Psychosocial job strain and productivity in human service workers: A test of the demand–control–support model

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The aim of the study was to test the main and interactive effects of the key dimensions of the demand–control–support model in predicting levels of strain (specifically emotional exhaustion, depersonalization and job dissatisfaction) and feelings of productivity and competency (personal accomplishment) in a multi-occupational sample of human service workers (N=813). Controlling for demographics, negative affectivity (NA), and quadratic terms, structural equation analyses showed some support for the additive iso-strain hypothesis: jobs combining high demands, low control and low support produced the lowest levels of satisfaction in workers. High demands and low supports only were associated with high depersonalization, and high emotional exhaustion. Support was also found for the additive active learning hypotheses: jobs combining high demands and high control produced the highest levels of personal accomplishment. The study supports job redesign interventions for improving worker well-being and productivity.

International research efforts continue in an attempt to reduce the human and economic costs of work stress. Job demand–control (DC) theory argues that the origins of work stress are situated primarily in the structural or organizational aspects of the work environment rather than in personal attributes or demographics (Karasek, 1979). The expanded three dimensional demand–control–support (DCS)
model predicts that workers with jobs combining high demands, low control, and low support from supervisors or co-workers are at the highest risk for psychological or physical disorders (iso-strain hypothesis) (Johnson & Hall, 1988).

There has been some contention in the literature that the strain hypothesis is supported only when interaction effects are shown between the work dimensions. Empirical tests of the DC model have shown that large-scale multi-occupational studies have tended to provide support for interaction effects between demand and control predicting strain (de Jonge & Kompier, 1997; Schnall, Landsbergis, & Baker, 1994). Smaller scale studies of the DC model in single-occupational samples have found primarily main effects of demands and control (e.g. Hurrell & McLaney, 1989; Perrewe & Anthony, 1990; Spector, 1987). Epidemiological studies provide the most support for the core assumptions of the DCS model (Amick et al., 1998; Theorell et al., 1998). However multiplicative interaction terms (i.e. demands × control × support) were not assessed in these studies and de Jonge and Kompier (1997) have observed that the interaction hypothesis is not often supported in epidemiological studies.

Recent reviews of the DCS model (de Jonge & Kompier, 1997; Kristensen, 1995) have argued that the framework is appropriate for further empirical investigation. Specifically the active-passive dimension of the model according to Theorell and Karasek (1996), has been under-utilized in research: ‘certainly patterns of active coping behavior could affect the progression of disease development’ (p. 10). Few studies have examined the active learning hypothesis (cf. de Jonge & Kompier, 1997), that jobs combining high demands and high control would lead workers to experience feelings of competence and productivity, and accomplishment. Most have found empirical support (e.g. Dollard & Winefield, 1998; Karasek, 1981; Landsbergis, Schnall, Deitz, Friedman, & Pickering, 1992) with the exception of Meijman, Ulenbelt, Lumens, and Herber (1996).

The aim of the present study was to test the two main hypotheses (as above) using structural equation modelling to predict differences in self-reported levels of strain and productivity within a relatively large sample with well-defined occupational groups. It was reasoned that such a sample would provide more variability on each of the work dimensions and increase the likelihood of uncovering multiplicative interactions shown previously (cf. Kristensen, 1995, 1996).

Method

Participants

Participants were employees (N = 1229) of a public sector welfare agency: social workers (N = 244), psychologists (N = 7), youth workers (N = 140), community support workers (N = 71), financial counsellors (N = 42), administrative staff (N = 156), project staff (N = 54), and managers (N = 46).

Measures/materials

Demographics assessed were: age, sex, living with partner, education level (from primary school to postgraduate quantifications), and shift work.
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Negative affectivity. A 10-item version of the State-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) was used to measure negative affectivity (as recommended by Watson & Clark, 1984), as a potential confounder of the stressor-strain relationship.

Work environment. The measures used were 9-item subscales of the Work Environment Scale (WES) (Moos, 1986).

Demands. The work pressure subscale measured the degree to which the pressure of work and time urgency dominate the work environment, e.g. 'it is very hard to keep up with your workload'.

Control. The autonomy subscale measured the extent to which employees are encouraged to be self-sufficient and to make their own decisions.

Support. The peer cohesion subscale, which measures the extent to which employees are friendly and supportive of one another, e.g. 'staff often talk to each other about their personal problems' was combined with the supervisor support subscale, which assesses the extent to which management is supportive and encourages employees to be supportive of each other, e.g. 'staff discuss their personal problems with supervisors'.

Strain. The emotional exhaustion subscale (9 items) of the Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1986) measured the depletion of emotional resources and the feeling that one has nothing left to give psychologically (Poulin & Walter, 1993).

Depersonalization. An MBI subscale (5 items) measured 'negative cynical attitudes and feelings about one's client'.

Job satisfaction. This was assessed on a 7-point scale from 1 = extremely dissatisfied to 7 = extremely satisfied, 'taking everything into consideration how do you feel about your job as a whole?' (Warr, Cook, & Wall, 1979). It has been recently argued that a global index of job satisfaction (single-item measure) is a valid measure of general job satisfaction (Wanous, Reichers, & Hudy, 1997). Low scores equate with high strain.

Productivity. A personal accomplishment subscale of the MBI (8 items) was used to reflect an improvement in feelings of competence and productivity at work (Maslach, 1998), e.g. 'I have accomplished many worthwhile things in this job.'

Procedure

All agency workers were sent a letter, a questionnaire, a self-addressed stamped receipt card, and a self-addressed stamped envelope. Those people who did not return a receipt card were sent a second questionnaire through a work mailing system.

Results

Response rate and representativeness of the sample

The number of usable questionnaires returned was 813, representing a response rate of 66.15%. Respondents did not differ from non-respondents in sex $\chi^2(1) = .87$, n.s. (males = 265, females = 536). There was good representation of responses by all work classifications. The greatest contribution to the sample was from social workers (30.5%) followed by administrative/clerical workers (19.5%) then youth workers (17.5%). Most workers were living with a partner (67%). The typical age range was between 35 and 54 years (69.5%). The mean length of service was 9 years. Most were permanent status (87%), full-time workers (82%), and 18%...
were shift workers. Fifty-four per cent held degree/diploma or postgraduate qualifications, and 32% held high school qualifications.

Preliminary analysis of correlates of strain

The relationship between demographics, negative affectivity work environment, and measures of strain and productivity were assessed initially using simple correlations (see Table 1). Results showed that negative affectivity and work environment dimensions accounted for most of the correlations with strain. Furthermore, Table 1 showed that the four outcome measures were significantly related as well. This justified the use of multivariate regression techniques such as structural equation modelling (cf. Barnett & Brennan, 1995).

Multivariate tests

Structural equation modelling with covariance matrices was performed using LISREL 8 (Jöreskog & Söbom, 1993). A few authors suggest that the (non)existence of interactive effects might be caused by the existence of curvilinear effects for one of the job characteristics (e.g. Lubinski & Humphreys, 1990; Warr, 1990). Therefore, several structural models were fitted to the data. First, a model M1 with only main effects (including NA) was specified, followed by a model M2 adding quadratic effects. Secondly, a model M3 was specified adding interactive effects to model M2. Finally, we checked the contribution of NA by deleting it from the best fitting model. Different structural models can be compared by a chi-square difference test (cf. Bentler & Bonett, 1980). Before conducting the LISREL analyses, job characteristics were mean-centred in order to prevent multicollinearity, and the quadratic terms as well as interaction terms of the job characteristics were computed from these centred variables (cf. Aiken & West, 1991).

The results of the models that address all kinds of effects are presented in Table 2. Consider first the models with (M2) and without quadratic effects (M1). The hypothesis test showed that the difference between the two chi-squares was significant ($\chi^2(12) = 33.31, p<.05$), which means that $H_0$ was rejected. The quadratic model (M2) had a better statistical fit (in terms of chi-square) than a purely additive model (M1). Consider next the models with (M3) and without (M2) interactive effects. The corresponding chi-square difference test showed that the difference between the two chi-squares was not significant ($\chi^2(16) = 24.38, p<.05$), which means that $H_0$ was maintained. Accordingly, the interactive model (M3) did not fit better than a quadratic model (M2). Also interesting is that the inferiority of the interactive model was not influenced by the curvilinear terms (i.e. comparison of M1 and M3 showed favourable results for M3). Finally, the best fitting model (i.e. M2) was compared with a model without NA (M4), resulting in a significant difference test ($\chi^2(7) = 184.04, p<.05$). In other words, the best fitting model remained model M2 (including controlling for NA).

Model M2 showed relatively good fit indices as well (i.e. AGFI = .94, RMSEA = .02, CFI = .99 and NNFI = .98). The estimated standardized structural coefficients of this model showed the following significant associations:
<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>N</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
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<tbody>
<tr>
<td>1. Age</td>
<td></td>
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<td></td>
<td>-.06</td>
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<tr>
<td>2. Sex</td>
<td></td>
<td>-.04</td>
<td>-.25**</td>
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<tr>
<td>3. Shift work</td>
<td>16.49</td>
<td>4.54</td>
<td>769</td>
<td>-.15**</td>
<td>.11**</td>
<td>-.11**</td>
<td>.84</td>
<td></td>
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<td>4. Trait anxiety</td>
<td>6.26</td>
<td>2.55</td>
<td>714</td>
<td>.03</td>
<td>.10**</td>
<td>-.32**</td>
<td>.10**</td>
<td>.82</td>
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<tr>
<td>5. Demands</td>
<td>5.71</td>
<td>2.20</td>
<td>717</td>
<td>-.06</td>
<td>-.04</td>
<td>.05</td>
<td>-.14**</td>
<td>-.13**</td>
<td>.66</td>
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<tr>
<td>6. Control</td>
<td>10.23</td>
<td>4.28</td>
<td>631</td>
<td>-.09*</td>
<td>.06</td>
<td>.00</td>
<td>-.21**</td>
<td>-.22**</td>
<td>.60**</td>
<td>.83</td>
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<td>7. Support</td>
<td>20.10</td>
<td>11.04</td>
<td>754</td>
<td>-.12**</td>
<td>.02</td>
<td>-.11**</td>
<td>.41**</td>
<td>.39**</td>
<td>-.27**</td>
<td>-.41**</td>
<td>.89</td>
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<td>8. Emotional exhaustion</td>
<td>6.72</td>
<td>5.70</td>
<td>746</td>
<td>-.18**</td>
<td>-.11**</td>
<td>.11**</td>
<td>.31**</td>
<td>.08**</td>
<td>-.13**</td>
<td>-.26**</td>
<td>.50**</td>
<td>.77</td>
<td></td>
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<tr>
<td>9. Depersonalization</td>
<td>4.84</td>
<td>1.37</td>
<td>786</td>
<td>-.00</td>
<td>.05</td>
<td>.02</td>
<td>.26**</td>
<td>-.18**</td>
<td>.49**</td>
<td>.52**</td>
<td>-.52**</td>
<td>-.28**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Job satisfaction</td>
<td>34.09</td>
<td>8.08</td>
<td>728</td>
<td>-.09*</td>
<td>-.06</td>
<td>.09*</td>
<td>-.40**</td>
<td>.04</td>
<td>.21**</td>
<td>.16**</td>
<td>-.13**</td>
<td>-.16**</td>
<td>.16**</td>
<td>.79</td>
</tr>
</tbody>
</table>

*p<.05; **p<.01.

N ranges from 760 to 819 due to missing data. Age, ordinal data higher score=higher age. Gender was coded 0=male, 1=female.

Note. Shift work was coded 0=no shift work, 1=shift work.
Table 2. Goodness-of-fit indices of structural models of the outcome variables

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$ (d.f.)</th>
<th>AGFI</th>
<th>RMSEA</th>
<th>CFI</th>
<th>NNFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additive model ($M_1$)</td>
<td>180.20*** (124)</td>
<td>.93</td>
<td>.03</td>
<td>.99</td>
<td>.98</td>
</tr>
<tr>
<td>Quadratic model ($M_2$)</td>
<td>146.89* (112)</td>
<td>.93</td>
<td>.03</td>
<td>.99</td>
<td>.98</td>
</tr>
<tr>
<td>Interactive model ($M_3$)</td>
<td>122.51* (96)</td>
<td>.94</td>
<td>.02</td>
<td>1.00</td>
<td>.99</td>
</tr>
<tr>
<td>Best model—NA ($M_4$)</td>
<td>330.93*** (119)</td>
<td>.88</td>
<td>.05</td>
<td>.97</td>
<td>.91</td>
</tr>
</tbody>
</table>

*p<.05; **p<.01; ***p<.001.

Note. N=160.

(1) Job demands were positively related to emotional exhaustion (.37), depersonalization (.11) and personal accomplishment (.10), and negatively associated with job satisfaction (−.10).

(2) Job control was positively related to personal accomplishment (.18) as well as job satisfaction (.28).

(3) Social support was negatively associated with emotional exhaustion (−.22) and depersonalization (−.22), and positively related to job satisfaction (.24).

Next to these additive associations, there were two significant quadratic effects (demands vs. exhaustion (.16), and support vs. satisfaction (−.08)). Finally, the magnitudes of the squared multiple correlations ($R^2$) of the outcome variables were .07 for job satisfaction, .16 for depersonalization, .18 for emotional exhaustion, and .20 for personal accomplishment.

Discussion

Despite the fact that we used a relatively large sample with well-defined occupational groups, results supported an additive rather than interactive model after controlling for confounding variables. Specifically the study found support for an additive model for both the iso-strain and the active learning hypotheses. The results of the study are improvements on previous studies as, (1) the use of structural equation modelling allowed simultaneous consideration of a number of dependent measures, (2) curvilinear effects were controlled, and (3) the active learning hypothesis was examined.

Job strain hypothesis

Confirmation of an additive iso-strain hypothesis and the expanded three dimension model accords with Amick et al’s (1998, p. 54) conclusion that ‘incorporating social conditions at work into the measurement of psychosocial work-environment exposure improves the identification of high-risk work arrangements’. It is also consistent with many other studies of human service workers of social workers (Jones, Fletcher, & Ibbetson, 1991; Melamed, Kushnir, & Meir, 1991), and of correctional officers (Dollard & Winefield, 1995)) which found that support at work
was a very important dimension of the psychosocial work environment associated with strain. Similarly, a longitudinal study of burnout in social workers, showed that increases in supervisor support over a 12-month period were associated with decreases in burnout (Poulin & Walter, 1993).

Active learning hypothesis

Support was also found for an additive active learning hypothesis, that jobs combining high demands and high control would provide the most sense of competence and productivity. Workers reporting these kinds of work conditions reported the highest levels of personal accomplishment. This result shows that high demands are not necessarily harmful if they are accompanied by congruent levels of control. Self-efficacy arising from these conditions may offset mental strain such as depression, and an inability to cope with the demands of the job (Maslach, 1998). This dynamism and reciprocity between the job-strain dimension and the active-passive dimension (see Karasek & Theorell, 1990; Karasek, 1998) is extremely important where jobs are challenging and require new learning and an active response. If workers are consistently in a situation of chronic heavy workload with a lack of either support or control, strain and ill-health, not to mention a lack of productivity can result.

Methodological issues and future research

The concept of negative affectivity (NA) as a confounder of the association between (perceived) job characteristics and job-related strain has been widely investigated (for an overview, see Brief, Burke, George, Robinson, & Webster (1988) and Spector, Zapf, Chen, & Frese, in press). Whether or not NA should be controlled in work stress relationships is contentious (Dollard & Winefield, 1998). Controlling for NA reduced the size of the job-strain relationships as expected.

Further, there was some evidence of curvilinear relationships between job characteristics and levels of strain, as predicted by the vitamin model (Warr, 1994), and this aspect requires further research.

There are obvious limitations to the cross-sectional self-report method used (e.g. it provides no information on the work stress process, and associations could be influenced by common method effects). As far as perceptions of the work environment are concerned, however, studies have shown a high correlation between expert ratings of job conditions and subjective assessments (Karasek, Baker, Marxer, Ahlbom, & Theorell, 1981; Spector, 1992). Future research could use: more objective measures of stressors (such as actual case loads); more objective measures of strain (e.g. measures of neuroendocrine stress reactions or registered sickness absence); more specific measures of timing and method control, when used shown to provide support for the interactive DC model (see Wall, Jackson, Mularkey, & Parker, 1996); other job dimensions such as job insecurity, socio-economic status (e.g. Lynch, Krause, Kaplan, Tuomilehto, & Salonen, 1997; Siegrist, 1996), and emotional demands (see de Jonge, Mulder, & Nijhuis, 1999; Söderfeldt, Muntaner, O'Campo, Warg, & Ohlson, 1996).
Conclusion and implications

The major implication from this study is that a reduction in levels of strain and an increase in productivity could be achieved with job redesign not necessarily by decreasing work demands, but by increasing the levels of control and support.

Given the projected increase in demands for human service industries coupled with the current political context of government cutbacks in resources to human service work, workers in the industry could be at high risk for the development of health problems, psychosocial in origin, without concomitant increases in control and support (Cahill, 1996; Schaufeli, Maslach, & Marek, 1993). This study has shown that a 'parsimonious set of theoretically meaningful dimensions' (Muntaner & O'Campo, 1993) accounts for significant variance in strain and personal accomplishment, and further pinpoints sites for intervention. Despite a lack of support for the statistical multiplicative interaction DCS model in practice the implications for intervention are nearly the same (cf. Karasek, 1989).

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References


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