Job stress in the nursing profession

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Chapter 3

Job Stress in the Nursing Profession: The influence of Organizational and Environmental Conditions and Job Characteristics

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Abstract

The aim of the present study was to examine the influence of organizational and environmental work conditions on the job characteristics of nurses and on their health and well-being. The sample consisted of 807 registered nurses working in an academic hospital. The direct influence of work conditions on outcomes was examined. Mediation of job characteristics in the relationships between work conditions and outcomes was tested by means of regression analyses. The results indicated that job characteristics, such as demands and control, mediated the relationship between work conditions, such as work agreements and rewards, and outcomes. By managing organizational and environmental conditions of work, job characteristics can be altered, and these in their turn influence nurses' job satisfaction and distress.

3.1 Introduction

3.1.1 Background

Stress in the nursing profession is an ongoing worldwide problem. Of all health care professionals, nurses have been found to have especially high levels of stress (Butterworth, Carson, Jeacock, White, & Clements, 1999; Bourbonnais, Comeau, Vézina, Guylaine, 1998). A study among a large sample of Swedish nurses revealed that more than 80% of the nurses reported high or very high job strain (Petterson, Arnetz, Arnetz, & Hörte, 1995). Job stress in the nursing profession has been associated with decreased job satisfaction (Blegen, 1993), increased psychological and physical complaints (Hillhouse & Adler, 1997; Marshall & Barnett, 1993) and absenteeism (Borda & Norman, 1997).

Studies examining job stress can be divided into two groups: those that examine characteristics that are intrinsic to the job, such as job demands and control, and those that examine the organizational and environmental conditions of work, such as work procedures or materials and instruments. The number of studies examining the influence of job characteristics far exceeds the number of studies examining the influence of organizational and environmental conditions of work. Stress research among nurses revealed that job characteristics are predictive of job satisfaction, as well as of psychological and physical distress, and even burnout (for literature reviews, see Blegen, 1993; Irvine & Evans, 1995; Mc Vicar, 2003). The organizational and environmental conditions of work refer to the way in which the work is managed and structured (Cooper & Cartwright, 1994; Hagberg et al., 1995), and the physical work environment. Work conditions that have been associated with stress outcomes are inappropriate levels of formalization of work procedures (too much or too little formalization of work procedures), lack of adequate communication within the organization, and organizational politics (Cooper, Dewe, & O'Driscoll, 2001). Research among nurses on this topic however, is scarce. The present study examines the way in which organizational and environmental conditions and job characteristics relate to the health and well being of nurses.

3.1.2 Theoretical Foundation

The Job Demand Control Support model (Karasek, 1979; Johnson, 1989) is often used when job characteristics are studied. This model considers three job characteristics (namely job Demand, Control and Social Support) as predictors

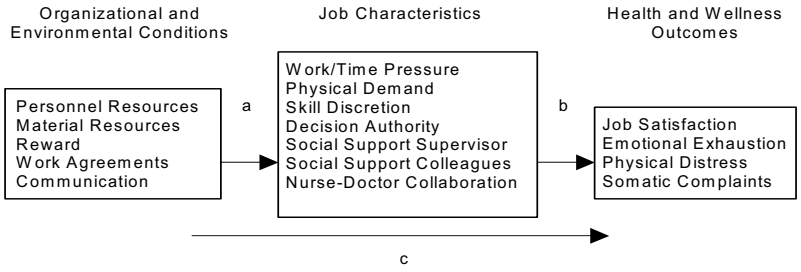
of job stress. Demand refers to time pressure, work pace and physical work load, control refers to the degree of decision authority, as well as to the degree of task variety and skill discretion, and support refers to the amount of social support received from supervisor or colleagues. The present study uses the dimensions of the JDCS to examine the influence of job characteristics.

The Tripod Accident Causation model (Wagenaar, Groeneweg, Hudson, & Reason, 1994) is used to examine the influence of organizational and environmental conditions of work. This model has its origins in studies to the determinants of human error. The model describes the way in which certain factors in the organization of work influence human error. Field studies indicate that health, just like safety can be managed by managing the organization of work (Groeneweg, 1998; Akerboom & Maes, 2004). For example, in a study among nurses, associations between stress outcomes on the one hand and bad communication (information flow), and material resources on the other hand were found (Akerboom & Maes, 2004).

3.1.3 Research Questions and Hypotheses

This study investigates three research questions. Firstly, the influence of seven job characteristics (work and time pressure, physical demand, skill discretion, decision authority, social support from supervisor, social support from colleagues, and nurse-doctor collaboration) on four stress outcomes (job satisfaction, emotional exhaustion, psychological distress, and somatic complaints) is examined. Based on conclusions of different meta-analytic studies on determinants of workplace stress in nursing (Mc Vicar, 2003; Irvine & Evans, 1995; Blegen, 1993), we expect that work and time pressure, physical demand, a lack of decision authority, lack of social support from supervisor or colleagues and a bad nurse-doctor collaboration are particularly predictive of distress (emotional exhaustion, psychological distress and somatic complaints), and that skill discretion, decision authority, social support from supervisor and colleagues and a good nurse-doctor collaboration are predictive of job satisfaction. Next, the influence of five work conditions (personnel resources, material resources, reward, work agreements, and communication) on the stress outcomes is studied. We expect that favourable conditions with regard to personnel resources, material resources, reward, work agreements, and communication will be associated with higher job satisfaction and lower distress. Finally, the nature of the relationship between the organizational and environmental conditions of work and job characteristics in predicting health and wellness outcomes is studied. We

hypothesize that the organizational and environmental conditions influence job characteristics, and that job characteristics influence the outcomes. In other words, we expect that job characteristics mediate the relationship between the organizational and environmental conditions and the outcomes. The research framework used in this study is presented in figure 1. Organizational and environmental conditions and job characteristics are measured with a questionnaire that is made specific for the nursing profession. In homogeneous samples, occupation-specific instruments are favourable over general measures, because more variance in the outcome variable is explained (Van der Doef & Maes, 2002).



3.2 Methods

3.2.1 Participants

All 1425 registered nurses (nursing managers not included) working in a large academic hospital in the Netherlands received a questionnaire and an accompanying letter in which they were invited to participate in the study. A total of 884 questionnaires were returned (a response rate of 62%) of which 807 questionnaires were complete and usable for this study. Of this population, the majority was female (85%). The mean age was 39.1 years (SD=9.0). Of the nurses, 55% had job tenures of more than 10 years and 65% had held their present position for at least 5 years. Seventy percent of the nurses worked part time (less than 36 hours per week; mean work hours per week of part time employees: 26.5, SD=6.6). Respondents were compared to non-respondents with respect to age and gender. Respondents differed from non-respondents in their age: respondents were in general older than non-respondents ($t(1423)=2{,}92$; $p<.01$) (mean

age non-respondents:37.6). Respondents did not differ from non-respondents with respect to gender.

3.2.2 Measures

Quality of work: Job Characteristics and Work Conditions

The Leiden Quality of Work Life Questionnaire for nurses (LQWLQn) was designed to measure the theoretical constructs of the independent variables of the research framework. Several existing questionnaires were used in this process. The scales that measure job characteristics were based on the Leiden Quality of Work Questionnaire (LQWQ; Van der Doef & Maes, 1999). This questionnaire measures among others the constructs of the JDCS model and has proven to be a reliable and valid instrument (Van der Doef & Maes, 1999). The scales measuring the organizational and environmental conditions were based on the Organizational Risk Factor Questionnaire (ORFQ; Akerboom, 1999). This questionnaire measures several constructs derived from the Tripod model. The reliability and validity of this instrument are satisfactory (Akerboom & Maes, 2004). To ensure relevance and content validity of the items of the LQWLQn, group meetings were organized with registered nurses in which items were made specific for the nursing job. The factor structure of the LQWLQn was determined by factor analyses and reliability analyses. The final instrument consisted of 12 scales measuring quality of work life, and one scale measuring the outcome job satisfaction. Responses were measured by means of a 4-point rating scale (totally disagree / totally agree). The scales measuring quality of work life are defined below.

Job Characteristics
Work and Time Demands: work pressure and time pressure (I must care for too many patients at once). Physical Demands: physical burden of work (At work I must sit in the same position for long periods of time). Skill Discretion: task variety and the extent to which the job challenges one's skills (My job gives me opportunities for self-development). Decision Authority: freedom of decision-making over one's work (I can decide for myself when I engage in patient-related versus non-patient-related tasks). Social Support Supervisor: support provided by the supervisor (I feel appreciated by my supervisor). Social Support Colleagues: instrumental and emotional support provided by colleagues (The nurses in my department work well together). Nurse-Doctor Collaboration:

interaction with doctors (In my department, the nurses and doctors work well together).

Work Conditions
Personnel Resources: amount and quality of personnel on a particular ward (In my department, there are enough nurses to provide good care). Material Resources: availability, amount and quality of materials and instruments on a particular ward (Materials and instruments are not always available when necessary). Rewards: rewards in terms of bonuses or appreciation (In this organization, there are sufficient funds and / or facilities for nurses). Work Agreements: quality and feasibility of procedures (In my department, regulations and procedures are often insufficiently defined). Communication: communication between departments, information provision (In this organization, there is effective interdepartmental communication about patients).

Outcome Measures

Job Satisfaction
Job satisfaction was assessed with the LQWLQn Job Satisfaction scale (six items; e.g. "If I had to choose now, I would take this job again", "I am satisfied with my job"). Responses were given on a 4-point rating scale (totally disagree / totally agree) with higher scores indicating more job satisfaction.

Emotional Exhaustion
Emotional exhaustion appears to be the major aspect of occupational burnout among human service professionals, including nurses (Buunk, Schaufeli & Ybema, 1994). The validated Dutch version of the Maslach Burnout Inventory (MBI-NL, Schaufeli & van Dierendonck, 2000) was used to assess emotional exhaustion. The scale consists of nine items; (e.g. "At the end of a work day, I feel empty"). Items were scored on a 7-point rating scale, ranging from "never" to "every day / always".

Psychological Distress and Somatic Complaints
Psychological distress and somatic complaints were assessed by means of three subscales of a validated Dutch version of the SCL-90, a 90-item inventory developed by Derogatis (1983). The Dutch version of the SCL-90 has been found to have adequate internal consistency, reliability and validity (Arrindel & Ettema, 1986). Two subscales were used to measure psychological distress: anxiety (10 items, e.g. "feeling afraid") and depression (16 items, e.g. "feeling lethargic"). A mean score of the two scales was calculated, because of the high correlation

between the two scales (r=.77). Somatic complaints was measured using a subscale of the SCL-90 (12 items, e.g. "pain in chest and heart region"). Items were scored on a 5-point rating scale ranging from "not at all" to "very much".

3.2.3 Procedure

Data were gathered in the context of a hospital quality of work screening. The employees were informed about the purpose and content of the research by the hospital management. The questionnaires were sent to the home address of the nurses. The questionnaire consisted of 15 pages. It took the participants approximately 45 minutes to fill in the entire questionnaire. Participation in the study was on a voluntary basis. To guarantee confidentiality, an identification code was used on the questionnaires. Only the researchers had access to the key. An answering envelope could be used to return the questionnaire without costs.

3.2.4 Analyses

To check multicollinearity between the independent variables, correlation analysis was performed. Reliability analyses were performed to examine the internal consistency of the scales of the LQWLQn. To answer the first research question, regression analyses with the job characteristics predicting the outcomes were performed. The second research question was answered with regression analyses of organizational and environmental conditions on the outcome measures. Mediation of job characteristics in the relationship between organizational and environmental conditions and outcome measures was tested c.f. Baron and Kenny (1986). Mediation is a hypothesized causal chain in which one variable affects a second variable that, in turn, affects a third variable (see fig. 1). By means of regression analyses, the associations between organizational and environmental conditions and job characteristics were examined (path a). To support mediation, the effect of the initial variable on the outcome, controlling for the mediator should be 0 (or nonsignificantly different from 0). In the case of partial mediation, path b is significant after controlling for the direct effect of the initial variable, but path c is still significant after controlling for the mediating variable. This was tested with regression analysis of the organizational and environmental conditions on the outcomes, controlling for job characteristics.

As the outcomes were skewed, they were transformed. Job satisfaction was moderately negatively skewed, and therefore the square root of the reflected variable was computed. Emotional exhaustion was moderately positively skewed, and therefore the square root was computed. Psychological distress and Somatic complaints were severely positively skewed, and therefore the inverse was computed. The transformations of job satisfaction, psychological distress and somatic complaints resulted in reversed directions of the beta's. For the purpose of clarity, the direction of the beta's in the tables is presented conform the direction of the outcome. For example: a higher value on the outcome job satisfaction means "more job satisfaction", and a higher value on the outcome somatic complaints means "more somatic complaints".

3.3 Results

3.3.1 Correlation Analysis and Reliability Analysis

The correlations of the subscales of the LQWLQn were all lower than .60, indicating there is no multicollinearity between the independent variables (table 1). Cronbach's alpha's of the scales of the independent variables were all above .70, which indicated satisfactory reliability (table 1).

3.3.2 Regression Analyses

To answer the first research question, the outcome measures were regressed on job characteristics (table 2, step 2). These results showed that job characteristics explain significant amounts of variance in the outcomes, ranging from 13% in somatic complaints to 38% in job satisfaction. Low physical demand, skill discretion, decision authority and social support from supervisor predicted job satisfaction, work and time pressure and physical demand predicted emotional exhaustion, psychological distress and somatic complaints. Skill discretion was also associated with emotional exhaustion. To answer the second research question, the outcome measures were regressed on the organizational and environmental conditions (table 3). The results showed that the organizational and environmental conditions explain significant amounts of variance in all outcome measures: 4% in somatic complaints, 5% in psychological distress, 11% in emotional exhaustion and 26% in job satisfaction. Good communication, rewards, clear work agreements and sufficient personnel resources were associated with

Table 1 Descriptive Statistics and Correlation Coefficients for Study Variables

Variables	M	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Personnel Resources	2.44	.54	.75	-															
2. Material Resources	2.53	.48	.75	.27**	-														
3. Reward	1.91	.47	.78	.38**	.20**	-													
4. Work Agreements	2.81	.35	.79	.32**	.34**	.26**	-												
5. Communication	2.42	.37	.70	.28**	.30**	.38**	.37**	-											
6. Work/Time Pressure	2.51	.47	.78	-.61**	-.29**	-.35**	-.33**	-.25**	-										
7. Physical Demand	2.66	.48	.74	-.17**	-.27**	-.29**	-.28**	-.23**	.23**	-									
8. Skill Discretion	2.77	.38	.76	.20**	.19**	.23**	.33**	.29**	-.28**	-.16**	-								
9. Decision Authority	2.66	.35	.70	.26**	.18**	.22**	.32**	.25**	-.29**	-.31**	.36**	-							
10. Support Supervisor	2.78	.51	.91	.23**	.18**	.18**	.48**	.22**	-.24**	-.23**	.35**	.34**	-						
11. Support Colleagues	2.99	.39	.84	.12**	.01	.07	.35**	.18**	-.10*	-.15**	.21**	.26**	.34**	-					
12. Nurse/Doctor Coll	2.50	.48	.77	.34**	.21**	.33**	.36**	.39**	-.23**	-.32**	.18**	.23**	.25**	.16**	-				
13. Job Satisfaction	2.60	.44	.84	.32**	.20**	.42**	.34**	.41**	-.34**	-.32**	.49**	.43**	.38**	.27**	.32**	-			
14. Em Exhaustion	12.02	7.91	.88	-.23**	-.17**	-.24**	-.23**	-.15**	.41**	.26**	-.29**	-.28**	-.27**	-.18**	-.13**	-.39**	-		
15. Psych. Distress	16.48	4.71	.93	-.11*	-.15**	-.09*	-.21**	-.12**	.25**	.22**	-.21**	-.23**	-.23**	-.19**	-.08	-.24**	.59**	-	
16. Som Complaints	16.16	4.23	.75	-.12**	-.17**	-.08	-.15**	-.11**	.25**	.25**	-.18**	-.19**	-.16**	-.15**	-.10*	-.17**	.48**	.59**	-

* *p =< .01*
** *p =< .001*

Table 2 Summary of Hierarchical Regression Analysis: Job Characteristics and Organizational and Environmental Conditions as Predictors of Outcomes

	Job Satisfaction		Emotional Exhaustion		Psychological Distress		Somatic Complaints	
IV	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Gender	.02*	.12*	.01	.02	.00	.04	.01	.08
Age		.06		-.10		-.02		.02
Work/Time Pressure	.38**	-.11	.25**	.31**	.14**	.16**	.13**	.18**
Physical Demand		-.12**		.13**		.14*		.21**
Skill Discretion		.30**		-.12**		-.09		-.09
Decision Authority		.17**		-.09		-.08		-.04
Support Supervisor		.12**		-.09		-.09		-.03
Support Colleagues		.07		-.07		-.10		-.06
Nurse/Doctor Collaboration		.11		.04		.05		.05
Personnel Resources	.04**	.04	.00	.04	.01	.07	.01	.04
Material Resources		.02		-.01		-.04		-.09
Reward		.17**		-.06		.03		.04
Work Agreements		-.05		.01		-.03		.03
Communication		.12**		.05		.03		.05
Full model	AdjustedR²= .44 F(14,682) =38.74**		AdjustedR²= .25 F(14,691) =18.21**		AdjustedR²= .14 F(14,687) =8.43**		AdjustedR²= .13 F(14,689) =8.84**	

* *p =< .01*
** *p =< .001*

higher job satisfaction. Low personnel resources, poor work agreements and low reward were predictive for emotional exhaustion. Nurses experiencing poor work agreements also reported psychological distress, and finally, somatic complaints were associated with poor material resources. Mediation was tested with two additional regression analyses: first, the organizational and environmental conditions were regressed on the job characteristics (table 4). These analyses showed that organizational and environmental conditions explain significant amounts of variance in job characteristics, ranging from 14% in social support colleagues to 41% in workload. Poor personnel and material resources, low rewards and poor work agreements were associated with work and time pressure. Poor work agreements, low reward and poor material resources were associated with physical demand. Nurses who reported good work agreements and good communication also experienced skill discretion. Good work agreements and sufficient personnel resources were associated with the experienced decision authority. Good work agreements were associated with social support from a supervisor and social support from colleagues. Moreover, good communication was associated with social support from colleagues, but was negatively related to material resources. Finally, the nurses who reported good communication, good work agreements, sufficient personnel resources and rewards also experienced good nurse-doctor collaboration. In the second series of regression

Table 3 Summary of Hierarchical Regression Analysis: Organizational and Environmental Conditions as Predictors of Outcomes

	Job Satisfaction		Emotional Exhaustion		Psychological Distress		Somatic Complaints	
IV	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Gender	.02*	.12*	.01	.02	.00	.03	.01	.08
Age		.04		-.10*		-.02		.03
Personnel Resources	.26**	.13**	.10**	-.15**	.05**	-.05	.05**	-.07
Material Resources		.01		-.06		-.08		-.14**
Reward		.23**		-.14**		-.02		-.02
Work Agreements		.14**		-.14**		-.16**		-.08
Communication		.20**		.03		-.01		.01
Full model	AdjustedR²= .27 F(7,715) = 38.89**		AdjustedR²= .11 F(7,732) = 13.73**		AdjustedR²= .05 F(7,727) = 5.97**		AdjustedR²= .05 F(7,729) = 5.61**	

* *p =< .01*
** *p =< .001*

analyses, outcome measures were regressed on both job characteristics and organizational and environmental conditions in hierarchical regression analyses to test full mediation (table 2). In the first step, job characteristics were entered to control for their influence. In the second step, organizational and environmental conditions were added. The effect of organizational and environmental conditions on outcomes, when job characteristics are controlled for, should be 0 to support full mediation (table 2, step 3). As predicted, the proportion explained variance of the outcome measures by organizational and environmental conditions diminishes when job characteristics are controlled for. In three of the four outcome variables, the amount of explained variance by work conditions even is not significant anymore ($p<.01$). Only in the prediction of job satisfaction, the conditions reward and communication explain a significant, although very reduced amount of variance. We also tested mediation of organizational and environmental conditions on the relationship between job characteristics and outcomes by repeating the former regression analysis but changing the order of entrance in the analysis. Job characteristics still predicted significant amounts of variance, ranging from 18% of job satisfaction to 10% in somatic complaints. Moreover, significant regression weights of the job characteristics remained significant after correction for organizational and environmental conditions. The results indicate full mediation of job characteristics in the relationship between personnel resources and work agreements on the one hand and job satisfaction on the other hand, and partial mediation of job characteristics in the relationship between reward and communication on the one hand and job satisfaction on the other hand. The results also support the hypothesized full mediation of job characteristics in the relationship between organizational and environmen-

Table 4 Summary of Hierarchical Regression Analysis: Work Conditions as Predictors of Job Characteristics

	Work/Time pressure		Physical Demand		Skill Discretion		Decision Authority	
IV	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Gender	.00	.01	.04**	-.10*	.00	.02	.00	-.02
Age		-.02		-.18**		-.06		-.00
Personnel Resources	.41**	-.51**	.15**	.00	.15**	.06	.15**	.14**
Material Resources		-.12**		-.13**		.04		.03
Reward		-.11**		-.17**		.09		.08
Work Agreements		-.11**		-.17**		.22**		.21**
Communication		.03		-.08		.13**		.09
Full model	Adjusted R^2 =.41 F(7,727) = 73.22**		Adjusted R^2 =.18 F(7,738) = 24.01**		Adjusted R^2 =.14 F(7,733) = 18.65**		Adjusted R^2= 14 F(7,735) = 18.15**	

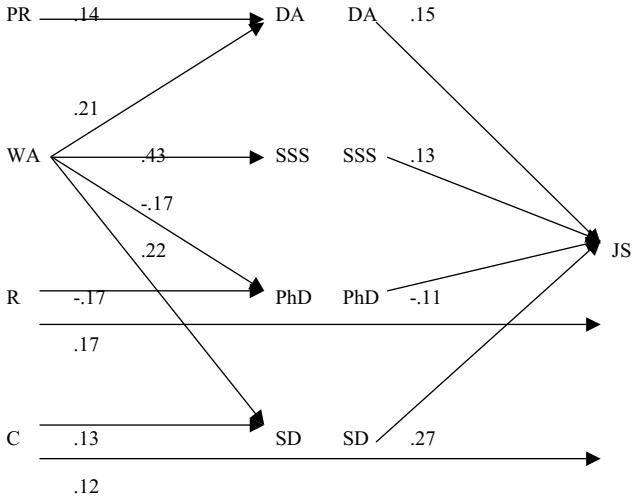
Table 4 Continued

	Social Support Supervisor		Social Support Colleagues		Nurse/Doctor Collaboration	
IV	ΔR^2	β	ΔR^2	β	ΔR^2	β
Gender	.00	.03	.02**	.07	.01	.06
Age		-.01		-.12**		-.05
Personnel Resources	.23**	.08	.14**	.02	.24**	.16**
Material Resources		.01		-.12**		.02
Reward		.02		-.05		.14**
Work Agreements		.43**		.35**		.18**
Communication		.03		.10		.21**
Full model	Adjusted R^2 =.23 F(7,727) = 31.82**		Adjusted R^2=.15 F(7,732) = 19.30**		Adjusted R^2 =.24 F(7,733) = 34.38**	

* *p =< .01*
** *p =< .001*

tal conditions on the one hand and emotional exhaustion, psychological distress and somatic complaints on the other hand. In figures 2a-2d, an overview of the above described relationships is drawn for each of the outcomes.

Figure 2a. Summary of regression analyses, showing the relationships between Organizational and Environmental Conditions, Job Characteristics and Job Satisfaction



Legend: see figure 2d

3.4 Discussion

This study confirms results from earlier studies on the determinants of job stress in the nursing profession (for reviews, see Blegen, 1993; Irvine & Evans, 1995; Mc Vicar, 2003): Characteristics of the job and work conditions are predictive of stress-related outcomes. These occupational stressors together predict important parts of the variance in the outcome measures, especially in job satisfaction (44%) and emotional exhaustion (25%).

With regard to our first research question, the results suggest that distress outcomes (emotional exhaustion, psychological distress, and somatic complaints) are most strongly influenced by job demands, such as work and time pressure,

Figure 2b. Summary of regression analyses, showing the relationships between Organizational and Environmental Conditions, Job Characteristics and Emotional Exhaustion

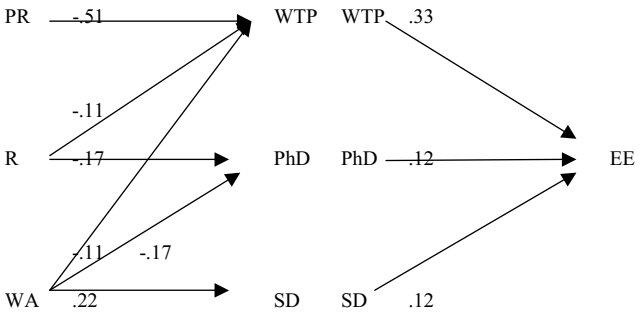


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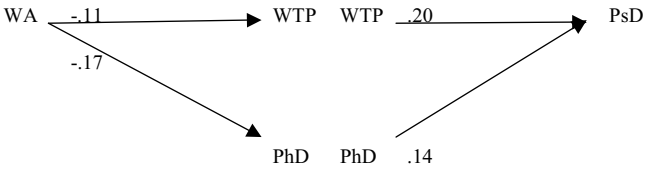
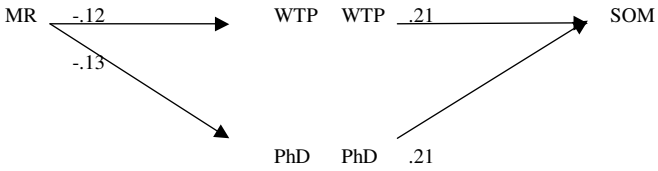
Figure 2c. Summary of regression analyses, showing the relationships between Organizational and Environmental Conditions, Job Characteristics and Psychological Distress



Legend: see figure 2d

Figure 2d. Summary of regression analyses, showing the relationships between Organizational and Environmental Conditions, Job Characteristics and Somatic Complaints



Legend:
PR= Personnel Resources, MR= Material Resources, R=Reward, WA=Work Agreements, C=Communication, WTP=Work-Time Pressure, PhD=Physical Demand, SD=Skill Discretion, DA=Decision Authority, SSS=Social Support Supervisor

and physical demands. In contrast to our expectations, social support was unrelated to distress outcomes. It is possible that a different aspect of social support than those we measured accounts for the relationships found in other studies. Our study (as most studies) did not measure specific aspects of social support separately. In a study that did make a distinction between instrumental support, appreciation and companionship, in the relation to burnout symptoms, only a relation was found with instrumental support (van Yperen & Baving, 1999). Job satisfaction was not found to be related to work and time pressure in our study. This is in line with some studies among nurses (Irvine & Evans, 1995), but in contrast to others (Tummers, Landeweerd & van Merode, 2002; Bradley & Cartwright, 2002; Jonge & Schaufeli, 1998). Differences in operationalisation of the concept of either work pressure or job satisfaction could account for these differences in findings. We found that the job control dimensions were the strongest predictors of job satisfaction. This is in line with results from other studies (de Jonge & Schaufeli, 1998; Irvine & Evans, 1995; Tonges, Rothstein, & Carter, 1998). Only weak associations were found between job satisfaction and the social support dimensions. Again, perhaps a specific kind of social support or a specific aspect of it is related to the outcome. With regard to our second research question, the results show that the organizational and environmental conditions examined in this study (communication, work agreements, personnel and material resources, and reward) explain substantial parts of the variance in the outcome measures, especially in job satisfaction (26%) and emotional exhaustion (10%). Our results suggest that nurses' job satisfaction is positively influenced by good organization of patient information, and by good communication between departments about patient information. Furthermore, a greater number of nurses on the ward, as well as a higher percentage of experienced nurses could enhance job satisfaction and lower the chance of emotional exhaustion. Our results further suggest that financial rewards, and a feeling of being valued in the organization is important, especially in the prediction of job satisfaction, which was also found in other studies (Mc Vicar, 2003; Tyson & Pongruenphant, 2004). Our results furthermore suggest that structuring the tasks and a good planning of work is beneficial for the nurses health. Finally, our results suggest that the availability and better quality of equipment, materials and instruments could lower somatic complaints, which is a sound association. One would expect for example, that back pains are reduced when nurses use good equipment to lift patients.

The results of our study partly confirm our third hypothesis. Only the direct relationships between communication and reward on the one hand and job satis-

faction on the other hand remain significant in the mediation analysis. All other relationships between the organizational and environmental conditions and the outcomes are mediated by job characteristics. For example, personnel and material resources are associated with decreased work pressure and physical demands. A decrease in demands is in its turn associated with a reduction in stress-related problems, such as emotional exhaustion or psychological or somatic complaints. Interestingly, the Tripod theory, (as outlined in the introduction of this article) describes how human error can be can be controlled through organization of work. Factors at the root of the business process influence the environment employees work in. By controlling the environment, the organization management can control the accident-proneness of the employees. Our results suggest that the environment of nurses and their occupational stress can also be controlled. The organization of work influences the health and well-being of nurses through job characteristics.

The results suggest that one organizational or environmental condition can influence more than one outcome at the same time through different mechanisms. For example, when tasks are clearly described and procedures are known to the personnel, and there is a clear planning of work, precious time could be gained on the work floor, possibly because nurses could work more effectively. Less work and time pressure, in its turn, can enhance job satisfaction and lower emotional exhaustion. At the same time, the more work agreements are properly organized, the more freedom the nurses experience in their job, and the more skill discretion (their skills are challenged more). A possible explanation for this result is that good knowledge of procedures allows nurses to feel safer to take authority in decisions themselves and to feel more secure to apply a variety of skills. More decision authority and more skill discretion can in their turn enhance job satisfaction and lower emotional exhaustion. Finally, work agreements can also positively influence the perceived social support from a supervisor. Perhaps the support of a supervisor is less needed when tasks are clearly described. Less need of social support could influence the perceived social support. Better (evaluation of) social support of supervisors is associated with more job satisfaction. Next to proper personnel and material resources and clear work agreements, rewards are also found to play an important role in the stress process. The results of this study indicate that rewards influence the way nurses appraise their workload and even their physical demands. This can be explained in terms of effort-reward imbalance. This theory states distress is caused by an imbalance of high effort (demand) and low rewards (Siegrist, 1996). Assuming that effort and reward are related in the prediction of out-

comes, rewards can compensate for the effort invested. Demerouti, Bakker, Nachreiner, and Schaufeli (2000) found that a low salary was a source of stress, and low salary was even a greater source of stress when work pressure was high. Demand and reward thus seem to be related in the prediction of job stress.

Because of the cross-sectional nature of this study, only suggestions on causality can be derived from this study. The results of this study are therefore suggestive in nature and are meant to give first indications. Because of the cross-sectional design of the study, the results should be interpreted with caution, and longitudinal studies are needed to verify the results.

The results of our study have theoretical implications. They suggest that it is important to look beyond the dimensions of the Karasek model to detect organizational and environmental conditions that underlie these dimensions. This study shows that the Tripod model is a good theoretical supplement when it comes to the understanding of occupational stress. It appears that stress, as human error, can be controlled to a certain extent, by controlling work conditions. However, longitudinal studies need to further examine this model in its relation to the job characteristics and outcomes. The sequence of events as suggested by this study can only be thoroughly investigated with longitudinal data. Therefore, we call for longitudinal studies to further examine the relationships between organizational and environmental work conditions, job characteristics, and stress outcomes among nurses.

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