The Job Demands–Resources model: An analysis of additive and joint effects of demands and resources

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A R T I C L E   I N F O

A B S T R A C T

The present study investigated the additive, synergistic, and moderating effects of job demands and job resources on well-being (burnout and work engagement) and organizational outcomes, as specified by the Job Demands–Resources (JD-R) model. A survey was conducted among two Chinese samples: 625 blue collar workers and 761 health professionals. A series of multi-group structural equation modeling analyses supported the two processes proposed by the JD-R model: (1) the stress process that originates from job demands and leads, via burnout, to negative organizational outcomes (turnover intention and low organization commitment); and (2) the motivational process that originates from job resources and leads, via work engagement, to positive organizational outcomes. In contrast to moderating effects, synergistic effects of job demands and job resources on burnout and work engagement were found in both samples. However, after controlling for additive effects of job demands and job resources, these synergistic effects largely disappeared. In conclusion, the hypothesized additive effects of the JD-R model were found but the evidence for additional synergistic and moderating effects was weak.

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At the heart of occupational health psychology lies the assumption that job characteristics such as job demands and job control affect worker health and well-being. In practice, such effects usually take the form of main effects of these job characteristics on the criterion variables (e.g., Bakker & Demerouti, 2007). However, from a theoretical perspective it is frequently assumed that job characteristics also *jointly* affect the outcome variables. For example, Karasek and Theorell's (1990) job demands–control (–support) model proposes that the adverse effects of high demands are buffered by high levels of job control and social support, thus decreasing the adverse effects of high demands on worker health and well-being. Similarly, the more general Job Demands–Resources model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) proposes that the combination of high levels of resources and high demands increases the "motivational potential" of jobs, and hence leads to work engagement (Bakker & Demerouti, 2007). Thus, it is not uncommon in occupational health psychology to examine the effects of job characteristics on health in terms of main effects as well as the joint effects with other work characteristics.

Unfortunately, the magnitude of such moderating joint effects is usually small (Taris, 2006). On the one hand one could argue that these small joint effects are of little importance. However, on the other hand, these small effect sizes could suggest that the conceptualization and measurement of these moderating joint effects is suboptimal. That is, the magnitude of these effects may be underestimated. Psychologists usually examine such moderating joint effects using the framework proposed by Baron and Kenny (1986), in which the multiplication of the standardized raw variables is used as an additional predictor of the study outcomes (cf. Aiken & West, 1991). However, multiplication of predictor terms may not be the only way to study the joint effects of job characteristics. For example, several alternative approaches focus on the difference between two sets of job characteristics (i.e., a

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synergistic joint effect). For instance, the quadrant approach focuses on the difference between high strain groups of employees and low job strain groups, and their relation with employee health and well-being (Karasek & Theorell, 1990). Another alternative is the ratio approach advocated by Siegrist (1996) in his Effort–Reward Imbalance (ERI) model, who studied the ratio of "effort" and "rewards" in relation to employee health and well-being. At present it is unclear which of these approaches measuring the joint effects of work characteristics is optimal (i.e., the multiplicative, quadrant or ratio approach). The present study addresses this issue using the Job Demands–Resources (JD-R) model as a theoretical framework and by including two independent Chinese samples.

The Job Demands–Resources model

The JD-R model proposes that employee well-being is related to a wide range of workplace characteristics that can be conceptualized as either job demands (i.e., the physical, social, or organizational aspects of the job that require sustained physical or psychological effort) or job resources (i.e., those aspects of the job that may reduce job demands, are instrumental to achieve work goals, or promote personal growth, learning and development) (Bakker & Demerouti, 2007). Excess job demands and lacking job resources exert an energy-draining effect on employees through a stress process, while high levels of job resources are related to positive work outcomes through a motivational process.

There has been considerable empirical support for the stress and motivational processes. For example, working in a demanding job and having few job resources is associated with burnout (Llorens, Bakker, Schaufeli, & Salanova, 2006), company registered sickness absence (Schaufeli, Bakker, & van Rhenen, 2009), perceived ill-health (Hakanen, Bakker, & Schaufeli, 2006), and health complaints (Korunka, Kubicek, & Schaufeli, 2009). Further, the motivational process links job resources via work engagement with organizational commitment (Llorens et al., 2006), low turnover intention (Schaufeli & Bakker, 2004), and extra-role performance (Bakker, Demerouti, & Verbeke, 2004).

In addition to these two additive processes, the JD-R model also assumes two moderating effects, namely that: (1) job resources buffer the potentially negative effects of excessive job demands on employee health and well-being, while (2) highly demanding work situations in combination with high levels of job resources result in higher levels of work engagement (Bakker & Demerouti, 2007). This agrees with the strain and learning hypotheses of Karasek and Theorell's (1990) JDC model, respectively. Indications have been found for the former moderating effect of job demands and job resources on psychological strain in large-scale studies among teachers in higher education (Bakker, Demerouti, & Euwema, 2005), and home care staff (de Jonge, Le Blanc, Peeters, & Noordam, 2008), as well as in a study using multiple occupations (Bakker et al., 2004). However, in most cases the moderating effect received only partial support (e.g., Bakker et al., 2005), and the interaction effect between various job demands and job resources is typically weak.

Unlike the JDC model, the JD-R model does not predict an interaction between *specific* job demands and *specific* job resources. Rather, an interaction is assumed between an overall, composite indicator of job demands and a similar indicator of job resources. This assumption was supported in a study of Bakker, Demerouti, Taris, Schaufeli, and Schreurs (2003) that used a general indicator for job demands and job resources and found that job resources buffered the impact of job demands on exhaustion, a key dimension of burnout. In the present study, we test the moderating joint effects of job demands and job resources not only with respect to negative work-related outcomes (i.e., burnout), but also with respect to positive work-related outcomes (i.e., work engagement) by using general, composite indicators for job demands and job resources.

Additive, moderating and synergistic effects

Past investigations on the relation between job demands and job resources using the JD-R model were restricted to additive and moderating joint effects. Kasl (1996) suggested that investigators should go beyond testing models to explore possible alternatives "even if these are not formally part of the model or even part of some broader formulation" (p. 49). We followed this lead by examining synergistic joint effects; that is, we assume that both high demands and low resources are associated with an increased health risk and that a combination of both increases the risk beyond the mere additive effects (Van Vegchel, De Jonge, & Landsbergis, 2005; Kasl, 1996). In other words, the combined risk of high demands and low resources for burnout is higher than the separate risks of high demands and low resources. A growing number of studies on the JDC-model and the ERI-model use such synergistic joint effects (i.e., the quadrant approach and ratio approach, respectively; Van Vegchel et al., 2005; Siegrist et al., 2004), predicting among others psychiatric disorder (Stansfeld, North, White, & Marmot, 1995), stress (Calnan, Wadsworth, May, Smith, & Wainwright, 2004), and sickness absenteeism (Griep, Rotenberg, Chor, Toivanen, & Landsbergis, 2010). Furthermore, a combination of the ratio approach and the quadrant approach appears to improve the estimated risk of psychiatric disorder, compared to both approaches separately (e.g., Siegrist, 2002; Ota et al., 2005).

Although Siegrist (1996) and Theorell and Karasek (1996) only included a limited number of specific work characteristics in their models (i.e., job demands, job control, effort and reward) their work is relevant for other models, such as the JD-R model. More specifically, Van Vegchel et al. (2005) suggest that an additive effect (i.e., discrepancy form, in which each predictor variable has a linear association with strain, also see Edwards & Cooper, 1990) implies that job resources represent *a standard* by which job demands are compared. The moderating effect (i.e., the multiplicative form, in which the combined effect of two predictor variables accounts for an additional proportion of the variance of an outcome variable, beyond their separate main effects) implies that job resources influence the *strength* of the relation between job demands and strain. Finally, the synergistic form shares characteristics of both additive and interactive forms, in that job resources operate as a standard by which job demands are