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Surviving chaos : predictors of occupational stress and well-being in emergency nurses

Adriaenssens, J.

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Author: Adriaenssens, Jozef M.L.
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Chapter 4

Causes and consequences of occupational stress in emergency nurses, a longitudinal study.

Jef Adriaenssens, Veronique De Gucht, Stan Maes

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Abstract

Aim: This longitudinal study examines the influence of changes over time in work and organizational characteristics on job satisfaction, work engagement, emotional exhaustion, turnover intention and psychosomatic distress in emergency room (ER)-nurses.

Background: organizational and job characteristics of nurses are important predictors of stress-health outcomes. ER-nurses are particularly exposed to stressful work-related events and unpredictable work conditions.

Method: The study was carried out in 15 ER-departments of Belgian general hospitals in 2008 (T1) and 18 months later (T2) (N=170).

Results: Turnover rates between T1 and T2 were high. Important changes over time were found in predictors and outcomes. Changes in job demand, control and social support predicted job satisfaction, work engagement and emotional exhaustion. Additionally, changes in reward, social harassment and work agreements predicted work engagement, emotional exhaustion and turnover intention respectively.

Conclusions: Work related interventions are important to improve occupational health in ER-nurses and should focus on lowering job demands, increasing job control, improving social support, and a well-balanced reward system.

Implications for Nursing Management: Nursing managers should be aware of the causes and consequences of occupational stress in ER-nurses in order to enable preventive interventions.

1. INTRODUCTION

According to a recent review of the literature (Lu et al, 2012) the current nursing shortage and high turnover is of great concern in many countries. These phenomena prove to be closely related to job satisfaction, working conditions, job stress, role conflict and ambiguity, and professional and organizational commitment. In comparison to other areas of nursing, such as general ward nurses, Emergency Room (ER) nurses are confronted with more acute and traumatic stressors and unpredictable work conditions, resulting in higher levels of burnout (Potter, 2006; Browning *et al*., 2007). In the present study we aim to obtain a better understanding of the determinants and consequences of occupational stress in emergency nurses based on a solid theoretical framework.

Overview of the literature

ER-nurses seem to be exposed to a broader variety of stressors as well as more severe stressors than their colleagues from other nursing departments. They frequently have to deal with *acute,* potentially traumatic experiences, such as threat, aggression and violence at work (Crabbe, 2004; Kilcoyne & Dowling, 2007) as well as death, mutilation and suffering (Clohessy & Ehlers, 1999; Adriaenssens, De Gucht & Maes, 2012). Other studies have suggested the presence of *chronic* stressors such as high time pressure and high physical demands, low decision latitude, less adequate work procedures, tension with colleagues and shift work (Clohessy & Ehlers, 1999, Adriaenssens et al., 2011). Moreover, ER-nurses have to deal with constantly changing, hectic and hardly predictable work conditions (Hooper et al., 2010; Healy & Tyrell, 2011). As a consequence, psychosomatic distress, emotional exhaustion and fatigue are very common in ER- nurses (van der Ploeg & Kleber, 2003; Potter, 2006, Escriba-Agüir & Perez-Hoyos, 2007).

Out of 45 studies on occupational stress in ER-nurses that were published during the 15 years only one had a longitudinal study design (van der Ploeg & Kleber, 2003). Cross-sectional studies have important limitations: (a) the direction of the relationship between predictors and outcomes cannot be tested, and (b) the influence of change in the work environment on outcome variables cannot be explored.

Theoretical framework

Previous studies have shown a relationship between job conditions, derived from the Job Demand Control Support (JDCS) model (Karasek & Theorell, 1990), and occupational stress outcomes in ER-nurses. In the JDCS-model psychological strain (fatigue, anxiety, depression) and ill health are seen as potential consequences of high job demands, low job control and low social support at work from supervisor and/or colleagues (Van der Doef & Maes, 1998; Van der Doef & Maes, 1999b, Häusser et al., 2010). The JDCS model has shown to explain an important part of the variance in stress-health outcomes. Inclusion of other work related variables beyond the JDCS-dimensions such as organizational

characteristics have further improved the prediction of health and well-being outcomes (McVicar, 2003; Akerboom & Maes, 2006; Adriaenssens et al, 2011, Pisanti et al., 2011).

The present study therefore includes JDCS-variables as predictors (Karasek & Theorell, 1990), as well as several organizational characteristics that are derived from the Tripod accident causation model. The Tripod accident causation model (Wagenaar et al., 1994) postulates that unsafe acts are not random events, but have their immediate origins in psychological states of mind (e.g., ways of reasoning, expectations, motives, plans, haste, emotional preoccupation). These states of mind, in turn, are generated by dysfunctional aspects of the organizational environment or latent failures (e.g. lack of work agreements such as poor information provision and unclarity of procedures, a reward system merely related to work speed, lack of personnel resources such as understaffing and poor training, lack of material resources and social harassment). These latent failures or organizational characteristics also demonstrated to have important adverse consequences in terms of stress-health outcomes (Akerboom & Maes, 2006).

Studies in ER-nurses that are based on the JDCS-model, found high work demands to be related to higher levels of fatigue and psychosomatic distress (Zangaro & Soeken, 2007; Adriaenssens et al., 2011). Lack of decision authority and skill discretion were both related to higher levels of occupational stress (McGrath et al., 2003; Adriaenssens et al. 2011). Lack of social support, by supervisor and colleagues, was found to be a strong predictor of psychosomatic distress in ER-nurses (Adriaenssens et al., 2011). Organizational variables can have an additional effect on the development of occupational stress for ER-nurses. For example, in a cross-sectional study, reward and appreciation were found to be strong predictors of job satisfaction, work engagement and lower fatigue levels, while adequate work procedures were related to more work engagement and less fatigue (Adriaenssens et al., 2011).

Until now, no longitudinal research in ER-nurses has been conducted on both job-content related factors and organizational characteristics as potential predictors of stress-health outcomes. Therefore, a longitudinal design was used in this study to investigate the main research question: to what extent do changes over time in (1) job characteristics (job demand, control and social support) and (2) organizational factors (social harassment, work agreements, material resources, personnel resources and reward) predict distress outcomes (job satisfaction, work engagement, emotional exhaustion, turnover intention and psychosomatic distress) at follow-up.

2. THE STUDY

Methods

Design & participants

This study uses a complete two wave panel design. With this approach all independent and dependent study variables are measured on both time points. The advantage of a complete panel design compared

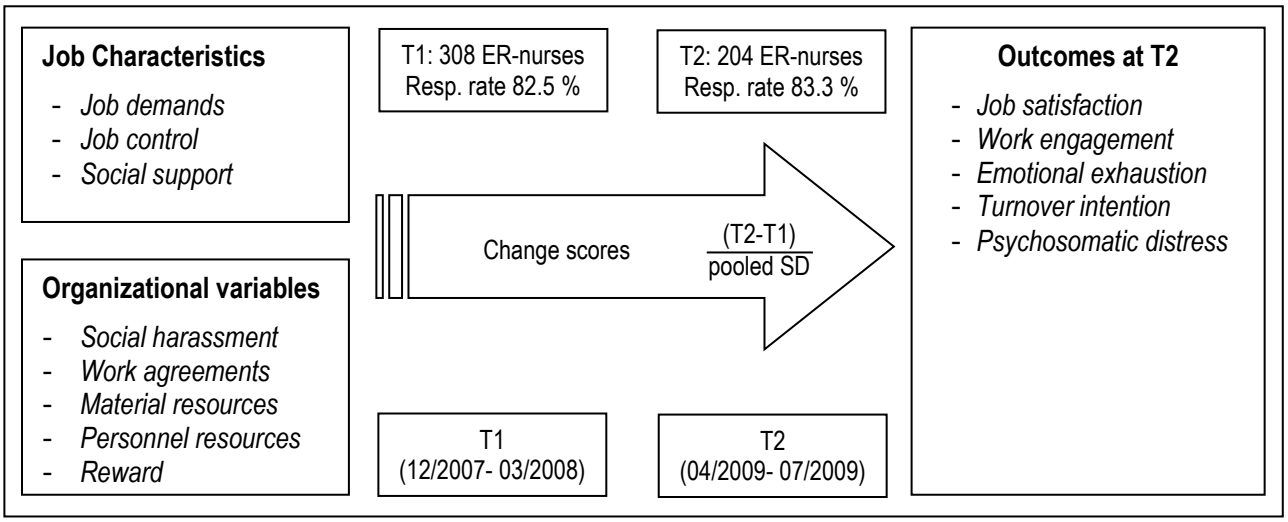
over incomplete panel designs (in which not all study variables are measured at all time points) is that the directions of relationships can be determined, thus allowing for a better understanding of the causal process (de Lange et al., 2003). All variables were measured by means of a self-administered structured survey, from December 2007 to March 2008 (T1) and from April 2009 to July 2009 (T2). The mean interval between the first and the second assessment was 18 months, which is sufficient to allow for research on the impact of organizational changes (Zapf et al., 1996) (Figure 1). Fifteen out of 56 general non-university hospitals (Flemish Government Website) were randomly selected from all over Flanders, in order to have a representative sample that met criteria for an optimal sample size (N=297) (Raosoft Inc.® sample size calculator).

Data collection

Every potential respondent (T1, N=308; T2, N=204) received an invitational letter at T1 and T2, containing information on the study, and an informed consent form. The first author, who himself is an emergency nurse, informed the potential respondents about the study during staff meetings. The head nurse distributed the paper questionnaires to the ER-nurses. Each respondent was asked to fill in the questionnaire individually in his/her leisure time. One reminder was sent one month after the start of data collection. The completed questionnaires were returned in a sealed mailbox in the emergency department. The mailboxes were collected by the first author two months after the distribution of the questionnaires.

At T1, 308 nurses, working at least for one month in the emergency department, and having direct patient contact, were approached. Supervisors and nursing managers were excluded from the study. A total of 254 completed questionnaires was returned at time 1 (response rate 82.5 %). Of this sample, 204 nurses, still working 18 months later at the same ER, were eligible for the survey. This decrease in number of eligible subjects from T1 to T2 implies a turnover rate of 19.7 % (range 5 % to 36 %) in a period of 18 months. A total of 170 completed questionnaires was returned (response rate 83.3 %). These respondents were included in the present study.

Figure 1: Design of the study



Measures

Socio-demographics

Data were gathered at T1 and T2 on the socio-demographic status of each respondent, including age, gender, marital status, level of education, degree, years of service, number of working hours and shift work schedule. All other measures, used to assess predictors and outcomes, are described in table 1.

Quality of work: job characteristics and organizational variables

In this study, the Leiden Quality of Work Questionnaire for Nurses (LQWQ-N) (Gelsema et al., 2005) was used at T1 and T2. The LQWQ-N consists of 15 subscales measuring six job characteristics, seven organizational characteristics and two outcome variables ('job satisfaction and 'turnover intention'. The subscales and example items can be found in table 1. For the purpose of this study and in accordance with the LQWQ-N guidelines, the sum-score for the dimensions 'work/time demands' and 'physical demands' was used as a measure of Job Demands. The sum score of the dimensions 'skill discretion' and 'decision authority' was used as a measure of Job Control. The sum score for 'social support supervisor' and 'colleagues' was used as a global measure of social support. Because of low Cronbach's α-scores, the dimensions of two organizational variables, internal communication and nurse-doctor collaboration, were excluded from further analysis.

The validated LQWQ-N was derived from the Leiden Quality of Work Questionnaire (LQWQ) (Van der Doef & Maes, 1999a). The items of the LQWQ-N are occupation-specific. The factor structure of the LQWQ-N was determined by means of factor analyses and reliability analyses and was established in previous studies (Gelsema et al., 2005; Pisanti et al., 2011; Adriaenssens et al. 2011). All items are formulated as statements which have to be rated on a 4-point Likert scale, ranging from 1 (totally disagree) to 4 (totally agree). A higher score on a LQWQ-N subscale, except for 'turnover intention', indicates a more favorable situation for the respondent in his workplace. The subscales are described below.

Outcome Variables:

Stress-health outcomes were operationalized in terms of 'job satisfaction', 'turnover intention' 'work engagement', 'emotional exhaustion', and 'psychosomatic distress'.

Job Satisfaction was assessed by means of the LQWQ-N. This dimension of the instrument measures the extent to which nurses are satisfied with their job. A higher score on this variable points at a higher level of job satisfaction.

Turnover intention was also assessed by means of the LQWQ-N. This dimension of the instrument measures the extent to which nurses have the intention to leave their current workplace or the job. A higher score on this variable indicates a higher intention of changing from workplace.

Table 1: Description of the measures and their dimensions and subscales.

Dimension and subscales	Scale	N° of items	Cronbach's α T1	Cronbach's α T2	Item description and example
Work characteristics					
Work/Time demands	*LQWQ-N*	*5*	*.75*	*.76*	*Work and time pressure: "During my shift, I am responsible for the care of too many patients."*
Physical demands	*LQWQ-N*	*4*	*.75*	*.74*	*Physical burden of work: "In carrying out my work, I must often lift or move large and/or heavy objects."*
Job demands	LQWQ-N	9	.75	.73	Sum score of Work/Time demands and Physical Demands
Skill discretion	*LQWQ-N*	*4*	*.79*	*.82*	*Task variety and the extent to which the job challenges one's skills: "My job gives me the opportunity to develop my abilities."*
Decision authority	*LQWQ-N*	*4*	*.70*	*.73*	*Extent to which nurses have the freedom to act on what they know and the amount of freedom they have over their work conditions: "I have the opportunity to make my own decisions at work."*
Job Control	LQWQ-N	8	.74	.82	Sum score of 'skill discretion' and 'decision authority'
Social Support supervisor	*LQWQ-N*	*4*	*.92*	*.93*	*Support provided by the supervisor: "I feel appreciated by my supervisor."*
Social support colleagues	*LQWQ-N*	*4*	*.82*	*.83*	*Instrumental and emotional support provided by colleagues: "My colleagues give me emotional support when I'm having difficulties."*
Social Support	LQWQ-N	8	.87	.87	Sum score of 'social support supervisor' and 'social support colleagues'
Organizational variables					
Work Agreements	LQWQ-N	4	.78	.79	Quality and feasibility of procedures: "In my department, procedures and rules are often unclear."
Material Resources	LQWQ-N	3	.67	.77	Availability and quality of materials and instruments on a particular ward: "Materials, equipment and/or instruments are not always available when necessary."
Personnel Resources	LQWQ-N	4	.68	.68	Amount and quality of personnel on a particular ward: "In my department, there are enough nurses to provide good care."
Internal Communication (1)	LQWQ-N	5	.59	.59	Quality of information provision in the organization: "In this organization, one must ask a question repeatedly before getting an answer."
Nurse-Dr. collaboration (1)	LQWQ-N	4	.57	.56	Jointly sharing information between nurses and doctors for decision making and problem solving: "In my department, nurses and doctors work well together."
Rewards	LQWQ-N	6	.69	.71	Rewards in terms of bonuses or appreciation: "In this organization there are insufficient funds and/or facilities for nurses."
Social Harassment	LQWQ-N	4	.88	.86	Use of peer rejection or exclusion to humiliate or isolate a person: "Some staff members in my department are excluded."
Outcome variables					
Job Satisfaction	LQWQ-N	3	.74	.68	The extent to which nurses are satisfied with their job: "If I had the choice now, I would take this job again".
Turnover intention	LQWQ-N	3	.77	.81	The extent to which nurses have the intention to leave their current workplace or the job: "I'm thinking about working in another hospital".
Vigor	*UWES*	*3*	*.81*	*.85*	*Level of energy and mental resilience while Working: "At my work, I feel that I am bursting with energy"*
Dedication	*UWES*	*3*	*.86*	*.89*	*Level of involvement in one's work, and experience of a sense of significance and enthusiasm: "I am enthusiastic about my job"*
Absorption	*UWES*	*3*	*.82*	*.86*	*Level of concentration and being happily engrossed in one's work: "I am immersed in my work"*
Work Engagement	UWES	9	.93	.95	Sum score of the UWES-subscales 'vigor', 'dedication' and 'absorption'.
Emotional Exhaustion	MBI	9	.90	.86	Chronic state of physical and emotional depletion resulting from excessive job demands: "I feel tired when I get up in the morning and have to face another day on the job"
Anxiety	*BSI*	*6*	*.77*	*.76*	*Level of unpleasant feelings of apprehensiveness: "suddenly scared for no reason"*
Depression	*BSI*	*6*	*.81*	*.82*	*A state of mind with persistent low mood, absence of positive affect, and a range of associated emotional, cognitive, and behavioral symptoms.: "feeling blue"*
Somatisation	*BSI*	*7*	*.76*	*.73*	*Level of experiencing and communicate psychological distress in the form of physical symptoms: "pains in the heart or chest"*
Psychosomatic distress	BSI	19	.87	.86	Sum score of BSI-subscales 'anxiety', 'depression' and 'somatisation'

Scales: LQWQ-N: 1 (totally disagree) to 4 (totally agree); UWES and MBI: 0 (Never) to 6 (Always); BSI: 0 (not at all) to 4 (very much). (1) Due to low Cronbach's alpha, this dimension was excluded for further analysis.

Work Engagement was assessed by means of the Utrecht Work Engagement Scale (UWES) (Schaufeli & Bakker, 2004). The UWES was found to have adequate consistency, reliability and validity (Seppälä et al. 2009). The items of the UWES are grouped into three subscales: vigor, dedication and absorption. All items are scored on a 7-point rating scale, ranging from 0 (never) to 6 (daily). Because of high intercorrelations between the subscales in the present study, only the total score was used. Higher scores are indicative of a higher work engagement.

Emotional Exhaustion, which reflects the main dimension of occupational burnout (Lee & Ashforth, 1996; Maslach & Jackson, 1997; Maslach, 1998), was measured by means of the Dutch version of the Maslach Burnout Inventory (MBI). The MBI consists of three dimensions (Emotional Exhaustion, Depersonalization and Lack of Personal Accomplishment) and has adequate internal consistency, reliability and validity (Bakker et al., 2002). Items are scored on a 7-point likert scale, ranging from 0 (Never) to 6 (Always). For the purpose of the present study, only the Emotional Exhaustion dimension was used. Higher scores point at higher levels of Emotional Exhaustion.

Psychosomatic distress: this variable was a sum score of the subscales 'anxiety', 'depression' and 'somatisation', of the validated Dutch version of the Brief Symptom Inventory (BSI). The BSI has been found to have adequate consistency, reliability and validity and is considered to be a good and shorter alternative for the Symptom-Checklist-90-revised (SCL-90R) (Derogatis, 1993; De Beurs &Zitman, 2005). Items are scored on a 5-point likert scale ranging from 0 (not at all) to 4 (very much). A higher score on a BSI-subscale indicates a higher level of the specific complaint.

Ethical considerations

At T1, all eligible subjects received an invitational letter, containing information on the study and an informed consent letter. To ensure confidentiality, an identification code was used on the questionnaires. Only one of the researchers had access to the identification code list. Signed informed consent forms were obtained from the participants before data collection at both measurements. Participation at T1 and T2 was on a voluntary basis. Appropriate institutional board approval was obtained for this study.

Data analysis

The Statistical Package for the Social Sciences for Windows 20.0 (SPSS® Inc., Chicago, IL, USA), was used to analyze the data. Descriptive statistics (means, standard deviations, frequency distributions, skewness and kurtosis) were computed. Pearson correlations were calculated between predictors and outcomes for T1 and T2. A standardized change score was calculated by use of Cohen's Delta (difference between T2 and T1, divided by the pooled standard deviation) (Cohen, 1988). Multiple linear regression analyses were conducted using the enter-method to examine the longitudinal effect (by means of change scores) of exposure to job characteristics, and organizational variables on the one hand and the outcome variables job satisfaction, turnover intention, work engagement, psychosomatic distress and emotional

exhaustion at T2 on the other hand, controlling for socio-demographic variables and for the respective outcome at T1. As eleven predictors were entered in the regression analysis, at least a sample of 110 ER-nurses was required from a power perspective, since the general rule is that at least 10 respondents are needed per predictor for a sample size above 100 respondents (Peduzzi et al., 1996; Wilson & Morgan, 2007).

3. RESULTS

Description of the socio-demographic characteristics of the respondents

At T2, 57.4 % of the 170 respondents were female. The mean age was 39.64 years (SD 8.57). Almost 75 % was married or co-habiting. More than 85 % had earned a bachelor degree and 82% were holders of the specialty "Certified emergency nurse" (CEN). 87.6 % of the ER-nurses worked rotating shifts, including night shifts and 54.3% worked full time. The mean job experience as a nurse was 16.26 years (SD 8.83) and the mean job experience as an ER-nurse was 13.57 years (SD 7.64). Female gender was related to higher job satisfaction (p=.03), higher work engagement (p=.004) and lower emotional exhaustion (p=.04). Age was positively but weakly correlated to turnover intention (r=.24, p<.001) and negatively but weakly to work engagement (r=-.22, p<.01). Marital status, educational level, degree, number of working hours and shift work were not significantly related to any of the outcome variables. Therefore these variables were not included in multiple regression analyses.

Table 2: Changes over time in job characteristics, organizational variables and outcomes (N=170).

	Worsening *Negative change ≥ 0.5 SD*	***Stable*** *Change < 0.5 SD*	***Improvement*** *Positive change ≥ 0.5 SD*
Job characteristics			
Job demands	20.5 %	61.3 %	18.2 %
Job control	24.0 %	46.4 %	29.6 %
Social Support	36.7 %	33.6 %	29.7 %
Organizational variables			
Social Harassment	25.0 %	46.8 %	28.2 %
Work Agreements	26.6 %	51.1 %	22.3 %
Material resources	30.5 %	31.2 %	38.3 %
Personnel resources	21.9 %	49.9 %	28.2 %
reward	22.7 %	52.2 %	25.1 %
Outcome variables			
Job satisfaction	28.1 %	43.7 %	28.2 %
Turnover Intention	39.5 %	36.3 %	24.2 %
Work Engagement	27.1 %	52.0 %	20.9 %
Psychosomatic distress	20.2 %	54.2 %	25.6 %
Emotional exhaustion	27.3 %	41.4 %	31.3%

Changes over time in job characteristics, organizational variables and outcomes

Descriptive analysis of the change scores (table 2) for the independent and dependent variables showed considerable changes between T1 and T2 for the different predictors. Depending on the specific predictor 18 % to 38 % of the respondents had a positive change score of more than 0.5 SD (improvement) while 20 % to 37 % had a negative change score of more than 0.5 SD (worsening). For the outcome variables, using the same criteria, 21 % to 31 % of the respondents had a positive change score, while 20% to 40% had a negative change score. Overall, job demands was the most stable characteristic as this dimension remained stable over time in 61% of the sample. In contrast social support, material resources and turnover intention showed the most variation over time, both in a negative and positive direction. The other dimensions still showed considerable variation, with on average half of the population remaining stable and the other half changing in a positive or negative direction.

Relationships between predictors and outcomes

The correlations between predictors and outcomes at T1 with their corresponding values at T2 are reported in table 3 and the results of the multiple linear regression analyses are reported in Table 4. Correlations between the independent variables were all lower than .60, indicating there was no risk of multicolinearity (Field, 2000). The JDCS-variables job demands, job control and social support at T1 on the one hand, and the organizational variables work agreements, material resources, personnel resources and reward at T1 on the other hand were significantly related to multiple outcome variables at T2.

Table 3 : Correlations between job characteristics, organizational variables and outcomes at T1 and T2 (N=170).

T2 ↓ ***T1*** →	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1. age	1.00**	-.10	-.05	-.13	-.08	.13	.16	.04	.14	-.05	.26**	-.16	-.05	.09
2. job demands	-.10	.51**	.08	.04	-.09	.04	-.08	.31**	.06	.05	-.04	.14	-.31**	-.28**
3. job control	-.02	.25**	.49**	.16	.05	.18*	.18*	.11	.18*	.37**	.26**	.29**	-.20*	-.20*
4. social support	-.06	.19*	.27**	.46**	.11	.27**	.22*	.23*	.21*	.29**	.17	.17	-.25**	-.19*
5. social harassment	-.01	.14	.13	.12	.20*	.13	.01	.14	.09	.29**	.33**	.17	-.23**	-.28**
6. work agreements	.01	.11	.07	.09	.15	.36**	.10	.23**	.19*	.10	.09	-.02	-.06	-.11
7. material resources	.24**	.02	.05	-.14	.03	.10	.31**	.06	.22*	-.05	.19*	.19*	.04	.10
8. personnel resources	.19*	.28**	.09	-.01	-.03	.05	.08	.45**	.15	.20*	.15	-.01	-.20*	.02
9. rewards	.14	.06	.23**	.26**	.13	.27**	.26**	.16	.47**	.38**	.34**	.24**	-.28**	-.23**
10. job satisfaction	.02	.21*	.33**	.16	.04	.36**	.35**	.24**	.34**	.53**	.43**	.33**	-.31**	-.30**
11. turnover intention	.24**	.04	.29**	.00	.13	.05	.22*	.15	.08	.26**	.49**	.05	-.22*	-.09
12. work engagement	-.22*	.10	.39**	.28**	.15	.18*	.27**	.08	.19*	.47**	.15	.64**	-.29**	-.48**
13. psychosomatic distress	.06	-.24**	-.17	-.19*	-.08	-.21*	-.09	-.23**	-.16	-.27**	-.13	-.41**	.59**	.54**
14. emotional Exhaustion	.07	-.30**	-.27**	-.14	-.04	-.31**	-.25**	-.25**	-.37**	-.39**	-.16	-.45**	.51**	.52**

** p<.05, ** p<.01 T1 = baseline, T2 = follow-up*

Table 4: Summary of regression analyses predicting outcomes at T2 on the basis of changes over time in job characteristics and organizational variables.

	Job Satisfaction T2			*Work Engagement T2*			*Emotional Exhaustion T2*			*Turnover Intention T2*			*Psychosomatic Distress T2*		
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Socio-demographics															
gender (Male=1 / Female = 2)	0.28	0.22	0.09	0.23	0.15	0.10	-0.24	0.15	-0.12	-0.32	0.31	-0.08	-0.56	0.92	-0.04
age	0.01	0.01	0.05	-0.01	0.01	-0.10	0.01	0.01	0.05	-0.03	0.02	-0.14	0.08	0.05	0.11
outcome at T1	0.57	0.07	**0.56** ***	0.77	0.08	**0.69** ***	0.50	0.08	**0.51** ***	0.49	0.08	**0.50** ***	0.55	0.07	**0.57** ***
Job Characteristics															
Δ job demands	0.12	0.05	**0.18** *	0.01	0.03	0.01	-0.05	0.03	**-0.17***	-0.07	0.07	-0.09	-0.14	0.21	-0.05
Δ job control	0.13	0.04	**0.25** ***	0.08	0.03	**0.21** **	0.01	0.03	0.,01	-0.08	0.06	-0.13	*- 0.05*	0.17	-0.02
Δ social support	0.9	0.03	**0.22** **	0.04	0.02	0.14	-0.07	0.02	**-0.24** **	-0.07	0.05	-0.14	-0.11	0.14	-0.06
Organizational Variables															
Δ social harassment	0.04	0.04	0.07	0.01	0.03	0.01	-0.05	0.03	**-0.14** *	0.01	0.05	0.01	-0.37	0.17	**-0.17****
Δ work agreements	0.01	0.05	0.01	0.04	0.04	0.08	0.01	0.04	0.03	-0.17	0.07	**-0.22** *	0.33	0.22	0.12
Δ material resources	-0.06	0.06	-0.06	-0.03	0.04	-0.04	-0.01	0.04	-0.02	0.14	0.08	0.14	-0.58	0.26	**-0.17** *
Δ personnel resources	-0.01	0.05	-0.01	-0.01	0.04	-0.01	-0.01	0.04	-0.01	0.06	0.07	0.07	0.43	0.23	0.15
Δ reward	0.04	0.04	0.06	0.6	0.03	**0.14***	0.05	0.03	0.13	-0.08	0.06	-0.11	-0.14	0.18	-0.06
	R^2 model		0.50	R^2 model		0.56	R^2 model		0.39	R^2 model		0.37	R^2 model		0.44
	adjust. R^2		0.45 ***	adjust. R^2		0.51 ***	adjust. R^2		0.33 ***	adjust. R^2		0.31 ***	adjust. R^2		0.39 ***

Results of multiple linear regression analyses (enter-method) for the outcomes job satisfaction, work engagement, emotional exhaustion, turnover intention and psychosomatic distress at T2, controlled for the respective outcome at T1, with change scores in job characteristics and organizational variables as predictors. Abbreviations: B = unstandardized regression coefficient, SE = standard error, β = beta, Δ = change score (T2 – T1/pooled SD), adjust R^2 = adjusted R^2 model

With respect to the outcome variable *job satisfaction at T2*, socio-demographics (gender and age) were not significantly related to this variable. Job satisfaction at T1 was a strong predictor of job satisfaction at T2. Changes over time in the JDCS characteristics significantly explained additional variance in this outcome. More specifically, a more positive perception of job demands (β=0.18, $p<.05$), higher perceived job control (β = 0.25, $p<.001$) and social support (β = 0.22, $p<.01$) over time were associated with an increase in job satisfaction at T2. A change in the organizational variables did not contribute to the explanation of the outcome. The model, including all variables, explained 45% of the variance in job satisfaction.

Work engagement at T2 was not significantly related to socio-demographics. Work engagement at T1 was a strong predictor of work engagement at T2. Of the JDCS variables, only higher perceived job control over time was related to more work engagement at T2 (β = 0.21, $p<.01$). Regarding the organizational variables, a more positive perception over time of reward was associated with an increase in work engagement at T2 (β = 0.14, $p<.05$). The model, consisting of all variables, explained 51 % of the variance in work engagement at T2.

Regarding *emotional exhaustion at T2*, no significant relationship was found with socio-demographics. Emotional exhaustion at T1 was a strong predictor for emotional exhaustion at T2. With respect to the JDCS characteristics, a more positive perception of job demands (β = -0.17, $p<.05$) and social support (β = -0.24, $p<.01$) over time were related to lower levels of emotional exhaustion at T2. Regarding the organizational variables, more positive perceptions over time regarding social harassment was associated with a decrease in emotional exhaustion at T2 (β = -0.14, $p<.05$). The final model explained 33% of the variance for this outcome variable.

T*urnover intention at T2* was not significantly related to socio-demographics. Turnover intention at T1 was a strong predictor for this outcome at T2. None of the JDCS-characteristics significantly contributed to the regression model. Of the organizational variables, only a positive change over time in work agreements was related to a decrease in turnover intention at T2 (β = -0.22, $p<.05$). The final model explained 31 % of the variance for this variable.

With respect to *psychosomatic distress at T2*, no significant relationship with socio-demographics was found. Distress at T1 was strongly related with distress at T2. The change scores for the JDCS-characteristics did not significantly contribute to the outcome. Concerning change scores for the organizational variables, more positive perceptions over time regarding social harassment (β = -0.17, $p<.01$) and material resources (β = -0.17, $p<.05$), were associated with a decrease in psychosomatic distress at T2. The final model explained 39 % of the variance for psychosomatic distress at T2

4. DISCUSSION

This study is unique from previous studies on occupational stress in emergency nurses because of the longitudinal design. The study showed that almost 20% of the respondents at baseline had left their workplace 18 months later. For the ER-departments in this study, this represented a loss of human capital. Previous studies show similar results: The Texas Hospital Nurse Staffing Survey 2004 found yearly turnover rates in ER-departments of 17.1% in 2004 and 22.2% in 2006 (Kishi et al., 2006), while Gillespie states that over half of the emergency departments in the United States had yearly turnover rates of more than 20% (Gillespie, 2008). In addition, there was substantial variance in turnover in the 15 participating ER-departments of our sample, ranging from 5 % to 36 %. The highest turnover rates were seen in two hospitals that were in the middle of a reorganization and fusion process and in two hospitals with a recent change of the direct supervisor after a period of internal conflicts. Turnover remains however an important issue for ER-departments.

A second finding of this study is the fact that major changes over time can be seen in the different predictors, as well as in the outcome variables. As described in the result section, depending on the specific variable, 39 to 69 % of the respondents had a substantial worsening or improvement of a job related condition in a period of 18 months. This is also the case for the outcome variables, where a change in 46 to 64% of the respondents can be observed. While job demands seems to be the most stable dimension, all other job characteristics as well as organizational variables show at least as much change as stability over time, both in a negative and a positive way. This implies that important work conditions change considerably within a relatively short time frame, which provides an opportunity for interventions to improve the work situation of the ER-nurse.

This finding is in contrast with previous research suggesting that work environment stays rather stable over time (Dormann & Zapf, 2001, Mansell et al., 2006). This is at least partly, in our opinion, due to the fact that previous studies did not use occupation-specific measures to assess job- and organizational characteristics, in contrast with the present study.

With regard to our main research question, changes over time in job characteristics (JDCS: Job demands, control and social support) were significantly related to job satisfaction, work engagement and emotional exhaustion, but not to turnover intention and psychosomatic distress at T2. In general, these findings are also consistent with the Job Demands-Resources model that distinguishes between two important processes that are differently related to stress-health outcomes: a motivational process that is based on available resources such as control, social support and reward and an energy depletion process leading to fatigue and distress that is caused by high demands (Bakker et al., 2005). The model states that work overload and high emotional demands may deplete employees' resources and lead to a state of (emotional) exhaustion, while autonomy (job control) and reward are seen as job resources which

instigate a motivational process leading to work engagement and organizational commitment. These effects were also found in the present study.

Due to the lack of longitudinal research in ER-nurses, it is difficult to compare the results of this study with the findings of previous studies. One longitudinal study reported ambulance nurses to have higher exposure to acute and chronic occupational stressors than a general nurses reference group (van der Ploeg & Kleber, 2003). Especially lack of social support/team spirit and poor communication at T1 were found to be strong predictors of well-being at work at follow up. A longitudinal study in ambulance workers (EMT) also found a significant effect of social support and time pressure at baseline on job satisfaction and emotional exhaustion at follow-up (Sterud et al., 2011). These results are consistent with the present study that found changes over time in social support and job demands to be predictive of job satisfaction and emotional exhaustion. Van der Ploeg et al (2003) emphasized the importance of good interpersonal relationships and therefore recommended workplace interventions to improve group cohesion and communication on the work field to prevent adverse consequences.

The results of this study are also consistent with a longitudinal study in a general nurse population that identified job demands, job control and social support as predictors of job satisfaction (Jönsson 2012). Another longitudinal study in a general nurse population found a significant relationship between job demands and emotional exhaustion (Sundin et al., 2012). A follow-up study by Gelsema et al. revealed a significant relationship between social support and job control on the one hand and job satisfaction on the other hand and also found an effect over time of job demands on emotional exhaustion (Gelsema et al., 2006).

The fact that no direct relationship was found between JDCS-variables and turnover intention or psychosomatic distress may be explained by the fact that these outcomes are longer term outcomes that are influenced by more short term outcomes such as job satisfaction and work engagement. Short term outcomes are directly influenced by the JDCS-variables, while longer term outcome variables require more time and are influenced or mediated by these short term variables. Several studies mentioned the mediating role of job satisfaction and engagement on turnover intention (Meeusen et al., 2011; Peterson et al., 2011; Sawatzsky & Enns, 2012). A systematic review on turnover intention in general nurses found job satisfaction and commitment (work engagement) to be stronger predictors of turnover than career opportunities elsewhere (Hayes et al., 2012). In addition, psychosomatic distress is a rather general outcome which is not only influenced by occupational factors. A longitudinal study by Gelsema et al. showed that psychological distress and somatic complaints in a general nurse population can also be influenced by variables outside the work environment (Gelsema et al, 2006).

To our knowledge, this study is the first longitudinal research in ER-nurses that includes JDCS-variables and organizational variables. The second part of the main research question regarded the influence of changes in these organizational variables over time. Changes over time in work agreements, material

resources, personnel resources, reward and social harassment were not related to job satisfaction and showed only small effects on work engagement, emotional exhaustion and turnover intention. These findings are different from the results of a cross-sectional study, where organizational variables accounted for a significant additional part of the explained variance (Adriaenssens et al., 2011). One of the reasons for this finding is that changes in JDCS-variables accounted for a large part of variance in job satisfaction, work engagement and emotional exhaustion at T2. Only changes in reward were found to influence work engagement at T2, decreased social harassment overtime was related to a decrease in emotional exhaustion and psychosomatic distress at T2, while a positive change in work agreements was related to a decrease in turnover intention.

The effect of social harassment on emotional exhaustion and psychosomatic distress in this longitudinal study supports previous research that found strong relationships between social harassment and burnout (Laschinger & Grau, 2012). As a consequence, timely detection of social harassment is very important and the introduction of anti-bullying policies and codes of conduct to prevent, detect and stop social harassment in a team is a well justified priority (Vartia & Leka, 2011). The relationship between reward and work engagement is also consistent with the Job Demands Resources model (Bakker, Demerouti & Euwema, 2005) that defines reward as a job resource. This study showed a need for well-balanced commitment-related reward systems, with emphasis on appreciation for above-average efforts or achievements. Rewards do not necessarily have to be only financial. Recognition, respect, responsibility, appreciation, personal attention and opportunities for growth are at least equally important (Curran, 2004; Berger & Berger, 2008). There has to be an equitable balance between the employee's personal contribution to the organization and the organization's contribution to the employee's personal goals and well-being.

The results of this study especially point at the importance of a good fit between the employees and their work environment, in terms of job demands, job control and social support. The findings also indicate that there are opportunities, within a relatively short time frame, to intervene in these predictors in order to improve relevant outcomes for ER-nurses. Interventions should be targeted at deteriorations in specific predictors. No doubt, it is important to fulfill vacancies as soon as possible, to ensure an adequate work load and priority, to anticipate peak load and to increase work efficiency wherever possible. Due to the current shortage of nurses, it is however difficult to find new employees. Therefore, management has to invest actively in the preservation of its human capital. A study by Sawatsky and Enns (2012) showed that engagement was an important buffer between job characteristics and the intention to leave the emergency nursing profession. Engagement was found to be influenced by type of leadership, opportunities for professional development, collaboration with physicians, staffing issues and shift work. Therefore, a good retention plan for ER-nurses should include investment in collaborative and empathic leadership of supervisors (by means of selection and training), creation of a

supportive work climate and opportunities for professional growth for ER-nurses (individual development plans, career plans). Furthermore it is important to create a good interdisciplinary group cohesion with mutual recognition, and flexible shift-scheduling with a focus on a good work-home balance.

In the case of lack of job control, management should ensure bottom-up communication and regular work meetings in order to create self-managing teams that guarantee employee involvement and participation. In addition, where possible, a tolerant attitude towards individual and group variance in work procedures is important. Direct supervisors must be available for their personnel, organize frequent team meetings, and be able to provide adequate personal feedback, related to performance and attitudes of ER-nurses. In addition, a strong group spirit is very important in emergency care as colleagues are an important buffer against consequences of confrontations with traumatic work situations (Maes & Van der Doef, 2004; Sawatzsky & Enns, 2012).

Finally, due to the variance of predictors and outcomes over time, this study underpins the importance of surveying nursing wards, such as ER-departments, regularly, e.g. at least every two years, on job and organizational characteristics, short term and longer term outcomes in order to prevent adverse consequences in terms of job satisfaction, work engagement, psychosomatic distress, burnout, absenteeism and turnover (intention) and to define intervention targets and action plans for the next years. There are several instruments that can be used by a human resources department to perform surveys at institutional and unit level, such as the Leiden Quality of Work Questionnaire for Nurses (LQWQ-N) or the Questionnaire on the Experience and Assessment of Work (QEAW). In addition direct supervisors should be trained in individual performance reviews that include the personal experience of emergency health care providers related to important job and organizational characteristics.

Strengths and weaknesses

The high response rate (both at baseline and at follow-up), the theoretical framework and the relatively large sample of ER-nurses, in comparison to other studies, are important strengths of this study. The broad variety of measured potential stressors, consisting of JDCS variables ánd organizational factors, is also an important strength of this study. A limitation is that there is only one follow-up measurement point. It would certainly be interesting to follow ER-professionals over a longer period of time. Secondly, institutional variables, such as size and location (rural, urban) of the ER-department, were not measured, mainly because all departments were located in smaller cities in a densely populated country and did therefore not substantially differ in this respect. However, future research should include such predictors. Next, the study was conducted in one country and results may be influenced by the specific work and cultural context. Cross-national studies are important to understand the influence of contextual and cultural factors on predictors and outcomes. Finally, although the high turnover rates are a characteristic of the study population and could thus not be prevented, they may limit the

generalizability of the results. Despite these limitations, the findings of this study are pioneering because they point at various important predictors, including socio-demographic and job characteristics and some organizational factors, of stress-health outcomes in ER-nurses that can be influenced by interventions.

5. IMPLICATIONS FOR NURSING MANAGEMENT

The high turnover rate in ER-nurses, found in this study, has to be a point of concern for hospital management, because of the loss of human capital and the growing nursing shortage worldwide. Additionally, this study found significant changes over time in predictors and outcomes of occupational stress in ER nurses. This provides opportunities to intervene in these predictors in order to improve work conditions and outcomes and to reduce turnover rates. On the one hand, changes in job characteristics (job demands, job control and social support) were found to predict job satisfaction, work engagement and emotional exhaustion. These short term variables may, in turn, influence longer term outcomes such as turnover intention. On the other hand, organizational variables showed only small, but significant, effects on the short term outcomes. Reward was found to be predictive of work engagement, and social harassment predicted emotional exhaustion. All of these factors can be influenced by hospital management. The findings of this study can direct managers to target work related interventions at lowering job demands, increasing job control, improving social support and team spirit, and striving for a well-balanced commitment related reward system. Moreover, this study underpins the need to invest in participative empathic leadership and personnel empowerment. Finally, this study provides arguments to regularly screen (emergency) nursing wards on job characteristics and organizational variables to prevent adverse work related outcomes. Future longitudinal studies are needed to support and refine the findings of this study.

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