

BURNOUT AMONG NURSES: EXTENDING THE JOB DEMAND-CONTROL-SUPPORT MODEL WITH WORK-HOME INTERFERENCE

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One of the leading models on antecedents of subjective well-being and stress at work is the job Demand-Control-Support model. Be it to a lesser extent, this model has also been applied to the study of burnout. In this study we tried to extend this model with work-home interference, which can be considered an additional stressor. 2075 Belgian nurses divided over 14 hospitals participated in this study. The results of hierarchical regression analyses showed a strong additional effect of work-home interference on each of the three dimensions of burnout, after controlling for the dimensions of the job Demand-Control-Support model. However, mediational analyses showed that the effect of work-home interference on depersonalization was partly mediated by emotional exhaustion and that the effect on personal accomplishment was partly mediated by emotional exhaustion and depersonalization.

Introduction

Since the late 1970s the concept of burnout has received a lot of attention, especially in human service professions (Cordes & Dougherty, 1993; Koustelios, 2001), but also in other professions as industry and transport (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The reason for this mass of research on burnout is the finding that burnout has important dysfunctional consequences such as an increase in turnover, absenteeism and reduced productivity implying substantial costs for individuals, organizations and even society (Jackson & Maslach, 1982; Leiter & Maslach, 1988; Shirom, 1989). For example Peeters and Le Blanc (2001) showed that the average workplace absenteeism rate in the Dutch health care sector is higher than the national average. This finding can probably to some extent be attributed to the incidence of burnout in this sector. Also Vlerick (1997) showed that burnout among nurses leads to an increased number of health problems,

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lower organizational commitment and higher turnover intentions.

In this study, burnout is defined as a psychological syndrome of emotional exhaustion, depersonalization and reduced personal accomplishment (Maslach, 1993). Maslach (1978, 1982) pictured burnout as a sequential process, starting with emotional exhaustion which leads to depersonalization, which in turn leads to a sense of reduced personal accomplishment. First, emotional exhaustion might appear as a consequence of an imbalance between resources and demands. Subsequently, perhaps as a defensive coping strategy, a set of negative attitudes and behaviors might develop in which individuals limit their involvement with patients and distance themselves psychologically. Finally, when individuals develop negative, cynical attitudes they might find that they are no longer willing, or perceive that they are no longer able to perform their job effectively, resulting in feelings of reduced personal accomplishment. Accumulating empirical evidence supports this idea of burnout as a process that gradually develops over time (Leiter, 1993; Maslach & Leiter, 1997; Schaufeli & Enzmann, 1998).

A lot of studies on burnout focused on antecedents of burnout. The job Demand-Control model of Karasek (Karasek, 1979), to which in a latter stage a social dimension was added (Johnson & Hall, 1988), can be situated within this tradition. Although this model has mostly been applied to research on occupational stress and psychological well-being, it has been used in research on burnout as well, be it that the majority of these studies did not systematically include each dimension of burnout (Rafferty, Friend, & Landsbergis, 2001).

The job Demand-Control-Support model (JDSCS) identifies three major aspects in the work situation, namely job demands, job control and social support, that impact on an individual's level of well-being (Sargent & Terry, 2000). Job demands refer to workload and have been operationalized mainly in terms of time pressure and role conflict. Job control refers to the extent to which the employee can exert influence over tasks and includes two components: skill discretion and decision authority. Social support refers to both supervisor support as well as social support from colleagues (for a review, see Van der Doef & Maes, 1999).

On the basis of the first two dimensions, Karasek classified jobs into four categories.

A job characterized by a combination of high job demands and high autonomy is labeled an "active job", leading to increased motivation and personal growth. The opposite is the "passive job", characterized by low demands and low task autonomy. A job characterized by high job demands and low task autonomy is labeled a "high strain job", leading to health complaints and decreased psychological well-being. The opposite is the "low strain job", characterized by low job demands and high task autonomy. In a later stage,

the third component of social support was added, leading to the definition of the most noxious work situation, namely the "iso-strain job", characterized by high strain and high isolation. On the other hand, the presence of social support is supposed to buffer for the negative impact of a high strain job.

In order to test the JDC(S) model, both additive and interactive effects of these job characteristics on burnout have been investigated, translated in different hypotheses. The "(iso)strain" hypothesis focuses on whether the most negative outcomes in terms of psychological well-being are found in "high-(iso)strain" jobs, suggesting main effects. The "two-way" buffer hypothesis explicitly predicts an interactive effect of job demands and control, in which control moderates the effects of demands on the outcome. The "three-way" buffer hypothesis states that social support moderates the negative impact of high strain on the outcome (Van Der Doef & Maes, 1999).

In most studies on burnout, the strain hypothesis, at least partly, receives support (Landsbergis, 1988; Melamed, Kushnir, & Meir, 1991; Sonnentag, Brodbeck, Heinbokel, & Stolte, 1994). Also the "iso-strain" hypothesis has received support (Melamed et al., 1991). These results revealed that job demands are a stronger predictor than control for emotional exhaustion whereas control is a stronger predictor for depersonalization and personal accomplishment (Rafferty et al., 2001).

For the buffering hypothesis, no evidence was found in studies on burnout. In the literature review of Van der Doef and Maes (1999), none of the burnout studies ($n = 4$) found evidence that control moderates the negative impact of high job demands. Also more recent studies on burnout did not find that the negative impact of job demands on burnout can be moderated by high control (de Jonge & Kompier, 1997; Schreurs & Taris, 1998). For the proposed three-way interaction between demands, control and support, no empirical support has been found either.

Thus, it appears that the Demand-Control-(Support) model is not unequivocally supported. However, one important issue that has been raised by de Lange, Taris, Kompier, Houtman and Bongers (2003) concerns the issue when the JDC(S) model is supported. Do additive effects suffice or are interactive effects necessary? On the basis of the literature, these authors propose that both additive effects and multiplicative interaction effects support the JDC(S) model. However, Hays (1983) argued that it is inappropriate to interpret main effects in the presence of a statistically significant interaction effect. Others, on the other hand, argue that main effects are meaningful in the presence of significant interactions, when interpreted as the average effect of an independent variable on a dependent variable (e.g., Overall, Lee, & Hornik, 1981). In line with de Lange et al., we will study both main and interaction effects, the latter interpreted as the average effect of an independent variable on a dependent variable.

In this study, we are not only interested in the effect of job characteristics as defined by the JDCS model on burnout, but we will try to extend this research with a new variable: work-home interference (WHI). An important limitation of current research on psychological well-being and burnout, is the neglect of extra-organizational stressors that might influence an employee's well-being as well. Cooper and Marshall (1976) argued that besides organizational sources of stress, there are a number of extra-organizational sources of stress which affect the physical and mental well-being of individuals at work. The relationship between work and private life in the sense of interference between these two domains, can be regarded as an extra-organizational stressor. Role stress theory (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964) hypothesizes that participation in one role limits the allocation of resources to other roles (Greenhaus & Beutell, 1985), evoking WHI. Demerouti, Bakker and Bulters (2004) define WHI as "the negative impact of the work domain on the home domain, when participation at home and recovery are inhibited by virtue of the experiences, behaviors and demands built up or faced at work" (p. 133).

WHI has markedly increased over the past ten years (Hochschild, 1997). Both organizational and demographic evolutions have led to more competing demands between work and home and especially employees working long or inflexible hours, as is the case for nurses, are suffering from heightened conflicts between work and home roles (Burke, Weir, & Duwors, 1980; Pleck, Staines, & Lang, 1980). However, only limited research has investigated how this extra-organizational stressor may affect burnout. The literature review of Kossek and Ozeki (1999) makes report of nine studies that investigated the relationship with one or more components of burnout. In all but one sample, significant correlations were found between WHI and emotional exhaustion, ranging from 0.18 to 0.60. Studies that also reported relationships with depersonalization showed significant but remarkably smaller effects. For example, Montgomery, Peeters, Schaufeli and Den Ouden (2003) found a correlation of .70 with emotional exhaustion and a correlation of .40 with depersonalization. Also Geurts, Rutte and Peeters (1999) found a correlation of .61 with emotional exhaustion and .38 with depersonalization. No studies were found that reported a relationship between WHI and personal accomplishment and the relationship with WHI was not measured after controlling for the dimensions of the JDCS-model.

Hypotheses

In this study, the following hypotheses will be tested.

Hypothesis 1. In line with the buffering hypotheses of the JDCS-model,

we hypothesize significant interaction effects between job demands, job control and social support from both supervisor and colleagues. We suggest that job control can buffer for the negative impact of high workload and that both kinds of social support can buffer for the negative consequences of a high strain job, characterized by high demands and low control. Besides interaction effects and in line with the strain hypotheses, we also expect significant main effects of job demands, job control and social support of supervisor and colleagues on the three dimensions of burnout.

Hypothesis 2. We expect a significant impact of WHI on each of the three dimensions of burnout, after controlling for the dimensions of the JDACS-model. In line with previous research, we expect a stronger positive relationship with emotional exhaustion than with depersonalization. We expect a negative relationship with personal accomplishment.

Hypothesis 3. In line with the definition of burnout as a sequential process, we suggest that WHI does not lead directly to depersonalization but that this effect is mediated by emotional exhaustion. This is in line with a study of Leiter (1993) in which evidence was found for a mediating role of emotional exhaustion between work stressors and depersonalization. We also suggest a mediating role of both emotional exhaustion and depersonalization on the relationship between WHI and reduced personal accomplishment.

Method

Procedure

This study was introduced in all Flemish hospitals which had an intensive care ward and an oncology or radiotherapy ward, resulting in 27 hospitals of which 14 hospitals agreed to cooperate. The introduction was done by means of both written and oral communication, under the label of “investigating work conditions of nurses”. The questionnaires were distributed to the head nurses, who spread the questionnaires to all the nurses in their ward and collected the questionnaires at a later time. One reminder was sent, one week after the deadline. This led to a response ratio of 69.5% for oncology nurses, of 74.7% for intensive care nurses and 69.1% for nurses in wards of general surgery and internal medicine.

Sample

Respondents were 2075 Belgian nurses, divided over 15 hospitals, working in three different medical fields: oncology, intensive care, and general

surgery. The spread over the three medical fields was respectively 21%, 25% and 54%. The mean age of the respondents was 35 and 84% of the respondents were women. 58% of the participants worked full-time. The average number of extra hours they worked per week was 1.73 with a standard deviation of 3.22. 76% of the respondents also followed an extra training during the last year.

Measures

1. *Burnout*. Burnout was measured by a Dutch translation of the Maslach Burnout Inventory, the Utrechtse Burnout Schaal or UBOS (Schaufeli & van Dierendonck, 2000). This scale measures the three dimensions of burnout on a Likert-type scale from 1 to 7. Emotional exhaustion and depersonalization were measured with seven items while personal accomplishment was measured with eight items. In this study, Cronbach's alphas for the three dimensions were 0.88 for emotional exhaustion, 0.78 for depersonalization and 0.81 for personal accomplishment.
2. *Job Demands*. Job demands were measured with three items, mainly referring to time pressure. Answers were given on a Likert-type scale, ranging from 1 (totally disagree) to 5 (totally agree). Cronbach's alpha for this scale was 0.90.
3. *Job Control*. Job control was measured with five items, measuring decision authority. Items were formulated in the negative sense and the scale was positively transformed afterwards. The same Likert-type scale was used as for job demands. Cronbach's alpha for this scale was 0.89.
4. *Social Support*. For the measurement of social support, a distinction was made between social support of colleagues versus social support of the supervisor. The same Likert-type scale was used, consisting of 6 items to measure social support of colleagues and 5 items to measure social support of supervisor. Cronbach's alphas were 0.82 and 0.91 respectively.
5. *Work-home interference*. The scale measuring WHI consisted of four items. Responses were again given on the same Likert-type scale and Cronbach's alpha for this scale was 0.80. Items were formulated in the sense of "How often do you feel irritable at home because your job is exigent?" or "How often does your job absorb time that you would rather spend on your private situation?" .

All the items in the scales of job demands, job control, social support from supervisor and colleagues and WHI were taken from a study of Le Blanc, Van Heesch, and Schaufeli (1998). However, in order to limit of the length

of the questionnaire, only a limited number of items was adopted from the original scales. The construct validity of the scales was well-supported by the results of a factor analyses with varimax rotation. Five components, representing the five constructs, with eigenvalues bigger than 1 were extracted, explaining 68% of the total variance.

The measure of WHI consisted of both time-based and strain-based items, suggesting a potential conceptual overlap with strain-related outcomes like emotional exhaustion. However, factor analysis with promax rotation on the questions of both scales clearly revealed two factors with an eigenvalue of 5.46 for the first factor and 1.32 for the second factor. Leaving loadings of minus .35 out, no double loadings were observed.

Analyses

To examine interaction effects between job demands, job control and social support for the JDCS model, most studies use moderated regression techniques (Van der Doef & Maes, 1999). In this study, we executed three moderated hierarchical regression analyses, one for each dimension of burnout.

Since in the literature, some effects were found for gender (Vlerick, 1996, 1999; Lemkau, Rafferty, Purdy, & Rudisill, 1987; Maslach & Jackson, 1981, 1985; Pretty, McCarthy, & Catano, 1992; Schwab & Iwanicki, 1982), age (Anderson & Iwanicki, 1984; Maslach & Jackson, 1981; Russell, Altmaier, & Van Velzen, 1987; Schwab & Iwanicki, 1982) and work experience (Anderson & Iwanicki, 1984), demographic variables were entered in the first step of the regression analysis. In this study, a distinction was made between tenure in the job in general and tenure within the same department. Since the nurses were taken from three different wards and some studies show some effect of ward (Stewart, Meyerowitz, Jackson, Yarkin, & Harvey, 1982; Olkinuora, Asp, Juntunen, Kauttu, Strid, & Äärimaa, 1990), this variable was controlled for by means of two dummy variables. In the second step of the regression analysis, the main effect terms for job control, job demands and social support of the supervisor and of colleagues were entered. Van der Doef and Maes (1999) stated that a proper test of the three-way interaction in the JDCS model using moderated regression analysis would include all possible two-way interactions as well. Therefore, all two-way interaction terms were entered in the third step before entering the three-way interaction terms in the fourth step. To avoid multicollinearity between the predictors and the interaction terms, the multiplicative functions were computed as the product of the standardized scores (Finey, Mitchell, Cronkite, & Moos, 1984). Since the purpose of this study was not only to test the stress-buffer-

Table 2. Moderated Hierarchical Regression Analyses Predicting the Three Dimensions of Burnout from Measures of Job Control, Job Demands, Social Support of Supervisor and Colleagues and Work-Home Interference

Predictor	Emotional exhaustion					Depersonalization					Personal accomplishment				
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 1	Step 2	Step 3	Step 4	Step 5	Step 1	Step 2	Step 3	Step 4	Step 5
Age	-.03	-.02	-.01	-.01	.02	-.07	-.07	-.06	-.06	-.04	.00	.05	.04	.05	.04
Gender	-.06*	-.06**	-.06**	-.06**	-.08**	-.16**	-.15**	-.15**	-.15**	-.15**	.00	-.01	-.01	-.01	-.01
Tenure in general	.16+	.07	.07	.07	-.04	.14	.10	.10	.09	.07	-.15+	-.15+	-.14+	-.15+	-.01
Tenure in this department	-.03	-.01	-.02	-.02	-.01	-.01	.01	.00	.00	.01	.02	.00	.00	.01	.00
Dummy-intensive care	-.01	.04	.04	.04	.01	.04	.06*	.06*	.06*	.04	-.13**	-.11**	-.12**	-.12**	-.11**
Dummy-oncology	.06*	.08**	.08**	.08**	.10**	-.03	-.02	-.02	-.02	-.01	-.04	-.03	.03	.03	.03
Job demands		.43**	.43**	.43**	.26**		.24**	.23**	.23**	.13**		-.08**	-.08**	-.07*	-.02
Job control		-.02	-.01	-.00	.02		-.03	-.04	-.05	-.03		-.00	.00	-.00	-.01
Supervisor support		-.08**	-.07**	-.07**	-.04		-.11**	-.11**	-.12**	-.09**		.14**	.13**	.14**	.13**
Support of colleagues		-.18**	-.17**	-.17**	-.13**		-.12**	-.11**	-.11**	-.08**		.20**	.20**	.17**	.16**
Job control x job demands			.06*	.06*	.05*			.05*	.05*	.05+			-.02	-.01	-.01
Job demands x supervisor support			-.04	-.04	-.06*			-.07*	-.06+	-.08*			-.02	-.03	-.02
Job control x supervisor support			.04	.04	.03			-.03	-.03	-.04			-.01	-.02	-.01
Job demands x support of colleagues			.00	.00	.02			.02	.02	.03			.01	.01	.00
Job control x support of colleagues			.03	.03	.03			.05	.05	.05			-.00	.01	.01
Job control x job demands x supervisor support					.00				-.02	-.02				.03	.03
Job control x job demands x support of colleagues					.00				.01	.01				-.08*	.03
WHI					.49**					.30**					-.15**
R ² cumulative	.02	.27	.28	.28	.47	.03	.15	.15	.16	.23	.03	.13	.13	.13	.15
Adjusted R ²	.02	.27	.27	.27	.46	.03	.14	.15	.15	.22	.03	.12	.12	.12	.14
R ² change	.02	.05	.01	.00	.19	.03	.02	.00	.07	.03	.03	.10	.00	.00	.02
F change	5.06**	122.51**	2.58*	.00	507.45**	8.43**	48.31**	1.75	.27	128.57**	8.20**	38.30**	.30	3.01+	31.66**
Df1	6	4	5	2	1	6	4	5	2	1	6	4	5	2	1
Df2	1434	1430	1425	1423	1422	1432	1428	1423	1421	1420	1401	1397	1392	1390	1389

All entries are standardised regression coefficients. + p < .08; * p < .05; ** p < .01

ing model but also to extend this model with WHI, in a fifth and last step of the regression analyses, WHI was added.

Before running the regression analyses, the assumptions underlying the linear model were tested. Because of heteroscedasticity, two of the three dependent variables, emotional exhaustion and depersonalization, were log-transformed.

Results

Table 1 shows the means, standard deviations and Pearson correlations of the variables in this study. As can be seen in the table, all the variables in the model were significantly related to at least two dimensions of burnout. The results of the hierarchical regression analyses are presented in Table 2. No variance inflation factor (VIF) exceeded the value of 10, which indicates that multicollinearity was not a problem (Stevens, 1996).

For the control variables, gender had a significant effect on emotional exhaustion and depersonalization but not on personal accomplishment. In our sample, women ($M = 2.63$, $SD = 1.09$) felt less emotionally exhausted than men ($M = 2.76$, $SD = 1.03$) and women suffered less from depersonalization ($M = 2.00$, $SD = .77$) than men ($M = 2.32$, $SD = .87$). Also a significant effect was found for ward on personal accomplishment. The results of a one-way ANOVA ($F = 14.11$, $p = .000$) showed that nurses working in intensive care felt less personally accomplished ($M = 4.98$, $SD = .93$) than nurses working on wards of general surgery and internal medicine ($M = 5.14$, $SD = .95$) and nurses working in oncology ($M = 5.31$, $SD = .90$). The last group had a significantly higher sense of personal accomplishment than the other groups of nurses. No significant effects were found for the other control variables.

In line with the first hypothesis, some evidence was found for the suggested two- and three-way interactions. First, a significant interaction effect was found between job demands and job control on emotional exhaustion. This interaction effect did not represent the expected buffering effect for high demands but, as is shown in Figure 1, especially nurses with low job demands benefited from having job control. On the other hand, this interaction effect lends support to the JDACS model in the sense that the highest level of emotional exhaustion was found for nurses with a high strain job. However, also nurses in the active job suffered from an almost equally high level of emotional exhaustion.

Second, a small interaction effect was found between job demands and supervisor support on depersonalization and on emotional exhaustion, but for the latter only after entering WHI into the regression equation. Therefore,

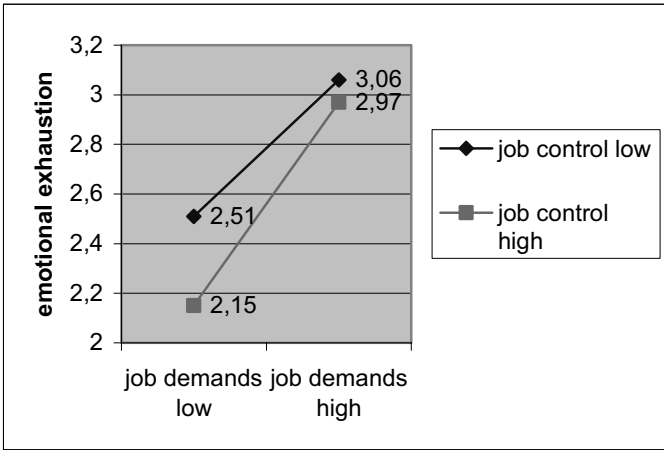


Figure 1. Interaction effect between job demands and job control on emotional exhaustion.

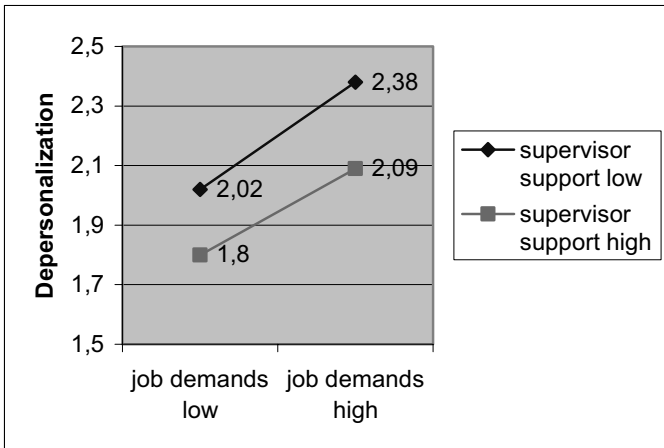


Figure 2. Interaction effect between job demands and supervisor support on depersonalization.

only the first interaction effect is visualized in Figure 2. Nurses with high job demands benefit more from supervisor support than nurses with low job demands, indicating that supervisor support can buffer for the negative impact of high job demands on depersonalization.

Also for the three-way interaction effects some support was found for the interaction between job control, job demands and social support of col-

leagues on personal accomplishment. Figure 3 shows that, although all groups benefit from social support of colleagues, it is especially important for nurses working in high strain jobs, characterized by high job demands and low job support. The lowest sense of personal accomplishment is experienced by nurses working in an iso-strain job.

No support was found for a buffering effect of social support of the supervisor.

However, the interaction effects should be interpreted with caution since they are small and the changes in R^2 and F indicate that the addition of the two-way and three-way interaction terms to the model did add little if any significance to it.

As mentioned above, besides interaction effects we also looked at the main effects, considered as the average effect of an independent variable on a dependent variable.

Main effects were found for job demands and for social support from supervisor and colleagues. On the contrary, no main effect was found for job control on any of the three dimensions of burnout.

With respect to the second hypothesis, we found a strong and significant effect of WHI on each of the three dimensions of burnout, even after controlling for the dimensions of the JDCS-model. Changes in R^2 and F were large and statistically significant for the last step in the regression analyses, indicating that the addition of this term increased the explanatory power of the model, for each of the three dimensions of burnout. However, the results also showed that the effect of WHI was stronger for the first component of burnout, emotional exhaustion than for depersonalization and personal

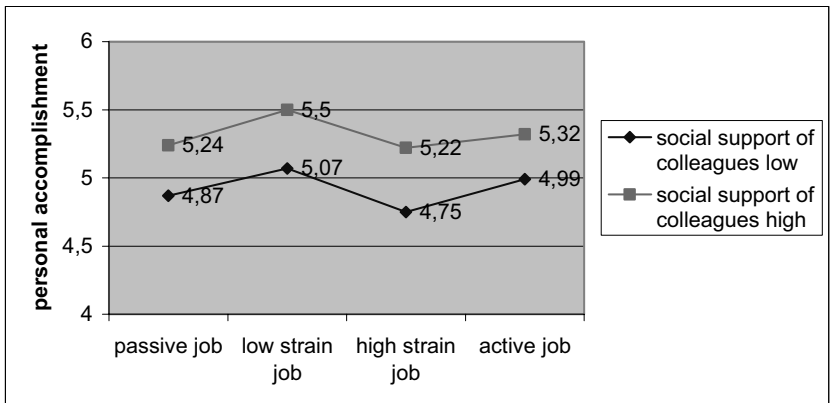


Figure 3. Three-way interaction effect between job demands, job control and social support of colleagues on personal accomplishment.

accomplishment and the latter showed the smallest relationship with WHI.

In order to test the third, mediational hypothesis, several regression analyses were executed, following the steps suggested by Baron and Kenny (1986). These authors recommend three steps in order to test for mediation, namely (1) regressing the mediator on the independent variable, (2) regressing the dependent variable on the independent variable and (3) regressing the dependent variable on both the independent variable and on the mediator. The independent variable of interest in this study is WHI.

To test for the mediating role of emotional exhaustion on the relationship between WHI and depersonalization, three regression analyses were executed. The results of the first regression analysis showed that WHI had a significant effect on emotional exhaustion ($Beta = .61, p = .00$). The results of the second step showed that WHI had a significant effect on depersonalization ($Beta = .39, p = .00$). The results of the third and last step showed that emotional exhaustion had a significant effect on depersonalization ($Beta = .550, p = .00$) and that the effect of WHI on depersonalization was substantially reduced, compared to its effect in the second equation ($Beta = .056, p < .05$). According to Baron and Kenny (1986), one can speak of partial mediation in this case. Also the Sobel test, as proposed by Baron and Kenny (1986) shows that the indirect effect of WHI on depersonalization via the mediator emotional exhaustion is significantly different from zero ($Test\ statistic = 21.77, p = .00$).

To test for the mediating role of emotional exhaustion and depersonalization on the relationship between WHI and personal accomplishment, again the three conditions as proposed by Baron and Kenny were verified. A significant effect of WHI on emotional exhaustion and depersonalization was already found in the previous mediational analysis. For the second step, a significant effect was found of WHI on personal accomplishment ($Beta = -.27, p = .00$). The results of the third and last step showed that emotional exhaustion ($Beta = -.10, p < .01$) and depersonalization ($Beta = -.38, p = .00$) had a significant effect on personal accomplishment and that the effect of WHI on personal accomplishment decreased as compared to the second equation ($Beta = -.07, p < .01$). Again one can speak of partial mediation (Baron & Kenny, 1986). Here too, the Sobel test shows that both the mediational effect of emotional exhaustion ($Test\ statistic = -11.71, p = .00$) and of depersonalization ($Test\ statistic = -12.78, p = .00$) is significantly different from zero.

Discussion

The aim of this research was to study the impact of two sources of stressors on the three components of burnout. Besides work-related stressors, defined by the job Demand-Control-Support model, also the influence of one

extra-organizational source of stress, namely WHI, was investigated.

Partial support was found for the JDCS model from two perspectives. In line with de Lange et al. (2003), we considered both additive effects and multiplicative interaction effects as supportive for the JDCS model.

Concerning the interaction effects, we found a small but significant interaction effect between job demands and job control on emotional exhaustion, but not in the expected direction. Especially nurses in jobs with low demands benefited from having control. On the other hand, this finding supports the JDCS model in the sense that the highest level of emotional exhaustion was found for nurses in high strain jobs. However, also nurses working in the active jobs suffered from an almost equally high level of emotional exhaustion. This is a remarkable finding viewed from the growth hypothesis of the JDSC model. In this hypothesis, the active job is considered as the job with the most growth opportunities. This study however, suggests that this job also leads to almost equally high levels of emotional exhaustion as the high-strain job.

We also found a significant two-way interaction effect between job demands and supervisor support, especially on depersonalization. Supervisor support can buffer for the negative impact of job demands on depersonalization. We also found a small but significant three-way interaction effect between job demands, job control and support of colleagues on personal accomplishment. Nurses working in high strain jobs benefited most from receiving social support from colleagues.

However, all the other interaction effects were not supported by the data and the changes in R^2 and F indicated that the addition of the two-way and three-way interaction terms to the model did add little if any significance to it.

With respect to the main effects, again the JDCS model was partially supported. Job demands, social support of supervisor and social support of colleagues had a significant effect on the three dimensions of burnout in line with the logic of the JDCS model. On the other hand, no effect was found of job control on any of the three dimensions of burnout. Although in the literature there is consistent evidence that job control has positive effects on the level of adjustment, independent of job demands (Sargent & Terry, 1998), within studies on burnout, this finding is not surprising. Rafferty et al. (2001) found inconsistent relationships between job control and emotional exhaustion and depersonalization when job control was defined as decision authority. However, for personal accomplishment, the relationship with job control, independent of its operationalization, was very consistent and was not found in this study either. One possible reason for not finding it in this research might be the dominance of women in our sample. Van Der Doef and Maes (1999) found in the review of the literature that studies using (predominantly) female samples, did not find additive effects of job demands and job control.

With respect to WHI, strong support was found for the idea that, besides organizational stressors, also this extra-organizational stressor has a strong influence on burnout. In the first analysis, the results showed a significant effect of WHI on each of the three dimensions of burnout. Where previous studies already showed a significant effect of WHI on emotional exhaustion, we extended these findings by investigating the effect of WHI on each of the three dimensions of burnout, even after controlling for the dimensions identified by Karasek. This supports the suggestion of Cooper and Marshall (1976) that the area of stress is multifactorial and that we should focus on more than one stressor at a time, if we are to draw meaningful conclusions.

Although the strongest effect of WHI was found for emotional exhaustion, also significant effects were found for depersonalization and personal job accomplishment. However, mediational analyses showed that the effect of WHI on depersonalization is partly mediated by emotional exhaustion and that the effect on personal accomplishment is partly mediated by depersonalization and emotional exhaustion. So, WHI primarily causes nurses to feel exhausted and to a smaller extent to develop a more cynical attitude towards care-takers and to feel less personally accomplishment in their job. Since WHI is markedly increasing over the past decade, this finding will show important for the prevalence of burnout.

There are a number of limitations to this work that should be considered in future studies. First, since we used cross-sectional data, we are not able to draw conclusions on the temporal order of the variables (de Lange et al., 2003). In this study, we considered WHI as an extra-organizational stressor, relying on role stress theory (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964) which hypothesizes that participation in one role limits the allocation of resources to other roles (Greenhaus & Beutell, 1985). However, Geurts, Kompier, Roxburgh and Houtman (2003) recently argued, that from this perspective, it remains unclear how WHI should be embedded in the stressor-strain relationship. Although WHI is often found to be a potential source of stress, having adverse effects on well-being (Leiter & Durup, 1996; Rice, Frone, & McFarlin, 1992), several authors have found that work-to-home conflict played a significant role in mediating the impact of work-based stress on well-being (Geurts et al., 2003; Peeters, de Jonge, & Montgomery, 2003; Bacharach, Bamberger, & Conley, 1991). However, Geurts et al. found that WHI played a more crucial mediating role with respect to general (context-free) indicators of well-being than with respect to work-related indicators of well-being. Further research to test the mediational model with respect to work-related outcomes is necessary in order to understand the relationship between work-related stressors and home-related stressors. More recently, Demerouti, Bakker and Bulters (2004) argued that also this mediational model might not be the most appropriate way to picture the relation-

ship between stressors, WHI and strain, and suggested a reversed causation model. In their longitudinal study, they found that work pressure, WHI and exhaustion predict each other over time so that none of these constructs can be considered as only a cause or only a consequence. Therefore, more longitudinal research is necessary in order to clarify the direction of the relationship between job stressors, WHI and strain-related outcomes such as burnout.

Second, in this study, we only included WHI as an extra-organizational source of stress. Other sources could be included as well, such as family problems (Pahl & Pahl, 1971), and life satisfaction and crises (Dohrenwend & Dohrenwend, 1974). For example, Demir, Ulusoy and Ulusoy (2003) found in a sample of 333 nurses that having difficulty in childcare and in doing house chores, health problems of the nurse herself or her children, economic hardships and difficulties encountered in transportation are all factors increasing burnout. It could be interesting to investigate to what extent the influence of these variables on burnout is mediated by home-work interference.

Third, the sample of this study was taken from one occupational group, namely nurses. Since this population is frequently confronted with irregular hours, the construction of the sample might partly explain the explanatory power of WHI with respect to burnout for this sample. Further research with other populations should be done in order to cross-validate these findings.

And finally, the mediational analyses were based on the assumption that burnout is a sequential process with emotional exhaustion leading to depersonalization, which in turns leads to reduced feelings of personal accomplishment. However, this model is not unequivocally supported. Whereas rather strong evidence exists that depersonalization develops in response to exhaustion, the role of the third dimension is rather ambiguous. Reduced personal accomplishment seems to reflect a personality characteristic, rather than a genuine burnout-component (Shirom, 1989; Coders and Dougherty, 1993). This view is supported by the fact that reduced personal accomplishment is related to the "Big five" factors of personality (Schaufeli & Enzmann, 1998). So, at this stage, only tentative conclusions can be drawn on the mediational role of emotional exhaustion and depersonalization between WHI and reduced personal accomplishment. More studies should be done in order to clarify these relationships.

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