and exhaustion (*Hypothesis 3a*), and whether job resources partly mediate the relationship between personal resources and work engagement (*Hypothesis 3b*). Previous analyses regarding Hypothesis 2 showed that personal resources are significantly related to both exhaustion and work engagement, as well as that job demands are significantly related to exhaustion, and job resources to work engagement. Furthermore, additional analyses showed that personal resources are significant predictors of job resources ($\gamma = 0.77, p < .001$), but not of job demands ($\gamma = -0.09, p = .08$). This finding automatically rejected Hypothesis 3a, since it showed that job demands cannot mediate the relationship between personal resources and exhaustion. However, preliminary analyses allowed proceeding with the test of Hypothesis 3b. Thus, we compared the Full Mediation model (M4; Table 2) with the Partial Mediation model (M4 with an additional direct path from personal resources to work engagement; M5). Results showed that M5 fit significantly better to the data than M4, $\Delta\chi^2(1) = 14.73, p < .001$; Table 2. Furthermore, the addition of job resources as mediators in the model significantly reduced the magnitude of the association between personal resources and work engagement (from $\gamma = 0.60$ to $\gamma = 0.34; z = 2.39, p < .05$), thus confirming Hypothesis 3b. Inspection of the modification indices showed that in order to improve the fit of M5, we should add the path from personal resources to exhaustion. Indeed, as can be seen from Table 2, the inclusion of this path (Alternative model; M6) resulted in a significantly better fit, $\Delta\chi^2(1) = 71.11, p < .001$, which indicates that there was a strong direct relationship ($\gamma = -0.35$) from personal resources to exhaustion. Figure 1 graphically represents the main results of our analyses. The two final, best-fitting models (M3 and M6) explain 44% and 42% of the variance in exhaustion and 46% and 47% in work engagement, respectively.

DISCUSSION

The purpose of the present study was to expand the JD-R model (Demerouti et al., 2001; Schaufeli & Bakker, 2004) by testing the role of three

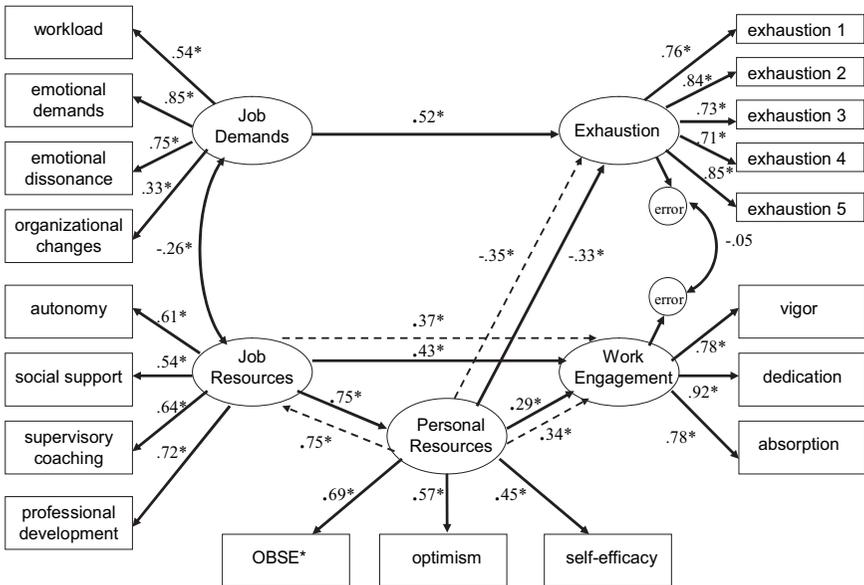


Figure 1. The expanded JD-R model (standardized path coefficients). Continuous lines indicate final results regarding the mediating role of personal resources. Discontinuous lines indicate final results regarding the role of personal resources as antecedents. OBSE = organizational-based self-esteem. * $p < .001$.

personal resources with regard to the model’s basic assumptions. The study makes a significant contribution to the theoretical development of the JD-R model because it confirms its central hypotheses, but most importantly expands the model, by specifying, for the first time, the various functions of personal resources within its framework.

Personal Resources in the Health Impairment Process

Although previous studies have supported the *moderator* role of personal resources in the relationship between adverse working conditions and well-being (Mäkikangas & Kinnunen, 2003; Pierce & Gardner, 2004; Van Yperen & Snijders, 2000), our results did not confirm such an effect. The rejection of our first hypothesis may be partly attributed to the homogeneous nature of our sample population. The fact that the study focused exclusively on highly educated employees may have resulted in range restrictions (toward the positive end) regarding the study variables. Such restrictions can lead to Type II errors in the test of the moderation hypothesis and can be avoided with the

examination of heterogeneous samples of employees, who are exposed to a wide range of the variables of interest (Kristensen, 1996).

The rejection of the hypothesis of moderation may be also attributed to the nature of the specific personal resources included in the study. It may be that these three personal resources operate mainly at an affective-cognitive level and less at a behavioral-practical level, which may also be important for the management of the specific job demands and the prevention of exhaustion. Consequently, different types of personal resources of a more practical nature, such as individuals' abilities to organize their time or the energy they should invest in a given task could be investigated in future studies. For example, Peeters and Rutte (2005) found that for teachers operating in an environment of high job demands and low autonomy, those who were able to manage their time well demonstrated lower levels of exhaustion than their colleagues with low time-management abilities.

Personal Resources in the Motivational Process

The empirical evidence of the mediation of personal resources in the relationship between job resources and work engagement contributes significantly in explaining the underlying psychological mechanisms of the motivational process of the JD-R model. Traditionally, job resources are seen as instrumental for employees to fulfill their work tasks, which consequently keeps employees interested and engaged in their work (Hakanen et al., 2006; Schaufeli & Bakker, 2004). The present study goes one step further by showing that the supply of job resources activates employees' self-efficacy, self-esteem, and optimism and makes them feel more capable of controlling their work environment (Luthans et al., 2006). Presumably, as a result, they are more confident and proud of the work they do, find meaning in it, and, in turn, stay engaged (Hackman & Oldham, 1980).

The present findings also highlight another significant process, namely, from job resources to exhaustion through personal resources. Previous studies in the context of the JD-R model that concerned the role of job resources in the prevention of exhaustion mainly emphasized their moderating potential in the model's health impairment process (Bakker et al., 2005). However, our findings suggest that job resources can play a more active role in the prevention of exhaustion since, through the activation of employees' resiliency beliefs, they can lead to more positive appraisals of stress situations (see Mäkikangas, Kinnunen, & Feldt, 2004). In other words, employees who work in a resourceful environment feel more capable to perform their tasks without investing excessive effort, and as a result, it is likely that they will not become overly fatigued. Generally, the above findings support the view that

personal resources are, up to a point, susceptible to environmental changes (Luthans et al., 2006).

Personal Resources as Antecedents

Some researchers have argued that core self-evaluations, like personal resources, may be the prime determinants of employees' adaptation (Judge et al., 1997), and empirical findings supported a reciprocal effect between personal resources and job characteristics (Kohn & Schooler, 1982). In this context, the results of the present study revealed that employees who hold personal resources are confident about their capabilities and optimistic about their future, and thus may identify or even create more aspects of their environment that facilitate goal attainment. This capability leads to goal confrontation and consequently to work engagement. Against the dominant perception, our results showed that employees who dispose personal resources do not perceive fewer job demands. Nevertheless, personal resources do have a negative relationship with exhaustion suggesting that efficacious or optimistic employees report lower levels of severe fatigue, meaning that they might be more resistant to adverse conditions (Hobfoll, 1989, 2002).

In conclusion, the present study proposes that personal resources play a significant role in the JD-R model since, together with job demands and job resources, they contribute in explaining variance in exhaustion and work engagement. These findings are also in accordance with the learning-generalization model (Kohn & Schooler, 1982), which suggests that the structural imperatives of work affect personal characteristics, and personal characteristics may have important consequences for an individual's perceptions of the work environment. One possible caveat, however, is that our analyses indicated a very high relation between job and personal resources (path coefficients of 0.75), which could suggest an overlap between the two factors. However, CFA demonstrated their empirical distinction, while the correlations among the four job resources and the three personal resources were weak to moderate (from 0.14 to 0.45).

Limitations

The present study has certain limitations that need to be acknowledged. While the SEM-technique used for the analyses informs about possible direction of effects, the cross-sectional nature of the study limits conclusions about the causal relationships among the variables. Moreover, even though we have shown that job and personal resources may be reciprocal, the design

of the study precludes conclusions regarding the sequence of the effects. Longitudinal designs are necessary in order to validate our findings over time, and in order to provide insights regarding causality. Furthermore, the present study was exclusively based on self-report measures that might lead to common method variance problems. However, it can be argued that such constructs as personal resources and work engagement are nearly impossible to measure in any other way than by self-reports (Mäkikangas et al., 2004). Finally, the study was conducted using a homogeneous sample of highly educated professionals working in the same company. Therefore, it is important to further test the external validity of our findings for other working populations.

Practical Implications

Our findings highlight the fact that the mobilization of job resources may be of value for employees to thrive. However, the initial merit of organizations should still be the avoidance of overwhelming job demands, since these are the main predictors of exhaustion. Additionally, the empowerment of employees' personal resources may also be profitable. According to Seligman (1991), employees who learn how to respond to adverse situations with optimism have greater persistence, a requirement for successful adaptation. To conclude, the present study is of importance for the development of job interventions that aim at maximizing engagement and reducing maladaptive exhaustion, contributing to the development of a flourishing and healthy work environment.

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