



Does equity mediate the effects of job demands and job resources on work outcomes?

An extension of the job demands-resources model

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Abstract

Purpose – This study aims to investigate the relation between job demands and job resources on the one hand and employee well-being (burnout and work engagement) on the other. It was assumed that this relation is mediated by an equity-based cognitive evaluation process.

Design/methodology/approach – This mediation hypothesis was tested using the Job-Demands Resources model in two Chinese samples of blue collar workers ($n = 625$) and nurses ($n = 1,381$).

Findings – As expected, structural equation analysis revealed that equity mediated the relation of job demands and job resources with burnout and work engagement among nurses. However, mediation was only partly confirmed among blue collar workers. In addition, and as expected, among nurses equity was non-linearly related with burnout.

Research limitations/implications – The cross-sectional design of the present study precludes causal conclusions.

Originality/value – The study extended the JD-R model with an equity-based cognitive evaluation process.

Keywords Job demands, Job resources, Equity, Job demands-resources model, Work engagement, Burnout, Stress, Employees, Nurses, China

Paper type Research paper

The job demands-resources (JD-R) model (Demerouti *et al.*, 2001) has gained much popularity in occupational stress research during the last decade (see Schaufeli and Taris, 2013, for an overview). According to this model, job demands and job resources are value-based job characteristics (Schaufeli and Taris, 2013). That is, job demands are negatively valued physical, social, or organisational aspects of the job that require sustained physical or psychological effort, and are therefore associated with certain psychological and/or physiological costs, such as fatigue or irritability (Bakker *et al.*, 2003). High demands trigger an erosion or health impairment process that could eventually lead to burnout and psychosomatic health complaints (Brotheridge and



Grandey, 2002; Schaufeli and Bakker, 2004). Conversely, job resources are positively valued physical, social, or organisational aspects of the job that may be functional in achieving work goals, reducing job demands, and/or stimulating personal growth and development via a motivational process (Schaufeli and Bakker, 2004; Schaufeli and Taris, 2013). Empirical evidence from multiple studies in various occupations and countries confirms that job demands and lack of resources are positively associated with burnout, whereas job resources are positively related to engagement (e.g. Hu *et al.*, 2011; Lewig *et al.*, 2007; Schaufeli and Bakker, 2004).

Despite its apparent popularity, the JD-R model suffers from two unresolved issues. First, similar to related job stress models such as Karasek's demand-control model (DCM) (Karasek, 1979), the JD-R assumes that a combination or interaction of job demands and job resources produces employee well-being (i.e. burnout and engagement). However, the empirical support for this idea is inconsistent. Second, although the JD-R model specifies what kind of job characteristics lead to particular psychological states, such as burnout and engagement, it does not tell us why this would be so. Both issues call for further theoretical development of the associations between job characteristics and employee well-being. The present study addresses both unresolved issues by proposing that the associations between job characteristics (demands and resources) and employee well-being (burnout and engagement) are mediated through an equity-based cognitive evaluation process. A key-role in this process is played by the employee's appraisal of his or her investments in and outcomes received from the job.

Job demands, job resources and cognitive appraisal

In the past few decades, researchers investigated the combined effects of job demands and job resources on employee well-being. For example, it has occasionally been shown that the impact of job demands on burnout (Bakker *et al.*, 2003), and work engagement (Hakanen *et al.*, 2005) depends on the level of job resources. When abundant resources are available, the impact of job demands is lower than when resources are lacking.

However, most studies using the JD-R model do not support the idea that job demands and job resources interact statistically, and even the few studies that reported significant interaction effects provide only weak and inconsistent evidence (cf. Taris, 2006). For example, job control did not buffer the negative effect of pupil misbehaviour on work engagement among teachers (Bakker *et al.*, 2007). Furthermore, Beehr *et al.* (2000) argued that social support may not just fail to alleviate the negative impact of job stressors, but could even intensify these harmful consequences, serving as a kind of "reverse-buffer" (e.g. Glaser *et al.*, 1999; Kaufmann and Beehr, 1986). Hu *et al.* (2011) conducted a comprehensive study on interactions between job demands and job resources, focusing on their joint effects (i.e. moderating and synergistic effects) on burnout and engagement, and found that these joint effects added very little beyond the additive effects. In sum: whereas there is strong evidence for the additive effects of job demands and job resources on employee well-being (i.e. burnout and engagement) in ways predicted by the JD-R model, the evidence for their interaction is still weak and inconsistent.

Up until now, demands and resources have been construed as independent entities that might or might not interact, and whose joint contribution to well-being can be established by relating their statistical interaction to employee well-being. Besides,

some researchers argue that the JD-R model fails to account for the important distinction among types of events with respect to the way they tend to be appraised by employees (Cavanaugh *et al.*, 2000; Muja and Appelbaum, 2012). For example, if an individual believes that his or her resources are sufficient to meet the demands of the situation, the situation is appraised as a challenge that may lead to future gain (i.e. elevated self-esteem, learning). Conversely, if these resources are judged to be insufficient, the situation is appraised as a threat because that may lead to future loss (i.e. poor self-esteem, strain). Also, the separation of job demands into “challenges” and “hindrances” (Crawford *et al.*, 2010) underlines the importance of cognitive appraisal for the effects of job demands on outcomes such as performance and well-being. Consistent with this reasoning, we believe that the nature of the relationship between job demands and job resources cannot be fully understood unless the cognitive appraisal of job characteristics and job resources is taken into account by integrating it into the JD-R model.

Therefore, instead of following the traditional JD-R model that links job characteristics (i.e. demands and resources) directly to well-being (engagement and burnout), the current study focuses on the mediating role of cognitive appraisal of demands and resources. More specifically, we postulate an intrapersonal, cognitive process (i.e. the perception of equity) that evaluates the relative importance of job demands and job resources as a mediator between job characteristics (job demands and job resources) and employee well-being (engagement and burnout). Basically, we assume that the imbalance between an employee’s investments in his or her job (e.g. time, energy, skills) and the outcomes (e.g. status, appreciation, pay) that are received in return will result in negative consequences, notably burnout (Schaufeli, 2006). For example, high job demands require substantial investments that constitute a potential threat for the balance between investments and outcomes, giving rise to inequity. In contrast, job resources are “rewards” or positive outcomes that potentially have a beneficial impact on the balance between investments and outcomes, giving rise to equity (Eisenberger *et al.*, 1986). Alternatively, we propose that employees feel engaged when the outcomes they receive from their job outweigh their investments. That is, when job resources are (more than) sufficient to deal successfully with the job demands that the employee faces, work engagement is likely to result. This is because resources constitute a source or supply that produces benefits that satisfy an individual’s needs. If this reasoning is correct, the associations between job demands and resources on the one hand and employee well-being on the other should at least partly be mediated by the degree of equity experienced by the employee. Below we first discuss the perception of equity and subsequently extend the JD-R model with the concept of cognitive appraisal (i.e. equity), after which we present the study hypotheses.

Equity

Social exchange theory asserts that employees seek to maintain a balance between the inputs that they bring to a relation (i.e. investments) and the consequences they derive from the exchange (i.e. outcomes) that takes place within this relation. Individuals who perceive themselves as unbalanced in an exchange relation will experience distress, and that distress will lead to efforts to restore equity in this relation (Adams, 1965). Equity, as conceived by social exchange theory, primarily refers to a process of social

or interpersonal comparison in which one's own ratio of inputs and outcomes is compared to that of others. However, Pritchard (1969) noted that individuals also use internal standards, thus excluding the comparison-other proposed by Adams (1965) (cf. Schaufeli, 2006). In line with Pritchard's interpretation, the current study conceives equity as the balance between perceived own job investments and own job returns, relative to the employee's own internal standards.

People invest time, energy, and skills to meet their job demands, to get their work done, and to obtain more work-related returns in the form of resources intrinsic or extrinsic to the job (e.g. control, occupational development, task clarity, or trust, status, and salary). If an employee perceives certain job demands as stressful or highly demanding, he/she will often cope by investing additional effort (Hockey, 1997). When this coping is effective and the job demands are met the expected returns will occur, the balance between investments and outcomes is restored, and equity is achieved. However, when coping is unsuccessful and the demands are not met, insufficient returns are achieved and inequity is experienced.

Similar exchange processes constitute the core of another popular job stress model; the effort-reward imbalance (ERI) model (Siegrist, 1996). Central to the ERI approach is the ratio between effort and reward. Employees' well-being is assumed to depend on the balance between investments in the job (i.e. efforts or job demands) and rewards obtained from the job (i.e. personal or job resources). An imbalance resulting from high efforts and low rewards has been identified as a major risk factor for reduced well-being (for a review see Van Vegchel *et al.*, 2005). Note that contrary to Adams (1965), in the ERI approach an imbalance of low effort and high rewards is not considered problematic. A distinctive feature of the ERI model is that efforts and rewards are conceptualised and assessed separately, and employees do not explicitly assess the ratio or balance between the two. As a consequence, it remains unclear whether workers actually perceive the theoretically postulated inequitable effort-reward ratio as being inequitable. Therefore, in the present research we not only ask participants separately about their efforts (demands) and rewards (resources), but also about their appraisal of the balance between the two.

Equity as a mediator

Stress is perceived as a relation between individual and environment that is appraised as potentially endangering to one's well-being. According to Lazarus and Folkman (1984), two types of appraisal occur in stressful situations. First, a particular event or situation is evaluated as positive (i.e. as a challenge), neutral, or negative (i.e. involving loss or threat) – the so-called primary appraisal. Particularly in case of a negative primary appraisal, a secondary appraisal process takes place in which the resources are evaluated that the person can draw upon when dealing with the perceived threat or loss. For instance, in the work situation an employee might primarily appraise the workload as stressful (i.e. as a threat to one's well-being), but secondary appraisal reveals that he/she has sufficient job control to address that high workload successfully. That is, a cognitive appraisal process occurs in which job demands and job resources are assessed simultaneously and relative to each other.

The outcome of this process not only constitutes the onset of coping behaviour, as assumed by Lazarus and Folkman (1984), but it also leads to a concomitant experience of equity – the appraisal of the balance of an individual's investments and outcomes.

That is, employees feel under-benefited when their job resources are insufficient to cope with their job demands, and feel over-benefited when a surplus of job resources is available. When the available job resources are sufficient to cope with the demands, the situation is balanced and equity is experienced. Inequity elicits negative emotions and cognitions, whereas the experience of equity elicits positive emotions and behaviours (Lazarus and Folkman, 1984).

Buunk and Schaufeli (1999) argued that an unbalanced relation between investments and returns would drain an individual's emotional resources and could eventually lead to burnout. They reasoned that continuously investing energy in one's job without receiving appropriate outcomes not only leads to emotional exhaustion, but also to the tendency to restore "the balance between give and take" by psychological withdrawal. Typically, emotional exhaustion and mental withdrawal (e.g. cynicism) constitute the hallmark of burnout (Schaufeli and Taris, 2005). A series of studies have supported the notion that, indeed, inequity, or feeling under-benefited, is associated with burnout (e.g. Bakker *et al.*, 2000; Schaufeli *et al.*, 1996; Smets *et al.*, 2004; Taris *et al.*, 2002; Taris *et al.*, 2001). However, these studies did not include possible antecedents of inequity, such as job demands and job resources. Following Lazarus and Folkman (1984) it is assumed that the cognitive appraisal process, in which the employee evaluates the meaning of job demands and job resources relative to each other, produces feelings of (in)equity, depending on whether the outcome of this process matches with the person's individual standards (Pritchard, 1969). In case the available job resources do not compensate for the job demands according to that standard, the employee will feel under-benefited, so that burnout is likely to occur (Schaufeli, 2006). In sum, we assume that the perception of equity mediates the relation between job demands and burnout (*H1a*), as well as the relation between job resources and burnout (*H1b*).

Equity theory assumes that individuals attempt to maximize their benefits in exchange relations. As Walster *et al.* (1978) stated, "[. . .] So long as individuals perceive they can maximize their outcomes by behaving equitably, they will do so. Should they perceive that they can maximize their outcomes by behaving inequitably, they will do so" (p. 16). This agrees with conservation of resources (COR) theory (Hobfoll, 1989) which posits that individuals strive to retain, protect and accumulate resources, also in the workplace (Hobfoll, 2002). When employees feel that their efforts which they invest to master the job demands they are facing are balanced by the outcomes or available job resources they will experience an affective-motivational state that has been labelled work engagement (Inceoglu and Fleck, 2010). That is, they are willing to put additional energy into their job because they feel it is worth it. Thus, we assume that the perception of equity mediates the relation between job resources and work engagement (*H2a*) as well as job demands and work engagement (*H2b*).

Non-linearity

Thus far, we have restricted ourselves to discussing the linear effects of equity: that is, feeling under-benefited is related to burnout (*H1*), whereas the experience of equity is related to engagement (*H2*). According to Walster *et al.* (1978), equity will affect well-being nonlinearly as well. It is assumed that individuals favour a social exchange situation in which their investments are roughly equivalent to their outcomes. If they are involved in an inequitable relationship they will feel uneasy and distressed. It is not

surprising that the under-benefited feel more distressed than the over-benefited (cf. Sprecher, 1986). Numerous studies have shown that lack of reciprocity is negatively related to employees' physiological and psychological well-being (Schaufeli, 2006). Aumer-Ryan *et al.* (2007), for example, found the European American and the Asian-American groups were far less satisfied in under-benefited than in balanced and in over-benefited in close relationships. Nevertheless, those who are feeling over-benefited – i.e. when the returns outweigh the investments – also experience low levels of well-being (e.g. guilt).

Consistent with this reasoning, researchers found that primarily feeling under-benefited at work may act as a risk factor for developing burnout, but also that over-benefited might result in burnout (Truchot and Badré, 2006; Van Dierendonck *et al.*, 1998). For example, Van Dierendonck *et al.* (2001) found that feeling more deprived as well as feeling more advantaged resulted in higher future emotional exhaustion – a core symptom of burnout – in health care professionals. The study of Taris *et al.* (2002) also provided evidence for the presence of quadratic (U-shaped) effects of inequity on burnout, and health complaints. The relationship between feeling over-benefited and burnout seems to be prevalent especially in medical settings. It has been argued and found (Van Yperen *et al.*, 1992) that health care workers usually have a communal exchange orientation, that means they are more oriented towards “giving” rather than “receiving”. In case they feel over-benefited (i.e. receive more than they give) this is especially stressful for them and it induces strong feelings of guilt, which eventually might result in burnout. The relationship between guilt and burnout has repeatedly been demonstrated (e.g. Gill-Monte, 2012).

Thus, non-linear relations might exist between the perception of equity and burnout (*H3*). Specifically, feeling under-benefited as well as feeling over-benefited should be related to higher levels burnout, relative to a situation in which a balance between job demands and job resources (equity) exists. So far, no studies have been carried out on non-linear relationships between equity and work engagement. Since engagement is considered to be the opposite pole of burnout (González-Roma *et al.*, 2006), it can – by way of analogy – be assumed that feeling under-benefited as well as feeling over-benefited is related to lower levels of engagement as compared to a balanced situation (*H4*).

All in all, the present study focuses on the mediating role played by the cognitive appraisal of job demands and job resources in terms of equity. This appraisal process links the perceived job characteristics (i.e. demands and job resources) to employee well-being (i.e. burnout and engagement). In doing so, this study extends the original job demands resources (JD-R) model (Demerouti *et al.*, 2001) with equity as a mediator. That is, the JD-R model traditionally assumes that job demands and job resources are separate concepts and that each of them may affect well-being, either separately or in combination. Our study supplements the JD-R model with an integrative, cognitive appraisal process in which job demands and job resources are evaluated simultaneously and in relation to each other.

Method

Sample and procedure

The present study employed data from two samples. Sample 1 included 625 blue collar workers, employed in Chinese medium-sized family-owned businesses. The

mean age sample 1 was 31.81 years ($SD = 9.16$); 348 (56 per cent) participants were male and 275 (44 per cent) female. Questionnaires were distributed by the human resource departments and the survey was accompanied by a letter that explained the general aim of the study and emphasised the participants' privacy. The response rate was 73 per cent. Sample 2 included 1,381 nurses from six Chinese hospitals, 1,297 were female (94 per cent) and 84 male (6 per cent). Their mean age was 29.64 years ($SD = 7.65$). Questionnaires were handed out by the head-nurse and a similar accompanying letter as used for sample 1 was included. The response rate was 76 per cent.

Measures

The measures used in the present study had been included in previous research in China, where they showed sufficient reliability and construct validity (Hu *et al.*, 2011; Hu and Schaufeli, 2011; Zheng *et al.*, 2010). For the internal consistencies of the scales (Cronbach's α) see Table I.

Job demands were assessed by the Chinese version of the questionnaire on the experience and evaluation of work (QEEW) (Van Veldhoven *et al.*, 2002; Zheng *et al.*, 2010). Five demands were included in the present study: workload (five items, e.g. "Do you have too much work to do?"); emotional demands (three items, e.g. "Are you confronted at your work with situations or events that affect you personally?"); mental demands (five items, e.g. "Does your work demand a lot of concentration?"); physical demands (seven items e.g. "At your work, do you have to lift or move heavy loads?"); and interpersonal conflict (five items, e.g. "How often do you get into arguments with others at work?").

Job resources were also assessed by subscales of the Chinese version of the QEEW (Zheng *et al.*, 2010). Three job resources were included: job control (three items, e.g. "Do you have freedom in carrying out your work activities?"); task clarity (five items, e.g. "Do you know exactly what areas you are responsible for and which areas are not your responsibility?"); and opportunities for learning and development (four items; e.g. "In my job I have the possibilities to develop my strong points"). All demand and resource items were scored on a five-point rating scale, ranging from 1 ("never") to 5 ("always").

Burnout was assessed with the exhaustion and cynicism subscales of the Chinese version (Hu and Schaufeli, 2011) of the core of Maslach Burnout Inventory – General Survey (MBI-GS) (Schaufeli *et al.*, 1996). Exhaustion was assessed with five items (e.g. "I feel used up at the end of the workday") and cynicism with four items (e.g. "I have become less enthusiastic about my work"). All items were scored on a seven-point frequency rating scale ranging from 0 ("never") to 6 ("daily"). High scores on the exhaustion and cynicism subscales signify burnout.

Work engagement was assessed with the Chinese version (Zheng *et al.*, 2010) of the Utrecht Work Engagement Scale (UWES-9) (Schaufeli *et al.*, 2006). The UWES-9 taps three underlying dimensions, each of which is measured with three items: vigor (e.g. "At my work, I feel bursting with energy"), dedication (e.g. "My job inspires me"), and absorption (e.g. "I get carried away when I am working"). All items were scored on a seven-point rating scale ranging from 0 ("never") to 6 ("daily"). High scores on all three dimensions indicate high levels of work engagement.

Table I.
Means (M), standard deviations (SD), internal consistencies (Cronbach's α on the diagonal), and correlations between the study variables for blue collar workers ($n = 625$, lower half) and nurses ($n = 1,381$, upper half)

	Workers		Nurses		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	M	SD	M	SD															
1. Workload demands	2.53	0.85	3.41	0.80	0.75/0.82	0.52**	0.59**	0.58**	0.37**	0.02	0.09**	0.00	-0.08**	-0.12**	-0.06*	0.45**	0.34**	-0.11**	0.09**
2. Emotional demands	1.93	0.823	3.27	0.98	0.43**	0.70/0.83	0.53**	0.59**	0.51**	0.01	0.05	-0.03	-0.15**	-0.19**	-0.11**	0.43**	0.39**	-0.13**	0.05
3. Mental demands	3.43	0.82	4.27	0.73	0.42**	0.36**	0.70/0.88	0.53**	0.20**	0.06*	0.15**	0.04	0.00	-0.04	-0.00	0.35**	0.23**	-0.10**	0.06*
4. Physical effort	2.36	0.90	3.26	0.98	0.43**	0.33**	0.22	0.85/0.90	0.39**	0.01	0.02	-0.03	-0.23**	-0.29**	-0.20**	0.47**	0.43**	-0.11**	0.08**
5. Interpersonal conflict	1.52	0.59	2.19	0.76	0.29**	0.44**	0.13	0.29**	0.79/0.84	0.00	-0.00	-0.06*	-0.16**	-0.19**	-0.14**	0.35**	0.38**	-0.08**	0.07*
6. Control	2.17	0.97	2.44	0.92	0.03	0.10*	0.14**	-0.15**	0.02	0.68/0.75	0.36**	0.44**	0.19**	0.17**	0.21**	-0.13**	-0.15**	0.01	-0.06*
7. Task clarity	2.98	0.92	3.27	0.81	0.06	0.11**	0.20**	-0.09*	0.09*	0.38*	0.73/0.82	0.45**	0.24**	0.24**	0.26**	-0.14**	-0.21**	0.08**	-0.03
8. Development opportunity	2.13	0.90	2.49	0.80	-0.05	0.05	0.16**	-0.20**	-0.02	0.52**	0.41**	0.73/0.82	0.34**	0.32**	0.36**	-0.26**	-0.27**	0.21**	0.00
9. Vigor	3.09	1.52	2.58	1.31	0.01	-0.01	0.22**	-0.10*	-0.09*	0.15**	0.27**	0.28**	0.75/0.80	0.80**	0.77**	-0.32**	-0.42**	0.20**	-0.01
10. Dedication	3.03	1.52	2.56	1.35	-0.01	-0.04	0.23**	-0.15**	-0.16**	0.19**	0.31**	0.37**	0.75	0.76/0.86	0.78**	-0.38**	-0.47**	0.20**	-0.02
11. Absorption	2.74	1.53	2.27	1.38	0.01	0.01	0.20**	-0.15**	-0.11**	0.22**	0.29**	0.31**	0.68**	0.75	0.75/0.84	-0.33**	-0.40**	0.23**	-0.02
12. Exhaustion	2.02	1.23	3.25	1.33	0.35**	0.36**	0.16**	0.37**	0.27**	-0.04	0.06	-0.15**	-0.14**	-0.20**	-0.14**	0.80/0.87	0.81**	-0.25**	0.12**
13. Cynicism	1.45	1.25	2.52	1.47	0.17**	0.28**	0.04	0.28**	0.22**	-0.04	-0.13**	-0.14**	-0.23**	-0.23**	-0.21**	0.68**	0.79/0.89	-0.25**	0.10**
14. Equity (linear)	2.63	0.76	2.18	0.82	-0.04	-0.05	-0.01	-0.17**	-0.09*	0.05	-0.08	0.10	0.08*	0.08*	0.09	-0.20**	-0.14**	-	0.40

Notes: * $p < 0.05$, ** $p < 0.01$

Following Hatfield *et al.* (1985) and Van Horn *et al.* (2001), the perception of equity was measured by a global single-item rating that requested respondents to consider their own investments and outcomes in relation to each other: “People ‘invest’ in their jobs (e.g. time and effort), but also receive all kinds of material and immaterial outcomes in return (e.g. salary, status, recognition). When I compare the investments in my job with the outcomes that I receive from it, then I get [...] back than I invest”. A five-point response scale was used, ranging from 1 (“much less”) to 5 (“much more”). Thus, individual scores of 4 and 5 indicate that participants feel over-benefited (investments are lower than outcomes), whereas scores 1 and 2 indicate that participants feel under-benefited (investments exceed outcomes); scores equal to 3 signify a balance between investments and outcomes (i.e. equity).

Data analyses

The four hypotheses were tested using structural equation modelling techniques as implemented in the AMOS computer program (Arbuckle, 2003). Four steps were followed:

- (1) The research model was examined in the overall, pooled sample.
- (2) A multi-group analysis was performed to assess the invariance of the estimated parameters across both samples (Byrne, 2010).
- (3) The non-linear effect of equity was examined separately for nurses and blue collar workers. If a non-linear effect of equity was present.
- (4) The association between equity and employee well-being was examined by comparing the mean scores for the over-benefited group, balanced group and the under-benefited group, using analysis of variance.

In the structural equation analyses, Maximum Likelihood estimation was used and the input for each analysis was the covariance matrix. To test the hypotheses, several nested models were compared by means of the χ^2 difference test. In addition, absolute and relative indices were computed to assess the goodness-of-fit of the models. The absolute goodness of fit indices were: the χ^2 goodness of fit statistic; the Root Mean Square Error of Approximation (RMSEA); and the Goodness of Fit Index (GFI). RMSEA values of 0.08 and lower indicate an acceptable fit (Byrne, 2010). As recommended by Marsh *et al.* (1996), the following relative goodness of fit indices were computed: Comparative Fit Index (CFI); and Tucker-Lewis Index (TLI). As a rule of thumb, values of 0.90 or higher indicate good fit for all three relative fit indices (Byrne, 2010). Sobel tests were used to evaluate the significance of the mediation effect (Sobel, 1988). Finally, the nonlinear effects of equity were tested by extending the research model with a nonlinear term which was computed as the squared of the standardised linear equity term. The shape of the possible nonlinear relationship between equity and the outcome variables was investigated using a polynomial approach (Royston and Altman, 1994; Sauerbrei and Royston, 1999). The quadratic model (Royston and Altman, 1994) includes a quadratic term to represent the nonlinear component of the relationship between equity and the outcomes. It allows for more flexibility in the shape of the fitted curve, that is, if there is only little linear structure, it results in a fit that is at least as good as a global polynomial, while if a quadratic term does not improve the fit, it selects a simple linear function.

Results

Descriptive statistics

Table I provides the means, standard deviations, Cronbach’s alphas, and product-moment correlation coefficients of the study variables among blue collar workers (Sample 1) and nurses (sample 2). As can be seen, the internal consistency of all scales are acceptable, with all alphas equalling or exceeding the threshold value of 0.70.

A principal components factor analyses for the studied variables was conducted in the total samples. A varimax rotation revealed that the four job demands (i.e. workload, emotional demands, interpersonal conflicts and physical effort) loaded on one demand component, whereas the three job resources (job control, task clarity, and learning and development opportunity) loaded on a resources component. Moreover, vigor, dedication and absorption loaded on a work engagement component, whereas exhaustion and cynicism converged into a burnout component. Finally, the single-item equity measure constituted the fifth component (Table II).

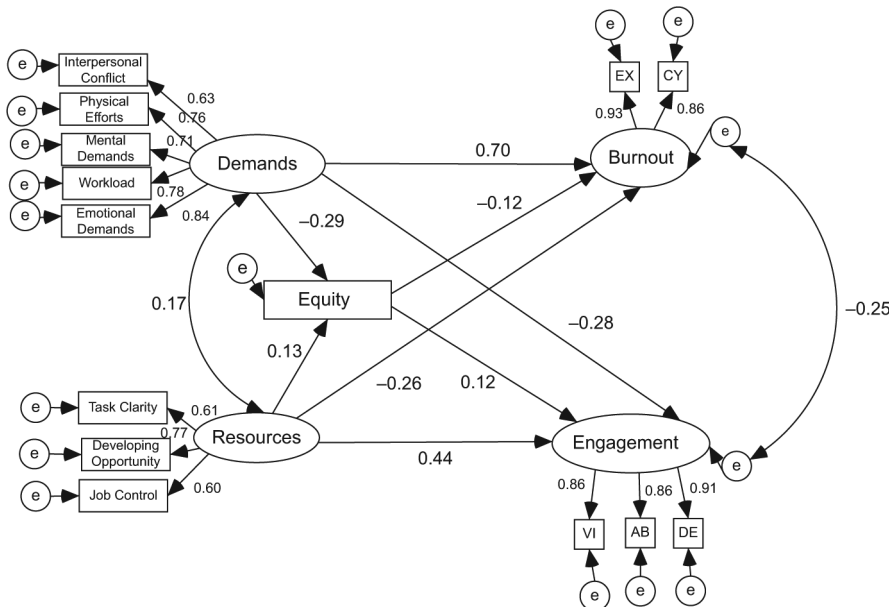
Test of the comprehensive model in the overall sample

Our main hypothesis stated that the perception of equity would mediate the relation between job demands and resources on the one hand, and burnout and engagement on the other hand. The fit of the comprehensive model in the overall, pooled sample was acceptable ($\chi^2 = 760.97$, $df = 68$, $GFI = 0.95$, $CFI = 0.95$, $TLI = 0.93$, $RMSEA = 0.07$), and all path coefficients were significant and in the expected direction (see Figure 1). Job demands were positively related to burnout, via the perception of equity (Sobel test = 5.76, $p < 0.001$; *H1a* confirmed), and negatively

	Component 1	Component 2	Component 3	Component 4	Component 5
<i>Demands</i>					
Workload	0.83				
Mental demands	0.83				
Emotional demands	0.78			0.32	
Physical effort	0.77				
Interpersonal conflict	0.53			0.45	
<i>Engagement</i>					
Vigor		0.90			
Dedication		0.89			
Absorption		0.88			
<i>Resources</i>					
Job control			0.83		
Development opportunity			0.78		
Task clarity			0.70		
<i>Burnout</i>					
Cynicism				0.83	
Exhaustion	0.44			0.76	
Equity (linear)					0.95
Explained variance	23.05	18.80	13.61	12.76	7.3

Table II. Factor loadings of the study variables in the total sample

Notes: Only factor loadings of 0.30 and over are displayed; $n = 2,006$



Notes: All effects significant at: $p < 0.001$; $n = 2,006$ ($\chi^2 = 760.97$; $df = 68$; $GFI = 0.95$; $CFI = 0.95$; $TLI = 0.93$; $RMSEA = 0.07$)

Figure 1. Standardized effects for the final model in the total sample

related to work engagement, also via the perception of equity (Sobel test = -4.71 , $p < 0.001$; $H2b$ confirmed). Moreover, job resources were positively associated with work engagement, via the perception of equity (Sobel test = 3.53 , $p < 0.001$; $H2a$ confirmed) as well as negatively related to burnout via the perception of equity (Sobel test = -3.91 , $p < 0.001$; $H1b$ confirmed).

Multi-group test of the comprehensive model

As two samples were involved, equivalence of the parameters across samples was tested by constraining regression weights to be equal across samples in a multi-group analysis. Results revealed that the constrained model had a good fit to the data ($\chi^2 = 933.72$, $df = 144$, $GFI = 0.94$, $CFI = 0.94$, $TLI = 0.92$, $RMSEA = 0.05$). However, the model that allowed all parameters to vary across samples fitted the data significantly better ($\chi^2 = 902.76$, $df = 136$, $GFI = 0.94$, $CFI = 0.94$, $TLI = 0.91$, $RMSEA = 0.05$) than the model in which the regression weights were constrained to be equal ($\Delta\chi^2$ with $df = 8$ was 30.96 , $p < 0.001$).

Next, separate tests of each regression weight revealed that three paths (i.e. resources → equity, resources → burnout, demands → work engagement) differed significantly across nurses and blue collar workers. The model in which these three paths varied across samples and in which all remaining paths were constrained to be equal fitted the data well ($\chi^2 = 905.48$, $df = 141$, $GFI = 0.94$, $CFI = 0.94$, $TLI = 0.92$, $RMSEA = 0.05$). Subsequent inspection of the parameter estimates in both samples revealed that job demands were positively related to burnout, via the perception of equity among nurses and workers (Sobel test = 4.16 , $p < 0.001$; $H1a$

confirmed for nurses and workers), and negatively related to work engagement, via the perception of equity among nurses and workers (Sobel test = -3.48, $p < 0.001$; *H2b* confirmed for nurses and workers). Job resources were positively associated with work engagement (Sobel test = 3.58, $p < 0.001$) and negatively associated with burnout (Sobel test = -4.33, $p < 0.001$), but only in nurses (*H2a* and *H1b* confirmed for nurses). Note that the regression paths revealed that job resources were significantly related to work engagement in both samples ($\beta = 0.44$ in nurses, $\beta = 0.47$ in workers, both $ps < 0.001$).

Non-linear effects of equity on well-being

To test for non-linear effects of equity on employee well-being, the research model was extended with a term representing the non-linear effect of equity (i.e. squared equity). The model was then tested separately for nurses and blue collar workers. The fit was acceptable for nurses ($\chi^2 = 592.77$, $df = 77$, GFI = 0.94, CFI = 0.95, TLI = 0.93, RMSEA = 0.07) as well as for blue collar workers ($\chi^2 = 328.59$, $df = 77$, GFI = 0.93, CFI = 0.91, TLI = 0.89, RMSEA = 0.07). Our results showed no non-linear effects of equity on burnout or work engagement in blue collar workers (*H3* and *H4* not supported for workers). For nurses, a significant non-linear direct effect was observed on burnout (a standardised effect of 0.13, $p < 0.001$) but not on work engagement (*H3* confirmed for nurses, *H4* not supported for nurses).

Next, we found that the direct path from job resources to non-linear equity was not significant for nurses (-0.03, ns). After deleting this path, Sobel tests showed that job demands were positively related to burnout via both the linear and the non-linear equity terms (Sobel tests were 4.08, $p < 0.001$, and 2.74, $p < 0.01$, respectively). Figure 2 presents the parameter estimates for the final model for nurses.

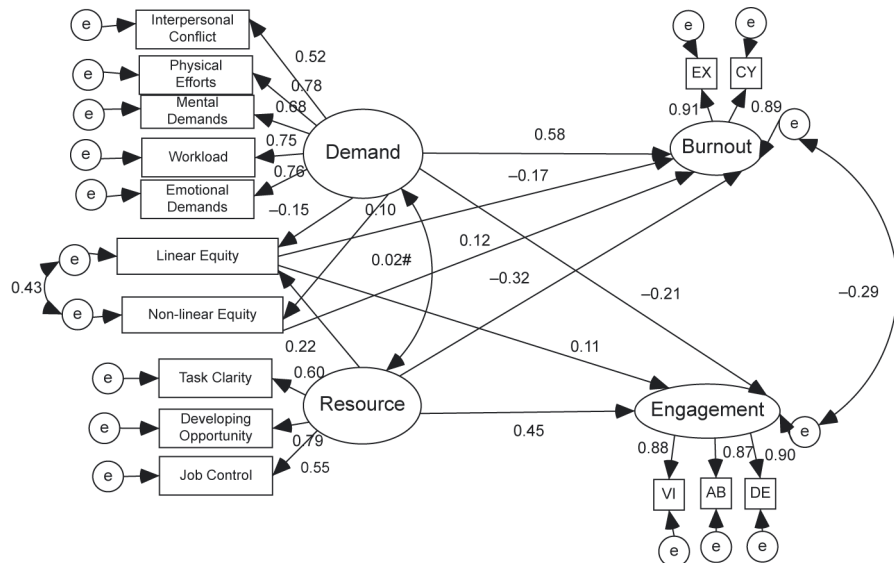


Figure 2. Linear and non-linear effects of equity in the final JD-R model among nurses

Notes: All effects significant at: $p < 0.05$; $n = 1,381$; $\chi^2 = 595.98$; $df = 79$; GFI = 0.94; CFI = 0.95; TLI = 0.93; RMSEA = 0.07; except # = not significant

In order to further explore the non-linear effect of equity on burnout among nurses, an over-benefited group ($n = 83$), a balanced group ($n = 301$) and an under-benefited group ($n = 997$) were created. For the balanced group, rewards and outcomes were the same (i.e. they reported a score of three on the equity measure). The two other groups reported equity scores above and under the midpoint of this measure, respectively. Analysis of variance (ANOVA) revealed that means of the three groups differed significantly in levels of burnout, $F(11, 1381) = 6.48, p < 0.001$. Figure 3 presents the mean levels of burnout for the three groups. *post hoc* tests showed that the mean of the under-benefited group differed significantly from those of the balanced (mean difference = $-0.62, p < 0.001$) and the over-benefited groups (mean difference = $-0.35, p < 0.05$). Interestingly, the difference between the means of the balanced and the over-benefited group was only marginally significant (mean difference = $-0.27, p = 0.07$). Thus, Hypothesis 3 was confirmed in that the expected curvilinear relation was observed for equity and burnout among nurses.

Discussion

The present study aimed to address two limitations of current research on Demerouti *et al.*'s (2001) JD-R model, namely the issue of how demands and resources combine in affecting employee well-being, and the lack of insight into how and why particular job demands and job resources affect employee well-being (Schaufeli and Taris, 2013). We proposed that the effects of job demands and job resources on burnout and engagement are mediated through an equity-based cognitive evaluation process, in which employees appraise their investments in and outcomes gained from their work (cf. Van Dierendonck *et al.*, 2001; Pritchard, 1969). By doing so we shed light on the psychological processes underlying the associations between job characteristics (i.e. demands and resources) and employee well-being (i.e. burnout and engagement).

Our findings partly supported our hypothesis that equity mediates the relation between job demands and job resources on the one hand and well-being burnout and

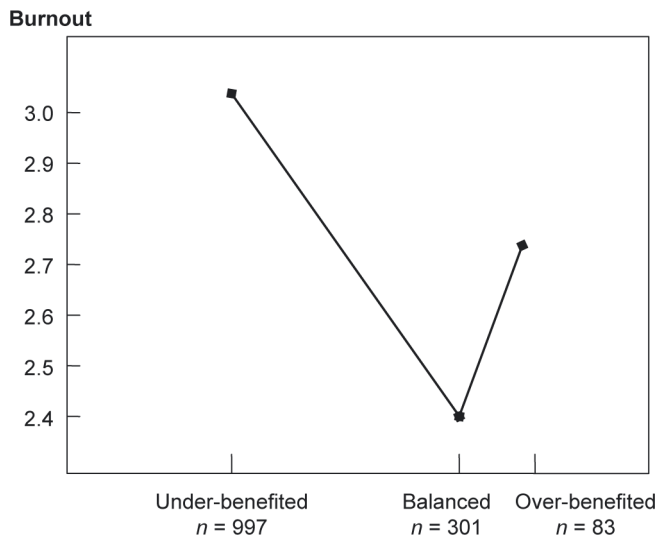


Figure 3.
Burnout among nurses as
a function of equity

work engagement on the other hand. Multi-group analysis showed that job demands were associated with high levels of burnout, and that job resources were related to work engagement and low burnout in both nurses and blue collar workers. These findings are in line with previous findings on the JD-R model (Schaufeli and Taris, 2013). A closer look at our findings in the two samples reveals that the perception of equity mediated the relation between job demands and burnout in both nurses and blue collar workers. Interestingly, in both samples the indirect effect of job demands on burnout via equity was stronger than the indirect effect of job resources on work engagement via equity. So it seems that employees are more sensitive to detrimental job characteristics that drain their energy (i.e. job demands) than to beneficial job characteristics that satisfy their needs (job resources). This may be due to the fact that negative emotions that people experience as a consequence of inequity induce feelings of incompetence to deal adequately with stressors (Baumeister *et al.*, 1994). Furthermore, earlier findings that people are more concerned about avoiding loss than about achieving gains (Hobfoll, 2002) may explain why among nurses the indirect effect of job resources on burnout via equity was stronger than the corresponding indirect effect of job resources on work engagement through equity.

The perception of equity mediated the relation between job demands and well-being (burnout and engagement, *H1a* and *H2b*) in both samples. Thus, when high job demands drain employees' energy, the ratio between their investments and rewards becomes less favourable. In the short term this does not necessarily lead to adverse consequences, but in the long term (especially when the employee cannot draw upon sufficient job resources), adverse consequences (such as burnout and the erosion of engagement) could occur.

Interestingly, our findings did not support the hypothesis that equity mediates the relation between job resources and well-being (burnout and engagement, *H1b* and *H2a*) in blue collar workers; rather, in this sample job resources were directly associated with low well-being. Apparently, the effects of job demands and job resources on equity and well-being differ as a function of the work context. In the present study, all participants in the blue collar sample worked in Chinese family-owned factories where job insecurity is very high and downsizing is endemic (Hu and Schaufeli, 2011, for details). Thus compared to the nurses in our study, the blue collar workers experience low levels of job security – a major job resource (cf. Siegrist *et al.*, 2004).

Additionally, this low level of job security of blue collar workers could have restricted the systematic variance of our equity measure, leading to an underestimation of the magnitude of the associations under study (cf. Table I). Alternatively, their past experiences may have led the blue collar workers in our study to focus more strongly upon the potential losses at work (Hobfoll, 2002) than on potential gains, which could explain why the direct effects of the two clusters of job characteristics on well-being were considerably stronger than the more subtle indirect effects via equity.

Our study not only revealed significant linear effects of equity on well-being (burnout and engagement) among nurses and blue collar workers, but also revealed significant non-linear effects of equity on burnout, albeit only for nurses. The linear effect of equity in our study is stronger than the non-linear effect, which goes against earlier studies in medical settings in Europe (Truchot and Badré, 2006; Van Dierendonck *et al.*, 1998, 2001). The reason might be that in collectivist cultures such as

China where interpersonal sensitivity is high, and harmony, solidarity, and cohesion more favourably valued, equality is preferred to equity. Conversely, equity might be preferred to equality in individualistic cultures such as Europe, stressing productivity, competitiveness, and self-gain (Leung and Bond, 1984). It leads people in individualistic cultures (i.e. Western Europe) to be far more concerned with equity than are people in collectivist cultures (i.e. China). Employees from a collectivistic culture may demonstrate a more linear relationship between equity and wellbeing, whereas in employees from western individualistic cultures the more common curvilinear relationship between equity and wellbeing could be present.

Furthermore, our study found that the negative effects on well-being of feeling under-benefited were considerably stronger than those of feeling over-benefited, which does not agree with previous studies. For instance, Van Dierendonck *et al.* (1998, 2001) observed that an asymmetrical health professionals–recipient relationship caused health professionals to feel over-benefited and more stressed. Our study agreed with the original assumption of Adams (1965) that the negative effects of feeling under-benefited outweigh those of feeling over-benefited. Finally, the fact that no non-linear association between equity and well-being was observed among blue collar workers might be due to the restriction-of-range effects discussed above. Long-term job insecurity for blue collar workers makes it very difficult for them to find an employment relationship that is rewarding, fair, and fulfilling.

Study limitations

Our study has several limitations. First, perceived equity was measured by a global single item in which participants evaluated their investments and outcomes directly in relation to each other. This approach has been proven to be useful in the past (e.g. Hatfield *et al.*, 1985; Van Horn *et al.*, 2001). For example, the studies of Taris *et al.* (2001) and Van Horn *et al.* (2001) showed that various equity measures (e.g. single-item measures and multi-item measures that tap investments and outcomes separately) tend to be highly correlated. Moreover, these studies demonstrated that a global single-item equity measure shows similar associations with other concepts (e.g. burnout) as compared to other multi-item equity measures. Taris *et al.* (2001) observed that scores on single-item equity measures are a function of the separate assessments of investments and outcomes. Although different assessments of equity (e.g. single-item measures and multi-item measures) produce similar results (Prins *et al.*, 1993), more refined measures (e.g. focusing on investments and outcomes separately, or on various types of investments and outcomes) might have provided a more detailed picture of the relations among equity and the other study variables.

Second, the cross-sectional design of the present study obviously precludes causal conclusions. However, note that previous longitudinal research (e.g. Taris *et al.*, 2001) yielded findings that support the idea that (lack of) equity leads to (un)well-being. Seen from this perspective we believe that the theoretical model tested in the current study represents a plausible causal model, which, of course, remains to be tested longitudinally.

Finally, the present study employed two relatively unusual, non-western samples, both collected in mainland China. Although this may well be considered a strength of the current research in that it contributes to our knowledge about the extent to which western theoretical notions also apply in non-western contexts, it is possible that some

of our findings are unique to our samples. For example, equity appeared to have no effect on well-being among Chinese blue collar workers. Therefore, our findings should be interpreted with caution and further research is needed in order to generalise to other non-western countries.

Practical and scientific implications

The present study showed that the incorporation of equity in the JD-R model accounts for part of the association between job characteristics and employee well-being. From a scientific perspective, the contribution of the current study is that it extended the theoretical basis of the JD-R model, suggesting that the cognitive evaluation of job demands and job resources is partly responsible for the associations between these job characteristics and employee well-being. In addition, our results provide a possible explanation for the mixed results produced by previous JD-R research on the joint effects of job demands and job resources on well-being. Our findings suggest that it would be fruitful to focus on understanding the role of cognitive evaluation processes as mediator between job characteristics and employee well-being in the JD-R model.

Practically, our study suggests that part of the adverse effects of job demands on burnout and engagement may be mitigated by increasing job resources, since we found that job resources affected employee well-being both directly and indirectly, via equity. Such an approach would seem especially useful in situations where it is difficult or impossible to reduce job demands, e.g. when high emotional or physical demands constitute an inherent part of the job. Although the adverse effects of such demands are unlikely to disappear fully, our results suggest that the negative effects are buffered to at least some degree by job resources.

In conclusion, the present study extended the JD-R model with an equity-based cognitive evaluation process. Apparently, part of the associations between job characteristics and employee well-being are due to the cognitive appraisal of workers' by a cognitive behavioural approach that seeks to restore equity. In fact, Van Dierendonck *et al.* (1998) demonstrated the usefulness of an individual intervention program to reduce burnout and sickness absenteeism that focused on restoring the cognitive balance between investments and outcomes at work. The current study provides a further rationale for the theoretical underpinnings of interventions to improve employee well-being by focusing on the cognitive appraisal process.

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