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Work engagement and burnout: testing the robustness of the Job Demands-Resources model

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This study focuses on work engagement and its negative antipode, burnout, as well as their antecedents and consequences. According to the Job Demands-Resources (JD-R) model, two different processes have to be distinguished: a motivational process that links job resources with turnover intention through work engagement, and an energetic process that links job demands and health complaints via the mediating role of burnout. The robustness of the JD-R model was tested in a heterogeneous occupational sample ($N = 846$). Structural equation modeling analyses yielded a slightly modified model with only exhaustion being indicative of burnout and vigor, dedication along with absorption being indicative of engagement. The results provide evidence for the dipartite structure of the JD-R model. Multi-group analyses revealed the model to be invariant across age and gender. Although strengths of path coefficients and factor loadings differed among white- and blue-collar workers, the basic structure of the model was also confirmed among these subgroups. Therefore, the findings underscore the robustness of the JD-R model.

Keywords: Job Demands-Resources model; work engagement; job burnout

Introduction

Throughout its history psychology has been preoccupied with the study and treatment of psychopathology and damage, neglecting those aspects of the human condition that foster well-being and fulfillment (Seligman & Csikszentmihalyi, 2000). Mirroring this almost exclusive focus on the negative, occupational health psychology emphasized performance deficits and work-related stress, rather than workers' happiness, health, and betterment (Hill, 2003). It is only recently that researchers in the emerging field of positive psychology have proposed to restore this imbalance by studying optimal functioning and positive experiences (Linley, Joseph, Harrington, & Wood, 2006). Accordingly, a growing body of research into concepts such as occupational well-being (Warr, 1999), self-efficacy (Grau, Salanova, & Peiro, 2001), sense of coherence (Kivimäki, Feldt, Vahtera, & Nurmi, 2000), flow (Csikszentmihalyi, 1990; Salanova, Bakker, & Llorens, 2006), or resilience (Strumpfer, 2003) has begun to provide better understanding of positive work-related experiences. Taking up this interest in workers' well-being, researchers supplemented and extended the concept of burnout, which has dominated the research agenda for over 25 years, by its positive antipode work engagement (Maslach, Schaufeli, & Leiter, 2001). To integrate both work engagement and job burnout into a comprehensive model of work-related well-being, the Job Demands-Resources (JD-R) model has recently been introduced (Bakker & Demerouti, 2007; Bakker, Demerouti, de Boer, & Schaufeli, 2003; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004).

So far, the JD-R model has been successfully tested in various countries such as Finland (Hakanen, Bakker, & Schaufeli, 2006), the Netherlands, and Spain (Llorens, Bakker, Schaufeli, & Salanova, 2006) whereby the model was shown to be invariant across Dutch and Spanish workers. Furthermore the model has been applied to various occupational groups such as home care professionals (Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003), teachers (Hakanen et al., 2006), and white- (Schaufeli & Bakker, 2004) and blue-collar workers (Bakker et al., 2003). However, no simultaneous test, comparing white- and blue-collar workers, has yet been conducted, nor has the model been examined for age or gender differences. Therefore, we examine the robustness of the JD-R model using a heterogeneous sample of Austrian workers.

The Job Demands-Resources model

The Job Demands-Resources model (Demerouti et al., 2001; Schaufeli & Bakker, 2004) specifies how working

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conditions produce motivation and health impairments. It assumes that while employees in different occupations confront different working environments, the characteristics of these environments can be classified in two global categories, namely job demands and job resources. *Job demands* refer to those aspects of the job that require sustained physical and/or psychological (i.e., cognitive or emotional) effort and are therefore associated with certain physiological and/or psychological costs (Demerouti et al., 2001). Given the potential risk of experiencing negative outcomes, such as burnout, when being confronted with demanding working conditions, occupational health psychology is interested in factors which keep people healthy even when they encounter high levels of workload (Richter & Hacker, 1998). These health-protecting factors are called resources.

According to Demerouti et al. (2001), *job resources* refer to those aspects of the job that are functional in achieving work goals, in stimulating personal growth and development, and in reducing job demands and the associated physiological and psychological costs. Hence, job resources play either an intrinsic or an extrinsic motivational role. If job resources exert an intrinsic motivational effect they will satisfy basic human needs for autonomy, relatedness (social support), and competence. As a result, well-being and commitment will increase and employees will be prevented from leaving the organization (Deci & Ryan, 1985; Hackman & Oldham, 1980). On the other hand, job resources may develop an extrinsic motivational effect in that they contribute to the successful completion of the work task, be it by providing required information or by fostering an innovative climate (Meijman & Mulder, 1998).

The JD-R model assumes that job resources and job demands evoke two different albeit related processes (see Figure 1): (1) a motivational process in which job resources stimulate employees' motivation and foster engagement and organizational commitment (Schaufeli & Bakker, 2004); (2) an energetic process of wearing out in which high job demands deplete employees' mental and physical resources and lead to job burnout, health impairments (Schaufeli & Bakker, 2004), and sick leave (Bakker et al., 2003).

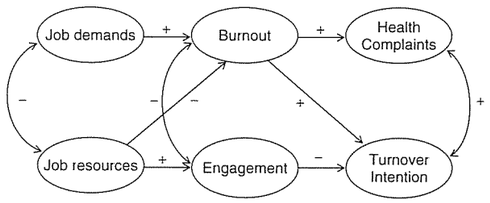

Figure 1. The Job Demands-Resources (JD-R) model.

More specific, the *motivational process* assumes that job resources are linked to organizational outcomes (e.g., turnover intention) through the intervening effect of work engagement whereas the *energetic process* links job demands with health impairments via the mediating role of job burnout.

Engagement, one of the core concepts of the JD-R model, has been defined as a persistent positive, fulfilling, work-related state of mind that comprises three components: energy or vigor, involvement or dedication, and absorption (Schaufeli, Salanova, González-Romá, & Bakker, 2002). Vigor refers to high levels of energy and resilience, the willingness to invest effort in one's job, and persistence in the face of difficulties. Dedication reflects a strong involvement in one's work, accompanied by feelings of enthusiasm and significance as well as a sense of pride and inspiration. The third dimension of work engagement, absorption, is characterized by total immersion in one's work, whereby time passes quickly and one is unable to detach oneself from work. It can be assumed that engaged workers are committed to the organization and remain with their current employer because the organization provides them with the resources needed not only to achieve work goals but also to experience growth and development (Houkes, Janssen, de Jonge, & Bakker, 2003).

Burnout, on the other hand, has initially been defined as a syndrome of exhaustion, cynicism, and reduced professional efficacy that results from chronic occupational stress (Maslach, Jackson, & Leiter, 1996). Exhaustion refers to feelings of chronic fatigue as a result of overtaxing work whereas cynicism reflects an indifferent or a distant attitude towards work in general. Finally, lack of professional efficacy is characterized by reduced feelings of competence and accomplishment both in one's job and in the organization. During the past decades, evidence has accumulated that exhaustion and cynicism constitute the core of the burnout syndrome, to which professional efficacy is only loosely related (Lee & Ashforth, 1996; Schaufeli & Bakker, 2004).

Besides the main effects of job demands and resources, the JD-R model postulates a *buffering effect* of job resources on job strain (e.g., burnout) (Bakker & Demerouti, 2007). Although this assumption corresponds to Karasek's (1979) Job Demands-Control model, Bakker and Demerouti (2007) argue that not only job control and psychological demands interact in predicting job strain but that various job resources may operate as buffers for various job demands. This proposition agrees with recent findings that several different job resources, such as supervisor support or feedback, buffer the impact of job demands on burnout (Bakker, Demerouti, & Euwema, 2005).

Relations with age, gender, and occupational level

Previous studies predominantly investigated relationships between the levels of engagement or burnout and various demographic variables such as age or gender (Maslach & Jackson, 1985; Maslach et al., 2001; Schaufeli, Bakker, & Salanova, 2006). For example, numerous studies considered age as a factor associated with job burnout but yielded inconclusive results (for a review see Brewer & Shapard, 2004). On the other hand, small but statistically significant positive relations were found between work engagement and age (Schaufeli, Bakker, & Salanova, 2006). Yet, researchers have seldom examined age as a factor that moderates the influence of job resources or job demands on employee's well-being. Age-related changes in physiological and cognitive functioning (de Zwart, Frings-Dresen, & van Dijk, 1995; Hess, 2005; Park, Lautenschlager, Hedden, Davidson, Smith, & Smith, 2002) may weaken employees' resilience and may, thus, lead to higher levels of burnout in the face of work demands. In a similar vein, one may assume that impaired well-being, as indicated by burnout, is more likely to result in health complaints among older workers than among their younger counterparts. From a more positive perspective, elderly employees may have accumulated more coping resources throughout their professional lives (e.g., Siu, Spector, Cooper, & Donald, 2001) that contribute to effective uses of job resources, thus fostering work engagement. We therefore expect that, depending on their age, employees differ in the impact of job resources and job demands on engagement and burnout.

Apart from age, gender was systematically used as a classifier in a number of engagement and burnout studies. However, few studies succeeded in reporting statistically significant gender differences in levels of engagement or burnout. If relations were found, they tended to be rather weak (for an overview see Greenglass, 1991; Schaufeli, Bakker, & Salanova, 2006; Schaufeli & Greenglass, 2001). Furthermore, gender has neither been investigated as a modifier in the motivational nor in the health impairment process of the Job Demands-Resources model. Applying research on gender differences in coping to work contexts, some general tendencies can, however, be noted. First, women tend to be more vulnerable to undesirable life events than men both in the work and the non-work domain (Kessler & McLeod, 1984, as cited in Krajewski & Goffin, 2005). Second, women tend to score higher in coping strategies in response to stressful situations as compared with men (Tamres, Janicki, & Helgeson, 2002). In line with this argument, recent findings indicate that resources play divergent roles in the development of engagement and burnout among men and women. For example, Greenglass, Burke, and Konarski (1998) reported that while co-worker support led to lower emotional exhaustion in women, supervisory and co-worker support resulted in higher levels of professional efficacy among men. It is therefore expected that job resources offer greater protection against burnout among women whereas they foster the development of engagement among men.

Finally, the influence of job resources and job demands on work engagement and burnout has been more often studied in white- than in blue-collar jobs. Comparisons between various occupational groups indicate that blue-collar workers score significantly lower on all engagement dimensions (vigor, dedication, and absorption) than occupational groups such as police officers, managers, and educators (Schaufeli et al., 2006). The JD-R model itself has, however, not yet been tested simultaneously among various occupational groups.

Hypotheses

The present study intends to investigate the robustness of the JD-R model across various occupational and age groups and across gender. Accordingly, the following hypotheses were tested:

Hypothesis 1. Job resources buffer the positive relationship between job demands and burnout. That is, the relationship between job demands and burnout is weaker when job resources are available.

Hypothesis 2. Job resources are negatively related to one's intention to leave the organization via the intervening effect of work engagement. That is, work engagement fully mediates the relationship between job resources and turnover intention.

Hypothesis 3. Job demands are negatively related to health complaints via the intervening effect of burnout. That is, burnout fully mediates the relationship between job demands and health complaints.

Hypothesis 4. Given age-related changes in physiological functioning and coping resources, we hypothesize that paths from job demands to burnout and to health complaints assume lower values among elderly workers than among younger workers. Furthermore we presume that job resources exert weaker effects on work engagement among elderly workers compared to their younger counterparts. Technically speaking, we expect path coefficients between latent variables, but not factor loadings or measurement errors to vary across age groups.

Hypothesis 5. The structural path linking job resources and burnout will reach a higher value among women whereas path coefficients linking job resources and engagement will assume higher values among men. That is, again we assume structural path coefficients, but not factor loadings or measurement errors to differ among subsamples.

Hypothesis 6. The importance of the specific job demands and job resources included in the model will vary across occupational groups. More precisely, we assume that the factor loading of quantitative workload will be higher and the factor loading of qualitative workload will be lower among blue-collar workers compared to white-collar workers. Co-workers support and decision latitude are presumed to assume higher factor loadings among white-collar workers than among blue-collar workers. Furthermore, we assume that the health impairing consequences of job demands are stronger among blue-collar workers than among white-collar workers. That is, we assume the structural path from job demands to burnout and health complaints to assume higher values among blue-collar workers.

Method

Procedure and participants

Between September and December 2005, participants were recruited from eight different companies in Austria. Participating organizations belong both to manufacturing and to service industries. After informative meetings with representatives of the personnel department and workers' councils of the respective organizations, questionnaires were either distributed by one of the researchers together with research assistants or by members of the workers' council. The questionnaire was accompanied by a letter from the researchers, in which the aims of the study were briefly introduced and the confidentiality and anonymity of the answers were emphasized. In one company, employees also received a letter supporting the study from the management team. The participants were asked to fill out the questionnaire at their worksite and to either return it to the researchers or post it in a special box at their departments.

A total of 964 employees participated in the study. Eight participants had to be omitted from the sample because of missing data in the turnover intention variable, resulting in an overall return rate of 55.3% ($N = 956$). The sample consisted of blue- and white-collar workers although the latter were stronger represented (77%). These two subgroups of employees may best be defined in terms of their work tasks. While white-collar workers such as office or technical personnel predominantly work with information, written material, or people, blue-collar workers are predominantly engaged in working with hands, tools, or equipment as exemplified by mechanics or assembly line workers.

The sample population was 59% male ($N = 562$) and ranged in age from 15 to 65 years, with a mean age of 36.4 years ($SD = 11.1$). Thirty-two percent of the participants were younger than 30 years of age ($N = 306$), 41% were between 30 and 44 years ($N = 397$), and 27% were 45 years or older ($N = 253$). The observed (relatively small) proportion of employees older than 45 years is typical for the Austrian working population (Statistik Austria, 2005). Education levels were slightly above the Austrian average, with 23% of the employees having a university degree (Statistik Austria, 2005). The mean organizational tenure was 11 years ($SD = 9.75$). We restricted our analysis to those 846 respondents who worked in a full-time job at time of data collection.

Measurement instruments

Job resources and job demands were assessed using the Salutogenic Subjective Work Analysis questionnaire (Fragebogen Salutogenetische Subjektive Arbeitsanalyse, SALSA) developed by Rimann and Udris (1997). The SALSA-questionnaire asks respondents to rate statements about their working conditions on a 5-point Likert scale ranging from 1 (*do not agree at all*) to 5 (*agree completely*). Ratings were summed to yield scores on five subscales that reflect employees' perceptions of job resources and job demands. *Decision latitude*, defined as control over decisions at work, was measured using four items (e.g., 'This work allows for making a lot of decisions on my own'). Eight items related to *support from co-workers*, seven items assessed *social support from supervisors*. Examples of these two scales are: 'The people I work with treat me in a friendly way' (co-worker support) and 'My supervisor supports me in carrying out work tasks' (supervisory support). Two types of job demands were measured: quantitative and qualitative workload. *Quantitative workload* refers to demands arising from tight deadlines or shortage of time as well as the parallel execution of several tasks. The scale consists of three items (e.g., 'There is so much work to be done at once that one can only hardly master it'). Likewise, three items were used to measure *qualitative workload*, which originates from tasks that require other than the acquired qualifications. (e.g., 'One must do things for which one is not trained or prepared enough').

Work engagement was assessed using a German version of the Utrecht Work Engagement Scale-9 (UWES-9; Schaufeli et al., 2006). The items of the UWES-9 are grouped into three subscales, each comprising three items. The items were scored on a 7-point rating scale, ranging from 1 (*never*) to 7 (*always*). Sample items from the subscales are as follows: (a) vigor: 'When I get up in the morning, I feel like going to work'; (b) dedication: 'I am enthusiastic about my job'; and (c) absorption 'I get carried away when I'm working.'

The German language version of the Maslach Burnout Inventory-General Scale (MBI-GS) was used to assess *job burnout* (Schaufeli, Leiter, Maslach, & Jackson, 1996). The factorial validity of the MBI-GS has been confirmed across occupational groups and across nations (Schutte, Toppinen, Kalimo, & Schaufeli, 2000). We used two subscales, namely exhaustion and cynicism, which both consist of five items. Examples of the items are 'I feel used up at the end of a working day' and 'I doubt the significance of my work.' All items were scored on a 6-point rating scale ranging from 1 (*never*) to 6 (*always*).

A dichotomous *turnover intention* index was calculated from four items measuring turnover plans and turnover behavior, based on the Questionnaire Experience and Evaluation of Work (Vragenlijst Belevingen Beoordeling van de Arbeid, VBBA; Van Veldhoven & Meijman, 1994). For example respondents had to indicate whether they intend to change jobs during the next year. Response categories for these items were dichotomous (*yes* or *no*).

Health complaints were measured using a modified version of Ducki's (2000) psychosomatic complaints scale which comprises eight items. This scale assessed the degree to which respondents experienced psychosomatic complaints on a 5-point scale (1 = *never*, 5 = *always*). For example, the scale includes neck and shoulder pain or pains in the chest. Although Ducki conceptualized the scale as one-dimensional, an explanatory factor analysis indicated a three-factor model explaining 72% of the variance. We characterized the three factors as musculoskeletal (2 items), gastro-intestinal (3 items), and cardiovascular complaints. After removing one unsound item, the cardiovascular complaints scale comprised two items.

Missing data

Within the data set, there was a small amount of missing observations on some variables (0 to 1.7% per variable). Given the small number of missing values and the potential negative effects of not including all available data in the analysis we used imputation techniques to calculate estimated scores (Bollen, 1989). We substituted missing observations on a particular variable with the overall sample mean on that variable. Supplemental analyses were conducted to prove the robustness of study results. Similar patterns of results were found in the analysis of datasets with listwise deletion of missing observations and in the analysis of the imputed dataset.

Analyses

To test the adequacy of the Job-Demands Resources model among various subgroups we used structural equation modeling techniques. Analyses were based on the PRELIS 2.51 and LISREL 8.51 programs (Jöreskog & Sörbom, 2001) and were conducted in four stages. First, scales were combined to form multiple measurement indictors of the various constructs. Decision latitude, supervisory support, and co-workers support were used to estimate the latent job resource variable whereas quantitative and qualitative workload represented the latent job demands variable. In accordance to recent findings (Schaufeli & Bakker, 2004; Schaufeli et al., 2002), burnout was measured by two indicators, exhaustion and cynicism, whereas engagement was assumed to consist of vigor, dedication, and absorption. Health problems comprised three indicators, namely, musculoskeletal, gastro-intestinal, and cardiovascular complaints. Turnover intention was measured with a single indicator. To account for potential measurement errors, the error variance was fixed by setting it equal to the product of the variance and the quantity one minus the estimated reliability as indicated by Cronbach's alpha (Bollen, 1989). Second, observed data were fitted to the hypothesized model and subsequently assessed for goodness-of-fit. Before testing the whole model, interaction effects were analyzed using moderated structural equation modeling (MSEM). In a third step, we compared the hypothesized model with an alternative model, which included direct paths from job resources to turnover intention and from job demands to health complaints, to assess whether engagement and burnout fully mediate the effects of job resources and job demands on turnover intention and health complaints, respectively. Finally, we conducted several multi-group comparisons to test for differences among age-groups, gender, and blue- and white-collar workers.

In keeping with Bollen (1989), we based our analysis on polychoric and polyserial correlations because of the categorical nature of some study variables. The estimation of parameters was determined using weighted least square (WLS) estimation procedures. We assessed the adequacy of the model by using five goodness-of fit statistics (Hoyle & Panter, 1995). The χ^2 goodness-of-fit statistic, the adjusted goodness-of-fit index (AGFI), the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Bayesian Information Criterion (BIC). Given the known sensitivity of the χ^2-test to sample size (that is the increasing probability of rejecting a hypothesized model with growing sample size) the AGFI, an absolute fit index, was employed, with values close to 1.00 being indicative of good fit (Hu & Bentler, 1995). RMSEA, another absolute fit index, assesses how well the model would fit the population covariance matrix if it were available. According to Hu and Bentler (1999), a cutoff value close to 0.06 represents a relatively good fitting model.

In contrast to absolute fit indices, incremental fit indices measure the improvement in fit by comparing the model with an independent model, that is a model in which all the observed variables are uncorrelated (Hu & Bentler, 1999). Bentler's CFI represents such an incremental fit index that takes sample size into account. Although a value higher than 0.90 was originally considered representative of a well-fitting model, a revised cutoff value close to 0.95 has recently been advised (Hu & Bentler, 1999). Finally, we used the BIC to compare non-nested models. Following Raftery (1995), a BIC difference of 2–6 provides positive evidence and a BIC difference of 6–10 provides strong evidence that the model with the smaller (i.e., the more negative) BIC value yields a better fit.

Results

Descriptive statistics

Table 1 presents reliabilities, means, standard deviations, and polyserial and polychoric correlations for all study variables. Apart from qualitative workload ($\alpha = 0.64$) and decision latitude ($\alpha = 0.69$), all internal consistencies as indicated by Cronbach's alpha were satisfactory with values higher than .70. Results also show that all significant relationships between the variables were in the expected direction.

Testing latent interaction effects

For testing hypothesis 1 we conducted MSEM analyses, following the procedure proposed by Jaccard and Wan (1995). Indicator variables were centered. The products of the centered indicators were used to define the indicators of the latent interaction term. In addition, we imposed several nonlinear constraints to specify the factor loadings and variances associated with the interaction term. As indicated in Table 2, none of the interaction effects was significant. Thus, we were neither able to show that job resources buffer the effect of job demands on burnout nor did our data support the hypothesis that job resources boost work engagement especially when job demands are high. Insignificant interaction terms were thus omitted from the model.

Table 1. Reliabilities, descriptive statistics, and intercorrelations among the study variables (total sample, $N = 846$).

Variable	α	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Quantitative workload	.76	2.61	0.80	—												
2. Qualitative workload	.64	2.24	0.66	.36	—											
3. Co-workers support	.84	3.78	0.65	−.20	−.12	—										
4. Supervisory support	.90	3.54	0.80	−.22	−.07	.54	—									
5. Decision latitude	.69	2.93	0.75	−.12	−.05	.41	.51	—								
6. Exhaustion	.86	3.01	1.02	.47	.33	−.27	−.20	−.20	—							
7. Cynicism	.81	2.62	1.01	.24	.23	−.40	−.43	−.46	.49	—						
8. Vigor	.83	4.46	1.15	−.14	−.15	.33	.37	.39	−.41	−.61	—					
9. Dedication	.88	4.76	1.32	−.11	−.09	.37	.41	.50	−.34	−.63	.78	—				
10. Absorption	.86	4.49	1.32	−.12	−.10	.32	.33	.39	−.32	−.55	.77	.82	—			
11. Gastro-intestinal complaints	.75	1.84	0.75	.20	.21	−.13	−.13	−.16	.42	.33	−.27	−.23	−.24	—		
12. Musculoskeletal complaints	—	2.91	0.98	.15	.08	−.18	−.12	−.17	.36	.27	−.23	−.19	−.15	.44	—	
13. Cardiovascular complaints	—	1.64	0.80	.12	.11	−.11	−.11	−.15	.28	.25	−.17	−.14	−.07	.36	.30	—
14. Turnover intention	—	0.28	—	.14	.05	−.23	−.25	−.28	.19	.36	−.26	−.35	−.30	.14	.09	.02

Note: Correlations of |.11| or higher are significant at $p < 0.001$.

Table 2. Results of moderated structural equation modeling: Interactions of job resources and job demands (total sample, $N = 846$).

	Engagement		Burnout		Model fit			
Predictor	*UPC (SE)*	*SPC*	*UPC (SE)*	*SPC*	χ^2	*df*	*GFI*	*RMSEA*
Job resources	−1.11 (.09)	−.66***	−0.56 (.06)	−.56***				
Job demands	−0.13 (.13)	−.04	−0.46 (.10)	−.32***				
Job resources × Job demands	−0.08 (.20)	−.02	−0.06 (.12)	−.03	353.09	99	.94	.055

Note: UPC = unstandardized path coefficient; SPC = standardized path coefficient; GFI = Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; ***$p < 0.001$; Estimator = WLS.

Testing the Job Demands-Resources model

In order to test the adequacy of the Job Demands-Resources model we performed a series of structural equation modeling analyses. As indicated in Table 3, the estimation of the original model (M1) suggests that the model fit was only marginally adequate. While the RMSEA value of 0.07 along with the GFI (0.97) and the AGFI (0.96) values represent a reasonably fitting model, the CFI value of 0.83 did not meet its cutoff criterion. Hence, modifications are advisable in order to determine a model that better represents the sample data.

Model re-specification suggested in the following draws upon a recent conceptual and causal discussion in burnout research. In line with Cox, Kuk, and Leiter (1993), we consider emotional exhaustion to be the central part of the burnout concept. Only recently, this theoretical perspective on burnout has been strengthened by Kristensen, Borritz, Villadsen, and Christensen (2005) who, in accordance with Pines and Aronson (1988) as well as Shirom (2003), conceptualize burnout as a form of fatigue or exhaustion that can be attributed to work-related activities such as work in general or client work (see also Toppinen-Tanner, Kalimo, & Mutanen, 2002). We therefore re-specified the model by focusing on exhaustion as the core component of burnout (M2). Thus, burnout was measured by one indicator, namely exhaustion. As shown in Table 3, the modification resulted in a significant improvement of fit compared to the initial model (M1). Comparing the fit indices with the above mentioned cutoff criteria the values are consistently indicative of a relatively well-fitting model. Furthermore the difference in BIC-values (-78.98) provides very strong support for the re-specified model.

To further test the mediating role of burnout and work engagement, a partial mediation model (M3) was fitted to the data which, compared to the full mediation model (M2), included direct paths from job demands to health complaints and from job resources to turnover intention. As suggested by Table 3, adding direct paths did not significantly improve the model fit. Although the changes in model fit compared to the fully mediated model would appear to be trivial on the basis of fit indices, the difference in BIC values provided positive evidence for the full mediation model, which yielded a lower that is more negative BIC-value. Thus, the modified full mediation model (M2) was used for the following multi-group analyses.

Multi-group analyses

Testing for differences across age-groups

To examine whether the model was invariant across age groups, simultaneous multiple-group comparisons were conducted using three age groups: 15–29 years ($N = 286$), 30–44 years ($N = 332$), and 45+ years ($N = 220$). In a first step, the baseline model was estimated simultaneously for *all* age groups. Assuming group equality (M3a), all parameter estimates were constrained to be equal across age-groups. In the following, less constrained models were fitted to the data. To assess the improvement in model fit, the differences in χ^2 values ($\triangle\chi^2$) between the less constrained and the baseline model were evaluated relative to differences in degrees of freedom ($\triangle df$). According to Reinecke (2005), a significant amelioration of fit is achieved when the comparison between the initial and the less constrained model yields at least a χ^2 difference value of 5 for each degree of freedom lost.

In a second step, structural paths, that is relations between latent factors, were estimated for all age groups independently (M3b). Since the difference in χ^2 values between this model and the constrained model was *not* statistically significant, no improvement in model fit was achieved ($\triangle\chi^2_{(12)} = 39.65$). Next, structural covariances (i.e. the covariance between job resources and job demands as well as those between burnout and engagement, and between health and turnover intention) along with structural variances and structural residuals were set free (M3c). Again, this model showed *no* significant improvement in model fit. As apparent in Table 4, χ^2 values did not significantly ameliorate in the less constrained model ($\triangle\chi^2_{(30)} = 142.91$). Finally, a model that allows all parameters, those of the measurement model and those of the structural model, to be freely estimated (M3d) was tested against the constrained (age-invariant) model. Again, *no* significant improvement in fit was achieved

Table 3. Fit indices of the structural equation models (total sample, $N = 846$).

Model	Model description	χ^2	*df*	*GFI*	*AGFI*	*RMSEA*	*CFI*	*BIC*	*ΔBIC*
M1	Hypothesized model	357.97	69	.97	.96	.07	.83	−107.13	—
M2	Re-specified model (without cynicism)	204.84	58	.98	.97	.05	.91	−186.11	−78.98
M3	Partial mediation model	196.27	56	.98	.97	.05	.91	−181.20	−4.91

Note: GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; BIC = Bayesian Information Criterion.

Table 4. Results of multi-group analysis of the Job Demands-Resources model comparing employees 15–29 years old ($N = 286$), 30–44 years old ($N = 332$), and 45 years and older ($N = 220$).

Model	Model description	χ^2	*df*	$\triangle\chi^2$	$\triangle df$	*RMSEA*	*CFI*
M3a	Constrained model (M2)	575.68	240	—	—	.07	.86
M3b	Structural paths freely estimated	536.03	228	39.65	12	.07	.87
M3c	Structural paths, structural covariances, and structural variances freely estimated	432.77	210	142.91	30	.06	.90
M3d	All structural and measurement parameters freely estimated	377.15	174	198.53	66	.03	.91

Note: RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index.

Table 5. Results of multi-group analysis of the Job Demands-Resources model comparing male ($N = 545$) and female ($N = 301$) employees.

Model	Model description	χ^2	*df*	$\triangle\chi^2$	$\triangle df$	*RMSEA*	*CFI*
M4a	Constrained model (M2)	347.94	149	—	—	.06	.89
M4b	Structural paths freely estimated	341.69	143	6.25	6	.06	.89
M4c	Structural paths, structural covariances, and structural variances freely estimated	324.29	134	23.65	15	.06	.89
M4d	All structural and measurement parameters freely estimated	308.89	116	39.05	33	.06	.89

Note: RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index.

Table 6. Results of multi-group analysis of the Job Demands-Resources model comparing blue-collar ($N = 162$) and white-collar workers ($N = 674$).

Model	Model description	χ^2	*df*	$\triangle\chi^2$	$\triangle df$	*RMSEA*	*CFI*
M5a	Constrained model (M2)	560.05	149	—	—	.08	.81
M5b	Structural paths freely estimated	510.85	143	49.20	6	.08	.83
M5c	Structural paths, structural covariances, and structural variances freely estimated	466.58	134	93.47	15	.08	.84
M5d	All structural and measurement parameters freely estimated	347.45	116	212.60	33	.07	.89
M5e	Final model	408.77	137	151.28	11	.07	.89

Note: RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index.

($\triangle\chi^2_{(66)} = 198.53$), suggesting that relations between latent and observed variables are age invariant. Thus Hypothesis 3 was *not* confirmed: the model works similar for all age groups.

Testing for differences across gender

Using the same procedure we tested whether the model was invariant across male ($N = 545$) and female ($N = 301$) employees. As apparent in Table 5, the constrained model (M4a) fitted the data quite well. Testing increasingly less constrained models did *not* result in a significant improvement of model fit. Neither the structural nor the measurement components were shown to vary across gender. Therefore we also had to reject Hypothesis 4: the model works similar for men and women.

Testing for differences across white- and blue-collar workers

In a final series of structural equation modeling analyses we evaluated the invariance of the model across occupational levels (white-collar workers, $N = 674$; blue-collar workers, $N = 162$). Table 6 presents the results of these analyses. In contrast to age and gender, model parameters were found to vary across occupational levels. As can be seen in Table 6, all less restrictive models significantly deviated from the baseline model which assumed all parameters to be equal across groups. To determine which parameters accounted for not achieving invariance, an iterative process was applied. With the fully constrained model as a starting point we allowed parameters one by one to be freely estimated. When model fit did not improve

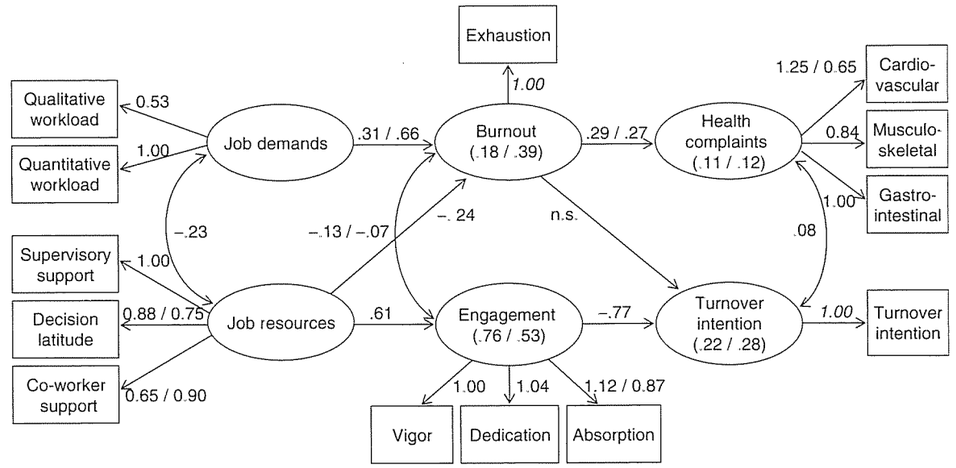

Figure 2. Parameter estimates of the accepted model (non-standardized coefficients). Left: coefficients of blue-collar workers. Right: coefficients of white-collar workers. Values printed in italics were not estimated.

significantly after testing a parameter independently for both groups, equality constraints were retained. This procedure led to a final model, which yielded an overall $\chi^2_{(137)}$ value of 408.77, with CFI = 0.89 and RMSEA = 0.07. Non-standardized model coefficients of this model are depicted in Figure 2. For non-invariant parameters two values are displayed: one for each subgroup. As apparent in Figure 2, white- and blue-collar workers differed in (1) the factor loadings of decision latitude, support from co-workers, absorption and cardiovascular health complaints; (2) path coefficients linking job demands to burnout and burnout to health complaints (i.e., the health impairment process) and the path coefficients linking job resources to burnout; and (3) the error covariances of engagement.

As can also be seen from Figure 2, path coefficients were not equally strong in both mediating processes. While job resources and work engagement as well as work engagement and turnover intention were strongly associated (0.61 and −0.77, respectively), associations related to the health impairment process were only moderate (0.31/0.66 and 0.29/0.27, respectively). Accordingly, more variance was explained in engagement (76/53 percent) and turnover intention (22/28 percent) compared to burnout (18/39 percent) and health complaints (11/12 percent). Taken together, these results suggest that the motivational process is more crucial than the energetic process.

Discussion

The Job Demands-Resources model

The aim of the present study was to test the robustness of the Job Demands-Resources model as proposed by Schaufeli and Bakker (2004) in a diverse sample of Austrian white- and blue-collar workers. The model assumes two different processes: (1) a motivational process that starts with job resources which may lead to work engagement and consequently to employees' intention to remain with their current employer and (2) an energetic process that starts with high job demands which may lead to burnout and consequently to health complaints. Furthermore, the JD-R model proposes that job resources may buffer the impact of job demands on job strain, such as burnout. In contrast to recent research findings (Bakker & Demerouti, 2007; Bakker et al., 2003, 2005), we were not able to confirm this interaction effect of job resources and demands on burnout or engagement. Instead, we replicated the dipartite structure of the JD-R model by slightly modifying the original model. Given the importance of exhaustion in developing burnout symptoms (Cox et al., 1993; Toppinen-Tanner et al., 2002), we concentrated on a core model, with only exhaustion being indicative of burnout. As Kristensen and his colleagues (2005) pointed out in their comprehensive critique of the Maslach burnout concept it is unclear why exhaustion, depersonalization/cynicism, and professional efficacy which have their own precursors and consequences (e.g., Lee & Ashforth, 1996) should be viewed as facets of the same phenomenon. Furthermore, as noted by Taris et al. (2005), the three components are not based on sound theorizing or clinical observations rather they have been inductively developed by factor-analyzing. Thus, in lieu of conceptualizing burnout as a three-dimensional syndrome, Kristensen et al. (2005) consider fatigue or exhaustion to be the core dimension of burnout. Our findings support this assumption and

question the original definition of burnout as a syndrome combining three different albeit related dimensions. Therefore, more work on the theoretical foundations of burnout is needed to further elucidate the construct (Shirom, 2005).

Despite these modifications, we were able to confirm the main assumption of the original JD-R model, namely the differentiation between two underlying processes. The motivational process linking job resources with turnover intention via engagement showed, however, stronger path coefficients than the health impairment process in which burnout played a mediating role. This result contradicts with previous findings. Besides Schaufeli and Bakker (2004), Hakanen et al. (2006) found the health impairment process to be more prominent than the motivational one. Irrespective of these differences in effect sizes, the model still has the potential to integrate more traditional studies on work stress and positive scholarship on workers' well-being by connecting positive and negative consequences of work environments.

In order to test the robustness of the JD-R model we conducted multi-group analyses, comparing different groups of employees. First, in contrasting three age groups (15–29, 30–44, and 45 + years) the JD-R model proved to be age invariant. This finding challenges manager's assumption that older workers are less able to mobilize job resources and to cope with job demands (e.g., Chiu, Chan, Snape, & Redman, 2001). In addition, analyses revealed that the re-specified model works similar among male and female workers. Contrary to age and gender, we did not find the model to be invariant across white- and blue-collar workers. Path coefficients as well as factor loadings were found to be affected by occupational level. The basic structure, however, remained unchanged. We therefore conclude that different occupational groups vary regarding the strength of correlations, but not regarding the underlying processes per se. Hence, our findings confirmed the robustness of the JD-R model in a diverse Austrian sample using German language questionnaires and other types of job demands and job resources compared to previous studies.

Study limitations and directions for future research

Perhaps the primary limitation of the present study concerns its reliance on cross-sectional data. Therefore, although the directions of arrows in the research model suggest causality, no causal inferences should be drawn. Rather longitudinal studies are needed to confirm the proposed processes.

Second, the measurement of the study variables was solely based on self-reports. Observed relationships may, thus, be due to common method variance (Campbell & Fiske, 1959). To avoid this bias, more objective indicators of health status and observer ratings of working conditions should be included in future studies. It has, however, been argued that measuring variables with the same method does not automatically inflate relationships between these variables. Instead of thinking of common method variance as a 'universal inflator of correlations,' Spector (2006, p 224) suggests a complex approach to dealing with biases that involves their identification and control to rule them out as explanations for observed associations. To reduce potential biases (e.g., justification bias) in the present study the working condition variables are based on questions asked prior to health and turnover intention variables.

A third potential limitation of the present study is its reliance on turnover intentions as an indicator of organizational outcomes. Future research needs to employ more objectively measured behavioral indicators, such as current personnel turnover or absenteeism rates. On the contrary, empirical studies (e.g. Parasuraman, 1982) as well as meta-analyses (Griffeth, Hom, & Gaertner, 2000; Steel & Ovalle, 1984) provided evidence that the most proximate predictor of actual voluntary turnover is the behavior intention to leave one's employer. As proposed by existing theoretical perspectives (Fishbein & Ajzen, 1975), proximal precursors in the withdrawal process, such as quit intentions, were shown to be among the best predictors of turnover with average intercorrelations between 0.33 and 0.38 (Griffeth et al., 2000; see also Warr, 1999). Nonetheless, future studies should take positive outcomes of work engagement, such as job performance or work attitudes, into account.

Implications for positive psychology

According to Linley et al. (2006), who distinguished between four levels of analysis for positive psychology (wellsprings, processes, mechanisms, and outcomes), the present study focused on mechanisms and outcomes. In line with previous findings, our results emphasize that working environments are essential for understanding the development of positive as well as negative work-related states of mind. Therefore, this study contributes to positive psychology in investigating those extra-personal factors that facilitate work-related well-being. The Job Demands-Resources model suggests two options to foster employees' well-being. Whereas efforts aiming at the reduction of job demands may counteract burnout symptoms and health complaints, activities to increase job resources may contribute to employees' well-being and commitment. The results of the present study, thus, emphasize that different organizational and individual interventions are warranted in order to increase well-being (engagement) and to decrease unwell-being (burnout) and that these interventions should by applied simultaneously. Since we found the underlying motivational and energetic processes to be invariant across age, interventions to redesign workplaces should not only focus on older workers but need to occur early in the working life. Fostering job resources and reducing job demands in all age groups seems to be warranted for they play an important role in the development of engagement and well-being on the one hand and burnout symptoms and health complaints on the other hand. In addition, future research should focus on further resources (e.g., personal resources such as self-efficacy) that enhance the development of positive well-being and facilitate the reduction of burnout.

Finally, a small but growing body of research stresses the positive impact of occupational well-being on economic outcomes (Harter, Schmidt, & Hayes, 2002; Keyes & Magyar-Moe, 2003; Salanova, Agut, & Peiró, 2005). Businesses with more employees showing high levels of well-being tend to report greater customer satisfaction and loyalty, higher productivity, and lower turnover rates. It is therefore in companies' interest to develop techniques for promoting employees well-being and engagement.

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