Job Resources Buffer the Impact of Job Demands on Burnout

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This study tested and refined the job demands–resources model, demonstrating that several job resources play a role in buffering the impact of several job demands on burnout. A total of 1,012 employees of a large institute for higher education participated in the study. Four demanding aspects of the job (e.g., work overload, emotional demands) and 4 job resources (e.g., autonomy, performance feedback) were used to test the central hypothesis that the interaction between (high) demands and (low) resources produces the highest levels of burnout (exhaustion, cynicism, reduced professional efficacy). The hypothesis was rejected for (reduced) professional efficacy but confirmed for exhaustion and cynicism regarding 18 out of 32 possible 2-way interactions (i.e., combinations of specific job demands and resources).

During the past three decades, many studies have shown that unfavorable job characteristics may have a profound impact on job stress and burnout. For example, research has revealed that work overload, lack of autonomy, emotional demands, low social support, and role ambiguity can all lead to feelings of exhaustion and negative, callous attitudes toward work (for reviews, see Lee & Ashforth, 1996; Schaufeli & Enzmann, 1998). Although these previous studies have produced a long list of possible antecedents of burnout, theoretical progress has been limited. The present study tries to increase our insight in the causes of burnout by extending the job demands–resources (JD-R) model (Bakker, Demerouti, De Boer, & Schaufeli, 2003; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The central hypothesis tested is that burnout is the result of an imbalance between job demands and resources, and that *several* job resources may compensate for the influence of *several* job demands on burnout. Evidence for this contention would offer organizations a clear tool for competitive advantage, because proof for such moderating effects implies that employee well-being and productivity may be maintained, even when it is difficult to reduce or redesign job demands.

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The Job Demands–Resources Model

At the heart of the JD-R model (Bakker, Demerouti, De Boer, & Schaufeli, 2003; Demerouti et al., 2001) lies the assumption that whereas every occupation may have its own specific risk factors associated with job stress or burnout, these factors can be classified in two general categories (i.e., job demands and job resources), thus constituting an overarching model that may be applied to various occupational settings, irrespective of the particular demands and resources involved. *Job demands* refer to those physical, social, or organizational aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs. *Job resources* refer to those physical, psychological, social, or organizational aspects of the job that (a) are functional in achieving work goals, (b) reduce job demands and the associated physiological and psychological costs, or (c) stimulate personal growth and development.

A second assumption in the JD-R model is that job stress or burnout develops—irrespective of the type of job or occupation—when certain job demands are high and when certain job resources are limited (Demerouti et al., 2001). Previous studies in several organizations have confirmed this hypothesis by showing that badly designed jobs or high job demands exhaust employees' mental and physical resources and therefore lead to the depletion of energy (i.e., a state of exhaustion) and to health problems (*health impairment process*), whereas the absence of job resources undermines motivation and leads to cynicism and reduced extrarole performance (*motivational process*; e.g., Bakker, Demerouti, De Boer, & Schaufeli, 2003; Bakker, Demerouti, & Schaufeli,

2003; Bakker, Demerouti, & Verbeke, 2004; Demerouti et al., 2001).

The proposition in the JD-R model that has received little research attention so far is that job resources may *buffer* the impact of job demands on stress reactions, including burnout (Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003). This assumption is consistent with the demand–control model (DCM; Karasek, 1979, 1998) but expands this model by claiming that several *different* job resources can play the role of buffer for several *different* job demands. Which job demands and resources play a role in a certain organization depends on the specific job characteristics that prevail. Thus, whereas the DCM states that control over the execution of tasks (autonomy) may buffer the impact of work overload on job stress, the JD-R model expands this view and states that many different types of job demands and job resources may interact in predicting job stress. This proposition agrees with Diener and Fujita's (1995) findings that there are many potential resources that can facilitate the achievement of a specific goal/demand, implying that different goals/demands are likely to be influenced by several resources.

This hypothesis is also consistent with Kahn and Byosiere (1992), who argued that the buffering or interaction effect can occur between any pair of variables in the stress–strain sequence. They claimed that properties of the work situation, as well as characteristics of the individual, can buffer the effects of a stressor. The buffering variable can reduce the tendency of organizational properties to generate specific stressors, alter the perceptions and cognitions evoked by such stressors, moderate responses that follow the appraisal process, or reduce the health-damaging consequences of such responses (Kahn & Byosiere, 1992, p. 622).

Social support is probably the most well-known situational variable that has been proposed as a potential buffer against job stress (e.g., Haines, Hurlbert, & Zimmer, 1991; Johnson & Hall, 1988; see Van der Doef & Maes, 1999, for a review). Other characteristics of the work situation that may act as moderators are (a) the extent to which the onset of a stressor is predictable (e.g., role ambiguity and feedback), (b) the extent to which the reasons for the presence of a stressor are understandable (e.g., through information provided by supervisors), and (c) the extent to which aspects of the stressor are controllable by the person who must experience it (e.g., job autonomy; Kahn & Byosiere, 1992).

Another issue that was raised by Diener and Fujita

(1995) was that because people's strivings often differ, the most important resources are likely to vary across individuals because different resources are most relevant to obtaining different goals. The authors therefore suggested testing the relevance of resources to well-being using an ideographical approach (i.e., congruence between personal goals and possessed resources for each individual) to find stronger relationships. However, they also recognized that there are particular resources that are related to the goals of most people and therefore can be tested in a so-called nomothetic way (i.e., averaged across individuals). In the present study, we follow the latter approach even though we acknowledge that there may be individual differences in what is considered as a resource. The reason is that we analyze job resources that are recognized by several authors (Hackman & Oldham, 1980; Johnson & Hall, 1988; Karasek, 1998; Väänänen et al., 2003) as being important for most people's work-related goal accomplishments within most working environments.

The Present Study

The central hypothesis tested in this study among employees working in a large institute for higher professional education is that particularly the combination of high job demands and low job resources is predictive of burnout. The proposed interaction is tested using four specific demands and four specific resources. The study started with an investigation of the most important job demands and job resources. According to the project team (including human resources managers and employee representatives), the crucial job demands were work overload, emotional demands by students, physical demands, and work–home interference. As potential job resources, social support, quality of the relationship with the supervisor, autonomy, and performance feedback were mentioned. Our central hypothesis is that *all* these specific job resources may buffer the positive relationship between the four specific job demands and burnout.

Social support is a straightforward resource in that it is functional in achieving work goals. Thus, instrumental support from colleagues can help to get the work done in time and may therefore alleviate the impact of work overload on strain, including burnout (Van der Doef & Maes, 1999). In addition, the stress-buffering hypothesis states that social support protects employees from the pathological consequences of stressful experiences (Cohen & Wills, 1985). In a similar vein, a high quality *relationship with one's*

supervisor may alleviate the influence of job demands (work overload, emotional demands, physical demands, and work–home interference) on burnout, because leaders' appreciation and support puts demands in another perspective. Leaders' appreciation and support may also aid the worker in coping with the job demands, facilitate performance, and act as a protector against ill health (Väänänen et al., 2003).

Different empirical results and theories about occupational stress have regarded job *autonomy* to be crucial for the health of employees, mainly because greater autonomy is associated with more opportunities to cope with stressful situations (see Jenkins, 1991; Karasek, 1998). In our study job autonomy means, on the one hand, independence from other workers while carrying out tasks, and on the other, decision latitude concerning one's work pace and phases. Several studies with the DCM have indeed confirmed that autonomy may act as a buffer against the influence of job demands (work overload, time pressure; Van der Doef & Maes, 1999).

Constructive *feedback* not only helps employees do their work more effectively but also improves communication between supervisors and employees. When specific and accurate information is provided in a constructive way, both employees and supervisors can improve or change their performance. All employees who perform well should receive frequent praise and encouragement, whereas those who are not performing at the expected level should be informed of any problems and coached on how to improve. Apprising employees of good performance helps maintain their motivation and signals them to continue in this direction (Hackman & Oldham, 1980). Communicating with employees in a positive manner when they need to improve their performance will help prevent work problems and minimize surprises during the performance review. For example, performance feedback may mitigate the positive relationship between work–home interference and exhaustion, because adequate feedback reduces the tendency to worry at home about work-related issues.

Method

Procedure and Participants

The study was carried out among employees of a large institute for higher professional education in applied science in the Netherlands. The institute offers a wide variety of programs (e.g., in technology, science and engineering, commerce and administration, health care). It has about 25,000 students and 2,400 staff members. On the basis of the literature and interviews with the members of the project team, a list of eight potential job demands and resources was compiled. Short instruments to measure each of these job characteristics were included in the questionnaire, as well as the Maslach Burnout Inventory—General Survey (see *Measures*). After announcements through the internal media, 1,803 employees received an informative letter about the study from the project team, together with the questionnaire and a return envelope, at their home address. Two of the seven faculties did not participate in the present study because they had just been involved in another study. The confidentiality and anonymity of the data were emphasized. Participants were requested to fill out the questionnaire at home and to post it in a special box placed at their department. A total of 1,012 employees filled out and returned the questionnaire (response rate was 56%). The sample included 539 men (53.3%) and 463 women (45.7%). For 10 employees (1%), information about gender was missing. The mean age was 46 years ($SD = 8.86$). The average number of years of working experience was 15 years ($SD = 10.01$), and mean organizational tenure was 10 years ($SD = 8.19$). Furthermore, 853 employees (84%) had a permanent job position, and 148 employees (15%) had a supervisory position.

Measures

Burnout. Burnout was assessed using the Maslach Burnout Inventory—General Survey (MBI–GS; Schaufeli, Leiter, Maslach, & Jackson, 1996). The instrument consists of three subscales, tapping exhaustion, cynicism, and professional efficacy. *Exhaustion* is measured with five items (e.g., feeling burned out from work, feeling tired in the morning). *Cynicism* reflects indifference or a distant attitude toward work and is measured with four items from the original scale (e.g., being more cynical about work contribution). Item 4 (doing my job and not be bothered) was omitted, as suggested by Schaufeli and Van Dierendonck (2000) and Schutte, Toppinnen, Kalimo, and Schaufeli (2000). They have shown that this item does not load on the intended factor and thus creates problems with factorial validity. Finally, *professional efficacy* encompasses both social and nonsocial accomplishments at work and is assessed with six items (e.g., making an effective contribution to the organization). Participants were asked to indicate the extent to which they agreed with each statement using a 7-point rating scale (0 = *never*, 6 = *every day*). High scores on exhaustion and cynicism and low scores on efficacy are indicative of burnout.

Job demands. Four job demands were included in the present research. *Work overload* was measured with a short scale developed by Bakker, Demerouti, Taris, Schaufeli, and Schreurs (2003). The scale included three items that refer to quantitative, demanding aspects of the job (e.g., time pressure, working hard). Items are scored on a 5-point scale, ranging from 1 = *never* to 5 = *always*. *Emotional demands* was based on a scale developed by Van Veldhoven and Meijman (1994) and included five items (e.g., being confronted with people who complain continuously), measured on a 5-point scale (1 = *never*, 5 = *always*). *Physical demands* were measured with a seven-item scale developed by Bakker, Demerouti, Taris, Schaufeli, and Schreurs (2003). Participants were asked to indicate how demanding they thought each of seven situations was (0 = *not demand-*

ing, 5 = *extremely demanding*), for example, working in a standing position and working in a physically unpleasant environment. *Work–home interference* was assessed with a three-item instrument of Geurts (2000; Wagena & Geurts, 2000). Responses could be made on a 5-point scale (1 = *never*, 5 = *always*). An example item measures how often work schedule interferes with domestic obligations.

Job resources. Four job resources were included in the questionnaire. *Autonomy* was measured with a short scale developed by Bakker et al. (2004). It includes three items particularly referring to decision authority (i.e., freedom of action in accomplishing the formal work task), for example, deciding how to execute the work. Items are scored on a 5-point scale (1 = *never*, 5 = *always*). *Social support* was also assessed with a three-item scale developed by Bakker et al. (2004), for example, being able to ask colleagues for help (1 = *never*, 5 = *always*). *Quality of the relationship with the supervisor* was measured using an adaptation of Graen and Uhl-Bien's (1991) leader–member exchange scale (Le Blanc, 1994). The scale includes five items, for example, a supervisor using his or her influence to help the employee solve problems at work (1 = *never*, 5 = *always*). *Performance feedback* was assessed with a three-item scale developed by Bakker, Demerouti, Taris, Schaufeli, and Schreurs (2003), for example, receiving sufficient information about work goals (1 = *never*, 5 = *always*). All responses were coded such that higher scores referred to higher job demands and more job resources, respectively.

Results

Descriptive Statistics

Table 1 shows the means, standard deviations, and correlations between the variables, as well as the internal consistencies of the scales included in the analyses. As can be seen from this table, all scales show good reliabilities, with all Cronbach's alpha coefficients higher than .73. Nearly all demands and resources are weak to moderately highly related to each other, with the highest intercorrelations found for the four resources measured. Preliminary analyses revealed that demographic variables were neither substantially nor consistently (across faculties) related to the three burnout dimensions, and these were therefore omitted from further analyses.[1]

Test of Job Demands–Resources Interaction Effects

According to the JD-R model and our central hypothesis, job resources can alleviate the impact of job demands on burnout. To test this hypothesis, we first entered all variables around their mean scores and built interaction terms (compare Aiken & West, 1991). The predicted two-way interaction effects were then tested in a series of 16 separate hierarchical regression analyses for each of the three burnout

dimensions. In each hierarchical regression, a specific job demand and a specific job resource were included in the first step of the regression equation, and the interaction term in the second step. In other words, we examined the extent to which the interaction between job demands and job resources explained a unique proportion of the variance in exhaustion, cynicism, and (reduced) professional efficacy, after controlling for the main effects. The results of these analyses are presented in Tables 2, 3, 4, and 5.

As can be seen in Tables 2–5, in terms of main effects, job demands were the most important predictors of exhaustion, whereas (lack of) job resources were the most important predictors of cynicism and professional efficacy. This is consistent with previous research (e.g., Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003; Demerouti et al., 2001). There is only one exception, and this concerns the relationship between emotional demands and cynicism, which is about equally strong as the relationship between the job resources and cynicism (see Table 3). Furthermore, none of the interaction terms explained a significant part of the variance in professional efficacy, thereby confirming the different role of this burnout dimension in comparison with the two other dimensions. Thus, our interaction hypothesis was rejected for the (reduced) professional efficacy dimension of burnout.

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[1] Given the intercorrelations between the four different job demands and the four job resources, before we tested our central hypothesis, we first examined whether the working conditions could be distinguished empirically. Exploratory factor analysis supported the proposed eight-factor structure of the working conditions. The analysis resulted in a clear eight-factor solution: All factors had eigenvalues larger than 1, and together they explained 68% of the variance. In addition, the results of confirmatory factor analysis with the AMOS software package (Arbuckle, 1997) corroborated these findings. The job characteristics were modeled in eight latent factors, each representing the specific demands and resources included in the questionnaire, indicated by the items introduced before. The latent factors were allowed to correlate. This eight-factor model (with four job demands and four job resources) showed a reasonable fit to the data, $\chi^2(637) = 2,650.84$, $p < .001$; nonnormed fit index = .89, comparative fit index = .90, root-mean-square error of approximation (RMSEA) = .06. The fit indices have values close to .90 (see Marsh, Balla, & Hau, 1996), and the RMSEA is lower than the criterion of .08 (see Cudeck & Browne, 1993). All items of the specific job demands and resources loaded significantly on the intended latent factors (loadings ranged from .49 to .89 with critical ratios ranging from 14.10 to 28.29). Taken together, these findings indicate that the four demands and four resources could indeed be distinguished empirically.

Table 1

Means, Standard Deviations, Internal Consistencies, and Correlations Between the Variables (N = 1,012)

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Work overload	3.28	0.91	(.83)										
2. Emotional demands	2.09	0.67	.39**	(.82)									
3. Physical demands	2.35	1.24	.18**	.28**	(.91)								
4. Work–home interference	2.03	0.74	.50**	.50**	.27**	(.77)							
5. Autonomy	3.71	0.76	.07*	−.22**	−.14**	−.15**	(.74)						
6. Social support	3.63	0.85	−.08*	−.34**	−.22**	−.27**	.41**	(.85)					
7. Quality relationship with supervisor	3.35	1.03	.00	−.25**	−.13**	−.15**	.45**	.56**	(.94)				
8. Feedback	3.26	0.96	.05	−.23**	−.16**	−.12**	.44**	.55**	.60**	(.84)			
9. Exhaustion	1.90	1.15	.39**	.51**	.22**	.55**	−.23**	−.32**	−.22**	−.25**	(.87)		
10. Cynicism	1.58	1.21	.07*	.40**	.23**	.27**	−.38**	−.41**	−.41**	−.43**	.49**	(.84)	
11. Professional efficacy	4.23	0.82	.08**	−.19**	−.14**	−.17**	.37**	.42**	.33**	.40**	−.26**	−.44**	(.78)

Note. Cronbach's alphas are listed on the diagonal.

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

Table 2

Regression of Burnout on Specific Job Demands and Job Resources: Work Overload (N = 1,012)

Step	Model	Exhaustion			Cynicism			Professional efficacy		
		β	ΔR^2	ΔF	β	ΔR^2	ΔF	β	ΔR^2	ΔF
1	Work overload	.41***			.10***			.06		
	Autonomy	−.25***	.22	135.99***	−.38***	.15	87.19***	.36***	.14	79.47***
2	Work Overload × Autonomy	−.08**	.01	7.51**	−.08**	.01	7.95**	.05	.00	3.06
1	Work overload	.37***			.04			.12***		
	Social support	−.29***	.24	149.54***	−.40***	.16	94.33***	.42***	.18	105.54***
2	Work Overload × Social Support	−.09***	.01	10.30***	.02	.00	<1	.01	.00	<1
1	Work overload	.39***			.07*			.08**		
	Quality relationship with supervisor	−.21***	.20	119.70***	−.39***	.16	89.69***	.31***	.11	56.83***
2	Work Overload × Quality Relationship With Supervisor	−.06*	.004	4.36*	−.01	.00	<1	−.01	.00	<1
1	Work overload	.41***			.09***			.06*		
	Feedback	−.27***	.23	144.39***	−.43***	.19	112.97***	.39***	.16	90.94***
2	Work Overload × Feedback	−.09**	.01	9.49**	.03	.00	<1	−.02	.00	<1

* $p < .05$.   ** $p < .01$.   *** $p < .001$.

Table 3

Regression of Burnout on Specific Job Demands and Job Resources: Emotional Demands (N = 1,012)

Step	Model	Exhaustion			Cynicism			Professional efficacy		
		β	ΔR^2	ΔF	β	ΔR^2	ΔF	β	ΔR^2	ΔF
1	Emotional demands	.46***			.31***			−.11***		
	Autonomy	−.11***	.27	177.30***	−.29***	.25	161.16***	.34***	.15	85.42***
2	Emotional Demands × Autonomy	−.05	.00	3.26	−.09**	.01	8.89**	.02	.00	<1
1	Emotional demands	.44***			.28***			−.05		
	Social support	−.16***	.28	185.85***	−.30***	.24	154.36***	.38***	.17	98.67***
2	Emotional Demands × Social Support	−.03	.00	<1	−.06*	.004	4.51*	.03	.00	<1
1	Emotional demands	.48***			.32***			−.12***		
	Quality relationship with supervisor	−.09**	.26	171.19***	−.31***	.25	161.70***	.28***	.11	60.80***
2	Emotional Demands × Quality Relationship With Supervisor	.00	.00	<1	−.03	.00	1.19	.01	.00	<1
1	Emotional demands	.46***			.30***			−.11***		
	Feedback	−.14***	.27	182.18***	−.34***	.28	186.37***	.37***	.17	95.62***
2	Emotional Demands × Feedback	−.04	.00	2.16	−.09***	.01	10.28***	−.01	.00	<1

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4

Regression of Burnout on Specific Job Demands and Job Resources: Physical Demands (N = 1,012)

Step	Model	Exhaustion			Cynicism			Professional efficacy		
		β	ΔR^2	ΔF	β	ΔR^2	ΔF	β	ΔR^2	ΔF
1	Physical demands	.25***			.19***			−.09**		
	Autonomy	−.19***	.11	58.83***	−.35***	.17	102.62***	.36***	.15	82.40***
2	Physical Demands × Autonomy	−.06*	.004	3.86*	−.07*	.004	5.24*	.00	.00	<1
1	Physical demands	.22***			.16***			−.06		
	Social support	−.26***	.14	79.09***	−.36***	.18	108.50***	.39***	.17	98.50***
2	Physical Demands × Social Support	−.05	.00	3.24	−.06*	.004	4.45*	.00	.00	<1
1	Physical demands	.25***			.19***			−.11***		
	Quality relationship with supervisor	−.17***	.10	55.62***	−.36***	.18	109.64***	.30***	.11	58.99***
2	Physical Demands × Quality Relationship With Supervisor	−.07*	.004	4.76*	−.03	.00	1.09	.01	.00	<1
1	Physical demands	.24***			.17***			−.08**		
	Feedback	−.21***	.12	64.29***	−.40***	.21	127.12***	.38***	.16	92.84***
2	Physical Demands × Feedback	−.04	.00	1.40	−.04	.00	2.39	−.05	.00	2.78

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5
Regression of Burnout on Specific Job Demands and Job Resources: Work–Home Interference (WHI), N = 1012

Step	Model	Exhaustion			Cynicism			Reduced professional efficacy		
		β	ΔR^2	ΔF	β	ΔR^2	ΔF	β	ΔR^2	ΔF
1	WHI	.52***			.20***			−.11***		
	Autonomy	−.14***	.33	236.11***	−.33***	.19	112.50***	.35***	.15	85.18***
2	WHI × Autonomy	−.08**	.01	8.14**	.10***	.01	11.62***	.03	.00	<1
1	WHI	.50***			.16***			−.05		
2	Social support	−.18***	.34	244.72***	−.36***	.19	112.58***	.39***	.17	98.64***
2	WHI × Social Support	−.02	.00	<1	−.05	.00	2.52	.04	.00	1.63
1	WHI	.53***			.21***			−.12***		
	Quality relationship with supervisor	−.13***	.32	230.74***	−.35***	.20	117.99***	.29***	.11	61.18***
2	WHI × Quality Relationship With Supervisor	−.07**	.005	6.77**	−.06*	.003	3.93*	.03	.00	<1
1	WHI	.53***			.22***			−.12***		
2	Feedback	−.19***	.34	250.80***	−.40***	.23	142.62***	.38***	.17	97.89***
2	WHI × Feedback	−.07**	.005	7.79**	−.06*	.003	4.30*	.01	.00	<1

* $p < .05$. ** $p < .01$. *** $p < .001$.

However, notably, 18 out of 32 possible interaction terms (56%) explained a unique, significant part of the variance in exhaustion or cynicism, thus qualifying the main effects. Note that all job resources buffered the impact of work overload on exhaustion, and that three of the four resources buffered the relationship between work–home interference and exhaustion. For cynicism, the results were slightly different. Emotional demands and work–home interference both interacted with three of the four job resources in predicting cynicism. Autonomy was the resource that acted most often as a buffer of job demands (seven significant interactions), followed by performance feedback (four), quality of the relationship with the supervisor (four), and social support from colleagues (three).

To enable an interpretation of the interaction effects, we followed a median split procedure for each of the demands and resources and calculated the mean scores for all possible combinations of low and high demands and low and high resources. All interactions showed a similar pattern and supported our central hypothesis: The level of exhaustion and of cynicism was elevated particularly when job demands (work overload, emotional demands, unfavorable working conditions, and work–home interference) were high and job resources (autonomy, social support, high-quality relationship with the supervisor, and performance feedback) were lacking. In cases when job resources were available in the working environment, job demands had a weaker or no relationship with burnout. Thus, our buffer hypothesis was supported for the exhaustion and cynicism dimensions of burnout, although not for all possible combinations of job demands and resources.

Discussion

The central aim of the present study was to test and refine the JD-R model of burnout (Bakker, Demerouti, De Boer, & Schaufeli, 2003; Demerouti et al., 2001) among employees working in an institute for higher professional education in the Netherlands. The JD-R model identifies two categories of job characteristics—job demands and job resources—that are assumed to play a key role in the burnout process. The central assumption in the model is that job demands evoke a stress process, because they lead to energy depletion, whereas a lack of job resources evokes a withdrawal process, because it undermines employee motivation and learning. Our study successfully showed that—in addition to such main effects—the interaction between job demands and job

resources explains a unique proportion of the variance in exhaustion and cynicism (but not professional efficacy). In the majority of the cases, employees reported the highest levels of fatigue and demoralization when high job demands coincided with low job resources. These findings are discussed in more detail below.

Job Demands × Job Resources Interactions

Results of a series of hierarchical regression analyses showed that not only autonomy but also social support from colleagues, a high-quality relationship with the supervisor, and performance feedback were capable of buffering the impact of work overload on exhaustion. These findings clearly expand the DCM (Karasek, 1979, 1998). Moreover, a highly similar pattern of results was found with two other demands, namely physical demands (e.g., working in a physically unpleasant environment, a lack of technical devices, working in a standing position) and work–home interference (a form of interrole conflict in which the role pressures from the work domain are mutually incompatible with the family life). The results were slightly different for the cynicism dimension of burnout. Specifically, emotional demands (defined as the frequency of exposure to emotionally demanding situations, such as complaints, impoliteness, and intimidation) interacted with autonomy, social support, and feedback; physical demands interacted with autonomy and social support; and work–home interference interacted with autonomy, quality of the relationship with the supervisor, and feedback. For work overload, only the interaction with autonomy was a unique and significant predictor of cynicism. On a more abstract level, these findings not only challenge the DCM but also Siegrist's (1996) model (focusing on the efforts–rewards interaction) by showing that several different demands and resources may interact to predict chronic job stress, in the present study assessed as symptoms of burnout.

These results clearly expand our knowledge about working conditions that may pose employees at risk for burnout. Earlier studies with the JD-R model have restricted themselves to testing the unique influences of job demands and job resources on employees' feelings of exhaustion and disengagement, and they revealed that job demands are the most important predictors of exhaustion (and indirectly of long-term absenteeism and in-role performance), whereas job resources are the most important predictors of (dis)engagement (and indirectly of short-term absen-

teeism and extrarole performance; Bakker, Demerouti, De Boer, & Schaufeli, 2003; Bakker et al., 2004; Demerouti et al., 2001). The present study focused more specifically on the *interaction* between job demands and job resources and shows that the combination of *high* demands and *low* job resources significantly adds to predicting the core dimensions of burnout (exhaustion and cynicism). More important, it helps to explain the meaning of main effects of unfavorable job characteristics on burnout. Thus, in 18 out of 32 cases, work overload, emotional demands, physical demands, and work–home interference did not result in high levels of burnout if employees experienced autonomy, received feedback, had social support, or had a high-quality relationship with their supervisor. In a psychological sense, different processes may have been responsible for comparable interaction effects. Thus, autonomy may have helped in coping with the job demands because employees could decide for themselves when and how to respond to their demands, whereas social support and a high-quality relationship with the supervisor may have buffered the impact of job demands on levels of burnout because employees received instrumental help and emotional support. In contrast, feedback may have helped because it provided employees with the information necessary to maintain their performance and to stay healthy (see Kahn & Byosiere, 1992, for a further discussion).

An important limitation of existing job stress models is their static character. Researchers have used the same set of variables in many different occupational domains and thus assumed that these variables are relevant to the universe of job positions. In our view, different demands and resources may prevail in different work situations. Even though we started the present study with a qualitative analysis of the potential job demands and resources, our study was limited to one single organization. To really speak about a flexible model, the present findings should be replicated in other studies using different sets of demands and resources. These future studies may reveal which particular job resources may buffer the impact of job demands on burnout in specific occupations.

The study of interactions between work characteristics to predict employee outcomes like burnout brings us one step closer to uncovering the complexity of the work situation. In this respect, Kahn and Byosiere (1992) have argued that in order for stress research to have external validity, it has to deal with combinations of work characteristics and "distinguish" between their effects as single predictors and

in combinations—at least in those combinations that are commonly encountered in the world of work (pp. 577–578). Results of the present study clearly support this view and show that for a complete understanding of the emergence of burnout, it is important to investigate the multiplicative impact of demands and resources. Because employees never experience work overload isolated without having some kind of support or interaction with their supervisor, it is prudent to examine combinations of work characteristics when explaining the experience of job stress. Although all job demands were positively, and all job resources were negatively related to exhaustion and cynicism, the interactions clearly revealed a more refined picture of working conditions responsible for chronic feelings of fatigue and negative attitudes toward work.

Previous research has revealed that it is often difficult to detect interaction effects in organizational stress studies (De Rijk, Le Blanc, Schaufeli, & De Jonge, 1998; Hockey, 1993). Our consistent findings may be partly due to our relatively large sample size and the fact that we did everything to empirically distinguish the job characteristics included in the study. Indeed, additional confirmatory factor analyses showed that the four job demands and the four job resources could be empirically distinguished. This may have helped in detecting the interaction effects, because there was little overlap between the separate predictors. In other words, the specific demands and resources were largely independent. It is interesting to note that while some scholars have argued that particular demands should *match* the resources in the workplace (De Jonge & Dormann, 2003; Frese, 1999; Van der Doef & Maes, 1999), the present study found, for example, that autonomy could buffer the stressful impact of *each* of the job demands on exhaustion and cynicism (with only one exception). Future research using different types of job demands and resources varying in compatibility should reveal whether the matching hypothesis holds.

Limitations

Although the present study provided support for the predicted interaction between job demands and resources in 56% of the cases, some caveats are warranted. The most obvious limitation is that we used a cross-sectional design. This means that common-method variance may have influenced the results and that we cannot draw firm conclusions about the directions of the effects. However, several previous studies have shown that the demands and re-

sources incorporated in the present study are predictors of burnout rather than outcomes (e.g., Schaufeli & Enzmann, 1998). In addition, our findings were consistent across 18 different interactions, and it would be hard to imagine exhaustion and cynicism predicting the exact combinations of job demands and resources. A second limitation is that we investigated a specific group of employees, namely individuals working at an institute for higher professional education. This means that future research is needed to clarify the generalizability of our findings to other occupations and organizations. While we expect that the presence of interaction effects should not necessarily vary with occupation, the relevant job demands and job resources may be different. Nevertheless, the four specific demands and resources used in this study have a solid basis in the literature and should not be neglected in future research. Finally, it should be noted that the interaction terms were only able to explain a limited amount of the variance in exhaustion and cynicism. This does not only apply to our study. According to Chaplin (1991) and Frazier, Tix, and Barron (2004), effect sizes for interactions are generally small—and small corresponds to an R^2 value of .02 or smaller. Nevertheless, we believe that the interactions are important from a theoretical perspective, because they shed light on the combination of different working conditions that may foster burnout.

Practical Implications

We have recently developed Internet applications of the JD-R model, in which employees who fill out an electronic questionnaire receive online feedback on their computer screen about their most important personal job demands and resources. An evaluation of one of these instruments for the Royal Dutch Medical Association suggests that—at the personal level—the combination of certain high demands and lack of resources is most predictive of symptoms of burnout (Bakker, Schaufeli, Bulters, Van Rooijen, & Ten Broek, 2002). Thus, the interactions also appear to have practical significance, even though their contribution to explaining variance in burnout for large groups of employees seems limited.

It is important to note that an increase in some resources may not always coincide with a decrease in symptoms of burnout. Warr (1987) argued that job resources such as autonomy, social support, and feedback may act like vitamins and have a *nonlinear* effect on well-being. Just like an overdose of vitamins may lead to a toxic concentration in the body

and ill health, an overdose of job resources may undermine employee well-being and foster burnout. Job autonomy, for example, is assumed to follow an inverted U-shape pattern: Very high levels of job autonomy are potentially harmful for employee well-being because it implies uncertainty, difficulty in decision making, and high responsibility on the job (Warr, 1987). There is indeed some evidence for a curvilinear relationship between job resources and employee well-being (De Jonge & Schaufeli, 1998; Warr, 1990).

What can practitioners and organizations learn from our study in terms of interventions to reduce burnout? The clear message that can be sent to the organizations is that they should try to provide their employees adequate resources. This does not mean that the enhancement of resources should be their primary merit. The main aim of an organization should be to design the job demands such that people can fulfill them without damaging their health. If in some cases it is impossible to reduce or optimize specific demands, for example, the cognitive load of an air traffic controller during rush hours at the airport, additional job resources should be provided, for example, in this case, the help of a colleague and the freedom to take a break before or after the rush hour. The task of the practitioner or the organization is to find the proper job resource that can (effectively) buffer the effect of the specific job demand.

General Conclusion

This study successfully expanded the DCM (Karasek, 1979, 1998) by showing not only that the interaction between job demands and job control may predict strain but also that several demanding aspects of the job may interact with the supplied resources in the prediction of burnout symptoms. Researchers may utilize this refined JD-R model (Bakker, Demerouti, De Boer, & Schaufeli, 2003; Demerouti et al., 2001) to increase our understanding of the burnout experience (or other work-related stress experiences) and to guide the changing of suboptimal working conditions into a healthy workplace.

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