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Active coping and need for control as moderators of the job demand–control model: Effects on burnout

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Empirical research on Karasek's job demand–control (JD-C) model has often failed to demonstrate the predicted interaction effect of high job demands and low job control on measures of strain. It has been suggested that the conceptualization of the control dimension as well as the neglect of workers' individual characteristics in the JD-C model may be responsible for its relative lack of empirical support. In the current study among 367 Dutch nurses from 18 intensive care units, a more focused measure of control was used. In addition, two individual characteristics (i.e. active coping and need for control) were included as potential moderators in the JD-C model. The demand-control interaction effect as predicted by the JD-C model could not be demonstrated. However, active coping turned out to moderate the interaction between job demands and job control. A misfit between level of control and individual coping style intensified the stress-enhancing effect of job demands. Further research on the extension of the JD-C model with personal characteristics is recommended.

The job demand-control (JD-C) model of job strain has been widely tested since its introduction by Karasek in 1979. This model assumes two main hypotheses: (1) the combination of high job demands along with low job control precipitates psychological and physical strain ('high strain' jobs); (2) jobs in which both demands and control are high produce well-being, learning and personal growth ('active' jobs) (Karasek & Theorell, 1990). So, according to the JD-C model, job demands and job control combine interactively rather than additively in predicting job-related outcomes.

However, empirical support for the JD-C model is inconclusive (Jones & Fletcher, 1996). Early studies in large and heterogeneous samples using American, Swedish and Finnish data showed moderate empirical support for the JD-C model (Karasek, 1979, 1981; Karasek, Baker, Marxer, Ahlbom & Theorell, 1981;

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Kauppinen-Toropainen, Kandolin & Mutanen, 1983), whereas more recent studies in similar samples failed to confirm the essential interaction of job demands and job control (Pieper, LaCroix & Karasek, 1989; Reed, LaCroix, Karasek, Miller & MacLean, 1989). The JD-C model has also been tested cross-sectionally in somewhat smaller and more homogeneous samples (e.g. de Jonge, 1995; Dwyer & Ganster, 1991; Fletcher & Jones, 1993; Fox, Dwyer & Ganster, 1993; Hurrell & McLaney, 1989; Landsbergis, 1988; Parkes, 1991; Payne & Fletcher, 1983; Sauter, 1989; Spector, 1987; Warr, 1990). In general, these studies showed significant main effects of job demands and/or job control on various aspects of psychological and physical strain, including objectively recorded indicators such as blood pressure and levels of cortisol. However, the predicted interaction between demands and control has been less consistently demonstrated. In addition, and in a similar vein, a recent longitudinal study failed to show this crucial interaction effect (Carayon, 1993).

Several methodological as well as conceptual criticisms have been expressed that might explain these quite disappointing results. Firstly, the fact that the JD-C model was, at least initially, confirmed in large and heterogeneous samples as opposed to the more recent small and homogeneous samples might be due to the lack of sensitivity of the measures used in the latter samples (Jones & Fletcher, 1996) or to the confounding effect of socio-economic status in large heterogeneous samples (Ganster, 1989). The latter explanation is supported by the finding in those large-scale studies that, when the level of the job is controlled for, no significant interaction of demands and control is found (Karasek *et al.*, 1981; Reed *et al.*, 1989).

Secondly, results of testing the JD-C model differ because different strategies have been used to test the interaction effect. Typically, analysis of variance has been carried out with two independent factors; that is, the level of job demands and the level of job control (e.g. Landsbergis, 1988; Sauter, 1989). In general, this method produces results that are relatively often in favour of the JD-C model. However, it has been argued that this procedure is not very efficient, and that interactions ideally should be tested with moderated regression analysis (Cohen & Cohen, 1983; Landsbergis, Schnall, Warren, Pickering & Schwartz, 1994; Zedeck, 1971). Quite often, studies that use the latter do not yield positive results (e.g. Payne & Fletcher, 1983; Spector, 1987). This difference in results can be explained by power differences between different statistical methods.

Finally, the results of studies on the JD-C model are often incomparable as different researchers conceptualize and measure job demands and job decision latitude in quite different ways. Various types of job demands, including workload (Fox *et al.*, 1993) and interpersonal conflicts (Spector, 1987), have been used as operationalizations for the concept of 'job demands'. In addition, Karasek's (1979, 1985) original scale includes not only purely descriptive items, but also affective items, which may lead to spurious relationships with the dependent variables (cf. Wall, Jackson, Mullarkey & Parker, 1996). Decision latitude has often been conceived as discretion (Spector, 1987), control (Sauter, 1989), autonomy (Aronsson, 1989; de Jonge, 1995) and self-determination (Kauppinen-Toropainen *et al.*, 1983). A fundamental problem is that Karasek's (1985) original measure of decision latitude has been criticized for being a mix of job control, skill variety and job complexity (e.g. Frese, 1989; Ganster, 1989). However, these three dimensions

are far from being the same thing (Kasl, 1996); for instance, skill variety should not be equated with job control. Wall, Jackson & Mullarkey (1995) found that, whereas skilled jobs were distinguishable from less skilled ones in having higher levels of production responsibility, monitoring demand and problem-solving demand, they showed no difference with regard to job control. Yet, theoretically, it is job control which is the crucial factor that provides the opportunity for individuals to adjust to demands according to their actual needs and circumstances (Karasek & Theorell, 1990; Sutton & Kahn, 1986). In a recent study, Wall *et al.* (1996) were able to demonstrate the interaction effect predicted by Karasek (1979) using a more focused measure of control, whereas parallel analyses using Karasek's original measure of decision latitude did not show an equivalent effect. Based on these results, they recommend that greater attention should be paid to congruence between theory and measurement.

An alternative, more theoretical, explanation for the lack of consistency may be the neglect of individual styles of adaptation to particular features of the work environment (cf. Parkes, 1991; Payne, 1988; Siegrist, Peter, Junge, Cremer & Seidel, 1990). In other words, the relationship between both dimensions of the JD-C model and the outcome measures may depend upon workers' individual characteristics. Parkes (1991), for example, investigated locus of control as a potential moderator of demand–control interaction effects in two studies among civil servants and teachers, respectively. For externals, she found an interaction effect of demands and control on anxiety, which is consistent with Karasek's predictions, whereas for internals only additive effects were found.

In the present study, the JD-C model is tested with burnout as the dependent variable in a homogeneous sample of intensive care nurses, using the recommended moderated regression analysis (cf. Landsbergis *et al.*, 1994). The purpose of the present study is twofold: (1) to test whether empirical support for the JD-C model can be found when using a more descriptive measure of job demands and a more focused measure of control, which is a replication of Wall *et al.* (1996); (2) to explore the moderating role of two individual characteristics (i.e. active coping and need for control). In other words, it is investigated whether or not the inclusion of these two moderators improves the explanatory power of the JD-C model.

Burnout among intensive care nurses

Traditionally, intensive care (IC) nurses have heavy workloads and extensive responsibilities, but only limited authority. They must care for unstable patients, do accurate routines, react with extreme urgency and work with sophisticated technology (Dewe, 1988). However, their level of job control is often insufficient to cope efficiently, effectively and speedily with these demands. In turn, this may cause burnout, which has been recognized as a problem in intensive care units (ICUs) for a long time (Lewandowski & Kositsky, 1983).

Burnout is conceived as a set of negative psychological experiences, reflecting a 'wearing out' from prolonged exposure to the stresses of contact-intensive occupations (Maslach & Schaufeli, 1993), such as IC nursing. Three dimensions of burnout are usually distinguished: (1) emotional exhaustion, which refers to the

draining of emotional resources; (2) depersonalization, a callous and cynical attitude towards the recipients of one's care; and (3) personal accomplishment, or work-related competence. High levels of emotional exhaustion, depersonalization and a diminished sense of personal accomplishment are indicative of burnout. However, in this study, we will focus on the first two dimensions, i.e. emotional exhaustion and depersonalization, as indicators of burnout. These two dimensions are considered the 'core of burnout' (Green, Walkey & Taylor, 1991, p. 463). In his theoretical model, Leiter (1993) assumes that the third component of burnout—reduced personal accomplishment—develops largely independently from emotional exhaustion and depersonalization. The results from a recent meta-analytic examination of the correlates of the three burnout dimensions confirm the independent role of personal accomplishment (Lee & Ashforth, 1996). It has been suggested that personal accomplishment reflects a personality characteristic akin to self-efficacy rather than a genuine component of burnout reaction (Cordes & Dougherty, 1993).

To date, burnout has been occasionally studied from the JD-C perspective. The results of a study by Landsbergis (1988) among 289 hospital and nursing home employees supported the hypothesis that burnout is significantly higher in jobs that combine high job demands with low job control. This association remained significant after controlling for age, gender, education, marital status, having children, hours worked per week and shiftwork. However, significant results were only found when MANOVAs were used to analyse the data. The crucial interaction effect of demands and control on burnout could not be replicated with regression analyses. Accordingly, as we noted before, the results seem to depend on the methodology used. De Jonge, Janssen & van Breukelen (1996) confirmed the predicted demand–control interaction effect on emotional exhaustion among 249 nurses and nurse's aides using structural equation modelling. High levels of job control appeared to attenuate the increase in emotional exhaustion due to job demands. Melamed, Kushnir & Meir (1991) studied the effects of job demands, job control and social support on burnout in a sample of 267 female social workers. They were only able to demonstrate additive effects of the three independent variables on burnout. The lowest burnout level was found under conditions of low demands, high control and high social support. The opposite was observed under conditions of high demands, low control and low support. Finally, the findings of a recent study by de Jonge (1995) among 1489 hospital nurses and nursing home nurses also could not confirm the postulated interactions on burnout. Thus, the evidence for the existence of an interactive effect of job demands and job control on burnout in people working in the human services in general and nursing in particular is inconclusive. Most of these studies failed to provide clear and unambiguous support for the JD-C model.

Active coping

Coping involves a wide range of strategies which are directed towards altering or avoiding (job-related) stressors (cf. Parkes, 1990, 1994). In this study, we used active coping, i.e. actively controlling the stressor, as a potential moderator of the

JD-C model. Active coping is the attempt to come to grips with problems at work by cognitively analysing the situation and/or by concrete action in order to solve or overcome the problem. Of course, such control-directed coping efforts can only be effective in situations in which opportunities to actually control stressors are perceived, either on the cognitive or on the behavioural level (Latack, 1986). In situations where no control is perceived, an active strategy is counterproductive and may eventually lead to 'learned helplessness' (Abramson, Seligman & Teasdale, 1978, Lennerlöf, 1988).

In two recent studies, interaction effects of job stressors and active coping were found. A study among trainee teachers by Parkes (1990) demonstrated that direct (i.e. active) coping buffers the negative effects of job stressors (like demands) on mental health outcomes. This result is confirmed in a study by Koeske, Kirk & Koeske (1993) among case managers, which demonstrated that control coping—which closely resembles our concept of active coping—buffers the effects of job stressors on negative job-related outcomes (i.e. burnout, job dissatisfaction, physical complaints and intention to quit). We explain these results by assuming that the mechanism by which this beneficial effect of active coping is brought about is the use of job control: only active copers will be inclined to use job control as a means to attentuate the negative effects of job stressors. In line with this assumption, we expect that the demand–control interaction effect as proposed by Karasek (1979) will only be found for nurses *high* in active coping.

Need for control

As White (1959) has pointed out in his seminal paper on human motivation, the need to control the environment is most central to the human species. However, individuals differ according to the extent they like to exercise control over their environment (see also Parkes, 1989). Burger & Cooper (1979) argue that individuals differ in their desire for control and that this construct can be validly assessed. According to them, 'people's general level of control motivation is posited to interact with situational variables to account for behavioral differences' (p. 383). When applied to job situations, the desire, or need, for control construct fits quite well within the framework of the JD-C model, as it represents a desire for control opportunities in the job.

In a study by Gaziel (1989), school administrators were classified according to their 'need for autonomy', which corresponds with our construct of need for control that is operationalized below. The results showed that for administrators with a low need for autonomy, job autonomy was not related to motivation and job satisfaction, whereas a positive relation between job autonomy and the outcome measures was found for administrators with a high need for autonomy. Gaziel (1989) concluded that a lack of job autonomy is experienced if and only if there is a discrepancy between the actual level and the desired level of autonomy. De Jonge, Landeweerd & van Breukelen (1994) showed that need for autonomy is a significant moderator of the relations between job autonomy on the one hand, and emotional exhaustion and health complaints on the other hand. A negative association between job autonomy and these outcomes was observed only in the case of a high need for autonomy.

In accordance with the results of these studies, we reason that the availability of job control will only be valued by nurses with a high need for control. Therefore we expect that the demand–control interaction effect as proposed by Karasek (1979) will only be found for nurses with a *high* need for control.

Hypotheses

In line with Wall *et al.* (1996), it is hypothesized that a more descriptive measure of job demands and a focused measure of job control have such an interaction effect on burnout (i.e. emotional exhaustion and depersonalization) which is consistent with Karasek's (1979) predictions. That is, the combination of high job demands and low job control precipitates burnout (hypothesis 1). In addition to this, it is hypothesized that the relationships between demand–control combinations and the two dimensions of burnout are moderated by active coping and need for control. It is expected that job demands and job control interact for nurses high in active coping but not for nurses low in active coping (hypothesis 2). Finally, it is expected that job demands and job control interact for nurses who have a high need for control, while this interaction will not be found for nurses with a low need for control (hypothesis 3).

Method

Procedure and participants

Twenty-three Dutch ICUs were asked to participate in the study. After a first introductory and informative meeting, 18 ICUs remained. Although these ICUs were not selected randomly, they seem a representative sample of Dutch ICUs as far as size and geographical region are concerned.

Questionnaires were sent to the home addresses of 578 ICU nurses. In order to guarantee anonymity, the completed questionnaire could be returned in a pre-stamped envelope Altogether, 367 nurses returned the questionnaire (response rate 65 per cent). Eighty-eight per cent are certified ICU nurses and 56 per cent are women Ages range from 22 to 55 years, the mean age of the sample is 34.30 years (SD = 8.37) On average, nurses had been working on an ICU for 6.03 years (SD = 4.33). Virtually all nurses (98 per cent) were employed on a permanent basis

Measures

Job demands were assessed by an eight-item scale that measures quantitative as well as qualitative demanding aspects of the job (e.g time pressure, working hard, strenuous work and task complexity) (de Jonge, 1995). The respondents were instructed to remain aloof from their work situations when they answered the questionnaire, in order to reduce the likelihood of scoring subjectivity (cf. Frese & Zapf, 1988). Items are scored on a five-point Likert scale, ranging from 'never' (1) to 'always' (5). Two earlier studies by de Jonge (1995) and by de Jonge and colleagues (1996) showed alphas of .87 and .90, respectively Sample items are 'In the unit where I work, work is carried out under pressure of time' and 'In the unit where I work, the work is too complicated'.

Job control was measured by selecting those items that reflect decision authority from a Dutch translation of Karasek's (1985) Job Decision Latitude Scale (de Jonge, Landeweerd & Nijhuis, 1993). This yielded the following three items 'My job allows me to make a lot of decisions on my own', 'I have a lot to say about what happens on my job', and 'On my job, I have very little freedom to decide how I work' (reverse scored). These items are scored on a four-point Likert scale, ranging from 'never' (1) to 'always' (4). De Jonge *et al* (1993) reported an alpha of .71 for this subscale.

Burnout was assessed by two subscales of the Dutch version (MBI-NL; Schaufeli & Van Dierendonck, 1993) of the Maslach Burnout Inventory (MBI; Maslach & Jackson, 1986): *emotional*

exhaustion (8 items) and *depersonalization* (5 items). Scores range from 'never' (0) to 'every day' (6). In the MBI-NL, one original item (number 16) of emotional exhaustion has been eliminated because of insufficient factorial validity (cf. Byrne, 1991). Recently, Schaufeli & Van Dierendonck (1993, 1994) have demonstrated that the reliability and construct validity of the Dutch version are comparable to the original American version.

Active coping was measured by the corresponding subscale of the Utrecht Coping List (Schreurs, Van de Willige, Tellegen & Brosschot, 1988). On a four-point Likert scale, ranging from 'seldom or never' (1) to 'very often' (4), respondents were asked to indicate how often they cope with problems and stressful situations in the way described by the particular item. The active coping subscale includes five items, e.g., 'Acting immediately when problems occur'.

Need for control was assessed by a self-constructed scale, consisting of the following four items: 'In my job, I set a great store by: (1) being able to set the pace of my tasks; (2) having control over what I do and the way that I do it; (3) doing my own planning, (4) giving orders instead of receiving them'. Items were scored on a five-point Likert scale, ranging from 'completely disagree' (1) to 'completely agree' (5).

Data-analysis

Hierarchical multiple regression analyses were performed to detect main effects and interaction effects of job demands, job control and the two moderators (i.e. active coping and need for control) on each of the two burnout dimensions. Cross-product terms of standardized independent variables were computed in order to test interaction effects (cf. Cohen & Cohen, 1983; Kleinbaum, Kupper & Muller, 1988).

Examination of the raw data revealed a positively skewed distribution for emotional exhaustion. To allow the use of this dependent variable in a regression analysis, scores on this variable were subjected to a $\log_{10}$-transformation (Kleinbaum *et al.*, 1988). After this transformation the distribution was approximately normal

The independent variables were entered into the equation in six successive steps (cf. Aiken & West, 1991; Jaccard, Turrisi & Wan, 1990). In the first step, age, sex and length of service were entered to control for possible confounding effects. Next, (2) job demands and job control; (3) the two-way interaction term (demands × control), (4) the moderator (i.e. active coping, or need for control), (5) the two-way interaction terms (demands × moderator) and (control × moderator); (6) the three-way interaction term (demands × control × moderator) were entered, respectively. A significant two-way interaction effect of job demands and job control on burnout would support hypothesis 1, whereas a significant three-way interaction effect of job demands, control and one of the two moderators would support hypothesis 2, or 3, respectively

In total, four hierarchical multiple regression analyses (i e. two analyses per burnout dimension for each moderator, separately) were performed. In order to interpret the *a priori* standardized variables as correctly as possible, unstandardized regression coefficients are shown in Tables 2 and 3 (cf Aiken & West, 1991, Jaccard *et al.*, 1990).

Results

All persons with missing values on any of the key study variables were excluded from the analyses, which reduced the number of participants to 277. The final sample did not differ significantly from the initial sample as far as composition, age distribution and length of service is concerned. Table 1 shows the empirical ranges, means, standard deviations, coefficient alphas and zero-order Pearson correlations of the study variables. Except for job control, need for control and depersonalization, the alphas showed a reasonable internal consistency (cf. Cortina, 1993).

Table 1. Descriptive statistics for the key study variables (N=277[a])

Variable	Range	M	SD	Alpha	2	3	4	5	6	7	8	9
1. Age	23–55	33.81	5.37	—	.12	.69**	.04	−.06	−.09	.13	.09	.07
2. Sex	1–2	1.45	0.50	—	—	.03	−.07	.16*	.11	.20**	−.01	.12
3. Length of service	0–24	7.44	5.04	—	—	—	−.00	−.02	.00	.09	.00	−.01
4. Job demands	12–33	23.15	3.84	.85	—	—	—	−.10	−.04	.04	.45**	.08
5. Job control	7–15	10.70	1.58	.60	—	—	—	—	.17*	.29**	−.19*	−.09
6. Active coping	8–24	16.72	2.53	.75	—	—	—	—	—	.16*	−.18*	−.06
7. Need for control	7–20	13.24	2.38	.63	—	—	—	—	—	—	.05	.03
8. Emotional exhaustion	0–38	10.10	6.19	.84	—	—	—	—	—	—	—	.48**
9. Depersonalization	0–18	5.67	3.53	.60	—	—	—	—	—	—	—	—

*$p \leq .05$, **$p \leq 01$, ***$p \leq 001$.
[a]N after listwise deletion of cases with missing values

Table 2. Hierarchical multiple regression analyses of job demands, job control and active coping and need for control on emotional exhaustion (N=277)

	Active coping		Need for control	
Moderator	B	R^2_{change}	B	R^2_{change}
1. Age	.07	.01	.07	.01
Sex	.03		.03	
Length of service	−.04		−.04	
2. Job demands	.46***	.22***	.46***	.22***
Job control	−.14*		−.14*	
3. Dem. × contr.	−.03	.00	−.03	.00
4. Moderator	−.15**	.02**	.03	.00
5. Dem. × mod.	.10	.01	−.03	.00
Contr. × mod.	.02		−.03	
6. Dem. × contr. × mod.	−.12*	.01*	−.07	.00
Multiple R	.53		.50	
R^2	.28		.24	
F	10.14***		8.59***	

*$p \leq 05$, **$p \leq 01$, ***$p \leq 001$

Note The B values are the coefficients from the final stage of the regression analysis, due to rounding off, R^2 differs .01 from the sum of R^2_{change}

Key Dem = demands, contr = control, mod. = moderate

Regression analyses

Emotional exhaustion. For each moderator variable, a hierarchical multiple regression analysis was performed separately (see Table 2). First of all, Karasek's (1979) demand–control interaction was not significant, indicating no support for hypothesis 1. However, active coping showed a significant three-way interaction effect with job demands and job control, thus lending support to hypothesis 2. Jaccard *et al.* (1990) state that main effects of (independent) variables usually will be a meaningful piece of information. As far as these main effects are concerned, the results showed that job demands are positively associated with exhaustion, while job control and active coping are negatively related to exhaustion.

The significant interaction effect of active coping with job demands and job control is graphically represented in Fig. 1, following the method recommended by Aiken & West (1991) and Jaccard *et al.* (1990). Values of the moderator were chosen 1 SD below and above the mean. Simple regression lines were generated by entering these values in the regression equation. The results for nurses low in active coping (1 SD below the mean score) contradict Karasek's (1979) predictions. Though overall the level of emotional exhaustion is higher in situations with *low* job control compared to situations with high job control, high levels of job control appear to enhance the increase in emotional exhaustion due to job demands. On the other hand, for nurses *high* in active coping (1 SD above the mean score) the interaction effect is consistent with the assumptions of the JD-C model. For these

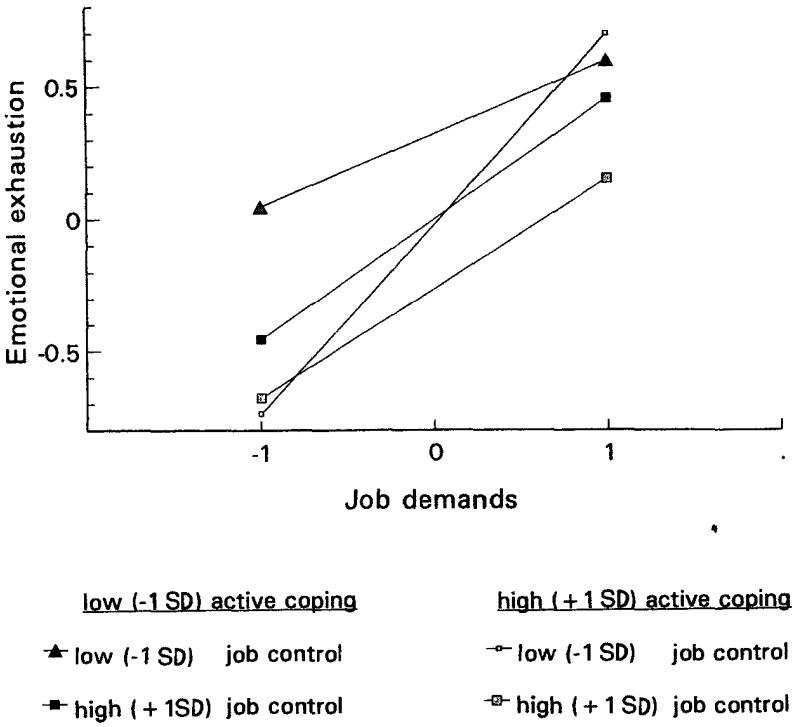

Figure 1. Three-way interaction effect of job demands, job control and active coping on emotional exhaustion

nurses, high levels of job control seem to attenuate the increase in emotional exhaustion due to job demands.

Depersonalization. Results concerning depersonalization are presented in Table 3. Job demands and job control again showed no significant interaction effect, so hypothesis 1 is not supported for depersonalization as well. Furthermore, none of the moderators showed a significant three-way interaction effect with job demands and job control. However, the three-way interaction between job demands, job control and active coping was close to being significant ($p = .085$). Accordingly, a trend was found for supporting hypothesis 2, while hypothesis 3 was not confirmed for depersonalization. Finally, significant main effects with regard to depersonalization were absent.

Discussion

The current study investigates whether (*a*) empirical support for the JD-C model can be found using a more descriptive measure of job demands and a theoretically more adequate operationalization of job control (cf. Wall *et al.*, 1996), and (*b*) the model 'works' better for individuals with particular features than for others who do

Table 3. Hierarchical multiple regression analyses of job demands, job control and active coping and need for control on depersonalization (N=277)

Moderator	Active coping		Need for control	
	B	R^2_{change}	B	R^2_{change}
1. Age	.11	.02	.11	.02
Sex	.13		.12	
Length of service	−.10		−.11	
2. Job demands	.09	.01	.06	.01
Job control	−.10		−.11	
3. Dem. × contr.	−.04	.00	−.08	.00
4. Moderator	−.07	00	.04	.00
5. Dem. × mod.	.04	.00	−.11	.01
Contr. × mod.	.05		.08	
6. Dem. × contr. × mod.	−.11	.01[a]	.07	.00
Multiple R	.23		.23	
R^2	.05		.05	
F	1.51		1.53	

[a] p= 085

Note The B values are the coefficients from the final stage of the regression analysis, due to rounding off, R^2 differs 01 from the sum of R^2_{change}

Key Dem =demands, contr =control, mod =moderator

not have these features. Basically, the JD-C model assumes that low job control intensifies the detrimental effects of heavy job demands on mental or physical health and well-being. The present study was carried out among ICU nurses and used burnout (i.e. emotional exhaustion and depersonalization) as the focal dependent variable. Though in this study a more focused measure of job control was used, the interaction effect between job demands and job control was not found. However, as far as emotional exhaustion is concerned, the predicted interaction effect was demonstrated for nurses who are high in active coping. On the other hand, for nurses who are low in active coping the opposite was found: high job control tended to enhance, not attenuate, the increase in emotional exhaustion due to job demands. In contrast with the findings for active coping, no moderating effects of need for control on the relationship between demand–control interactions and burnout were found.

The above results can add to the present theoretical knowledge of the way job demands and job control interact in producing negative psychological outcomes, such as emotional exhaustion. Apparently job characteristics and individual characteristics interact in a complex way in influencing workers' health and well-being. Integration of an individual coping style into the JD-C model seems to offer a plausible explanation of why some researchers were able to demonstrate the demand–control interaction effect, and others were not. As Parkes (1991) has already mentioned, theoretical support for this finding is offered by the

person–environment (P-E) fit model (e.g. French, Caplan & Harrison, 1982), which suggests that congruence between individual preferences and work environment characteristics gives rise to more favourable outcomes than incongruent combinations. However, the results with respect to need for control are not in line with this idea. We will come back to this issue later on in the discussion. Based on the results represented in Fig. 1 and in Table 2, it can be concluded that job control generally is positively related to workers' well-being; that is, the overall level of emotional exhaustion is lower in situations with high job control than in situations with low job control. Moreover, for people who are inclined to use control (i.e. who are high in active coping), job control acts as a stress-buffer, as it attenuates the increase in emotional exhaustion due to job demands. However, in demanding situations, coping skills of people who are low in active coping are easily overtaxed by high levels of control, which in turn will have negative effects on their well-being. In fact, for these individuals increased job control acts as a stressor, which agrees with Warr's (1987) vitamin model of job stress, that assumes a curvilinear relationship between particular job characteristics (e.g. control) and strains (e.g. burnout). Theoretical and practical implications of our findings will be discussed in the next sections.

Burnout among ICU nurses

As is usually the case in burnout research using the MBI, effects are less strong for depersonalization than for emotional exhaustion (Koeske & Koeske, 1989; Lee & Ashforth, 1996; Maslach & Schaufeli, 1993). That is, squared multiple correlations (R^2) range from .05 for depersonalization to .28 for emotional exhaustion. The latter comes closest to an orthodox stress reaction, such as job-related anxiety or psychosomatic complaints. Furthermore, the validity of depersonalization as a dimension of burnout among ICU nurses can be questioned. Maslach (1982) described depersonalization as a strategy to cope with the emotional stresses that result from intensive interpersonal contacts with patients. Alternatively, depersonalization is often described as an effective conduct in the dehumanizing setting of ICUs, allowing nurses to focus on the technical aspects of their work (Roelens, 1983). Therefore, depersonalization can be regarded as the 'default behaviour' of an ICU nurse. Because of lowered consciousness, mechanical ventilation to support breathing, pain and intravenous lines and tubes, patients are barely able to communicate: they cannot move, let alone speak. Contact between nurse and patient is mainly indirect through instruments. Patients' lack of responsiveness easily permits considering and treating patients as impersonal objects, which corresponds to the way depersonalization is operationalized. Moreover, it appears that the actual nursing care that is provided in direct contact with the patients covers only 12 per cent of the shift of an ICU nurse (Reis-Miranda, de Rijk & Schaufeli, 1996).

For now, it can be concluded that the trend for a significant three-way interaction effect on depersonalization strengthens the validity of our findings for emotional exhaustion.

Active coping and need for control

For nurses high in active coping, job demands and job control predict emotional exhaustion in the interactive way as postulated by Karasek (1979). A straightforward explanation of these results is that these nurses are inclined to utilize opportunities for job control in order to deal with heavy job demands, thereby taking advantage of its stress-reducing effect. As far as active coping is concerned, similar results were found in a recent study by Furda (1995) for health complaints as a dependent variable.

Both job control and active coping have significant negative main effects on emotional exhaustion. Most notably, people who are high in active coping and who have low control opportunities in their job (i.e. a misfit) will get frustrated; the sharpest increase in emotional exhaustion due to job demands is found in these people (see Fig. 1).

Active coping showed only a slight correlation with need for control ($r = .16$, $p < .01$), indicating that we are more than likely dealing with two different personality variables. Several differences between these two concepts may account for the fact that a significant three-way interaction effect on emotional exhaustion was demonstrated for active coping, but not for need for control. First, each of the concepts is operationalized differently. The active coping scale specifically addresses situations in which there are work-related difficulties or problems, whereas the need for control scale applies to work in general. Second, and more importantly, active coping has to do with one's behavioural style, while need for control has to do with one's preferences or attitudes. So, active coping is directly related to dealing with job stressors, such as high demands, whereas this is not the case for need for control. Probably congruence between one's need for control and the actual level of job control is more strongly related to job motivation or job satisfaction than to stress-related outcomes, such as burnout (see also Warr, 1987).

Limitations

The current study has some limitations that need to be considered. First, as the design of this study is cross-sectional, the results need to be interpreted with caution. For instance, no causal inferences can be made. However, several longitudinal studies have shown that job characteristics like job demands and job control had causal predominant relationships with health outcomes in such a way that the outcomes tended to occur *after* job perceptions, rather than vice versa (see Buunk, de Jonge, Ybema & de Wolff, in press). Second, since the present study exclusively relies on self-reports, results may be contaminated by common method variance. For instance, 'burned out' nurses may have overestimated their job demands and/or underestimated their job control, which will result in higher correlations between the independent and dependent variables. However, we did try to reduce this problem by classifying job characteristics in terms quite different from those for the health outcomes. In addition, method variance may bias the results towards main effects rather than interactions. Future studies should be

longitudinal and should include more 'objective' measures of both job characteristics (e.g. expert ratings, aggregated individual data) and job-related outcomes (e.g. registered absenteeism, turnover; cf. Semmer, Zapf & Greif, 1996). Third, three measures had relatively poor internal consistencies (i.e. job control, need for control and depersonalization), which might have negatively influenced the results. An important reason for the poor alpha coefficients of the first two scales is probably the small number of items (three). In addition, similar somewhat lower internal consistencies for the depersonalization scale have also been observed in other studies (cf. Schaufeli, Enzmann & Girault, 1993).

Recommendations

In contrast to the findings by Wall *et al.* (1996), we were not able to demonstrate the interaction effect predicted by the JD-C model by using a descriptive measure of job demands and a more focused measure of job control. On the other hand, the results of our study clearly show that an individual coping style moderates demand–control interaction effects. Therefore, in addition to using more precise measures of the two job characteristics, the inclusion of individual difference variables, such as an active coping style, into studies on the JD-C model seems fruitful. For example, in a study by Parkes (1991), the JD-C interaction hypothesis was supported for people with an external locus of control, whereas for internals only additive effects were found. Besides, Johnson & Hall (1988), as well as Fletcher & Jones (1993), mentioned the importance of social support as an additional dimension of the JD-C model. It is possible that nurses who do not use control-oriented strategies to cope with high demands are more reliant on support from co-workers instead.

In general, our results lend more support to the ideas of the P-E fit model than to the JD-C model. However, it should be noted that the first model is much more general, and that in this study we were able to explain burnout (i.e. emotional exhaustion) by linking the corresponding P-E fit ideas to concepts derived from the theoretical framework of the JD-C model.

Second, the 'active–passive' dimension of the JD-C model has been underutilized in occupational stress research (Theorell & Karasek, 1996). Therefore, it is still interesting to study whether the model is able to explain motivational outcomes in addition to strain-related ones. We already tentatively hypothesized that cognitions such as need for control are more strongly related to measures of job motivation or job satisfaction than to measures of strain (cf. Warr, 1987, 1994).

The current study shows that an adequate approach to prevent burnout among ICU nurses is to reduce their workload. As this is often difficult to achieve, an alternative measure to support ICU nurses in dealing with demanding situations is to provide a level of job control that matches their individual coping style. It is important to note that job control generally has a positive effect on well-being. As Landsbergis (1988) pointed out, control levels that are too low can have negative socialization effects in the long run. Low control environments may act to reduce one's coping abilities and motivation to improve the job situation or, to state it in other words: the everyday job experience of low job control is likely to become

routinized as part of a 'typical situation' to which workers in the long run may adapt both cognitively and emotionally (Siegrist *et al.*, 1990, p. 1128) and which eventually might result in learned helplessness, as was mentioned in the introduction (cf. Lennerlöf, 1988). Because our study is based on cross-sectional data, it gives no insight in these adaptation processes. However, our results make clear that job control should be carefully implemented. Nurses high in active coping should be given extra job control, because they will suffer most from a misfit between environmental coping restrictions and their active problem-solving style. On the other hand, nurses low in active coping should be offered specific training, so they can learn how to benefit from job control as a buffer against the stress-enhancing effect of job demands. This implies that senior nursing officers on an ICU must take individual characteristics into account when giving guidance to staff members. The results of a study by Le Blanc (1994) among nurses in 18 Dutch general and university hospitals showed that a working relationship which is in keeping with an individual nurse's competencies is positively related to his or her health and well-being. These results call for a 'diagnostic attitude' of senior nursing officers and a flexible approach towards their subordinates. Teaching these skills to senior nursing officers might require a special education programme as well.

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