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Testing global and specific indicators of rewards in the Effort–Reward Imbalance Model: Does it make any difference?

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The aim of the present study was to investigate relationships between Effort–Reward Imbalance (ERI) and employee adverse health (i.e., psychosomatic complaints, physical symptoms, and exhaustion). The Effort–Reward Imbalance Model was extended by discriminating three specific rewards separately (i.e., salary, esteem, and job security). A sample of 167 health-care workers was used to test the relationship between ERI (i.e., high effort accompanied with low reward) and employee adverse health with multiple univariate logistic regression analyses. Separate analyses were carried out with a composite reward scale and with each of the three specific reward scales as independent variables. The results indicate that the health outcomes of ERI vary depending on the specific reward that was used. Generally, the most adverse health effects were found for employees who reported both high efforts and low rewards, thus supporting the ERI Model. Moreover, the strongest effects of ERI on employee health were found when esteem was used as a reward indicator. Job security also appeared to be an important reward in this respect, whereas salary did not have strong effects as a result of ERI. Although the ERI Model was merely supported by the results, current findings also indicate it is important to separate different kinds of rewards, especially in health-care work in order to capture the complexity of working with clients as well.

Globally, the nature of health-care work has changed rapidly since the early 1990s. One of the most prominent changes is an increased workload (e.g., De Jonge, Vlerick, Büssing, & Schaufeli, 2001). Today's work places high

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psychosocial demands on employees, especially on health-care workers. For example, research has shown that the pace of work has become increasingly induced by patients and clients (Merllié & Paoli, 2001). Due to specific demands and responsibilities (e.g., highly demanding clients), health-care work requires a lot of quantitative as well as qualitative efforts. However, though a high workload is experienced in health-care work, there seems to be no adequate compensation in terms of occupational rewards, such as salary and promotion prospects (Siegrist, 1999).

To shed more light on the specific relationship between work characteristics (such as workload and occupational rewards) and employee health, several theoretical frameworks have been developed. A recent framework is the Effort–Reward Imbalance (ERI) Model at work (e.g., Siegrist, 1996; Siegrist, Siegrist, & Weber, 1986). The ERI Model has a strong sociological focus and emphasizes both the effort and the reward structure of work (Marmot, Siegrist, Theorell, & Feeney, 1999). The model is based upon the premise that work-related benefits depend upon a reciprocal relationship between efforts and rewards at work. More specifically, the ERI Model claims that work characterized by both high efforts and low rewards represents a reciprocity deficit between "costs" and "gains". This imbalance may cause a state of emotional distress, which can lead to strain reactions such as poor subjective health and sickness absence. So, achieving at a high level without receiving much appreciation is an example of a stressful imbalance.

In addition, adverse (health) effects of an effort–reward imbalance may be aggravated by "overcommitment". Overcommitment is seen as a personality characteristic based on those cognitive, emotional, and motivational elements of Type A behaviour that reflect an exorbitant ambition in combination with the need to be approved and esteemed (Hanson, Schaufeli, Vrijkotte, Plomp, & Godaert, 2000; Siegrist, 1998). People characterized by overcommitment tend to exaggerate their efforts and underestimate their rewards. There is evidence that the underlying need for approval and esteem may lead to an underestimation of the challenge (or demanding situation) which results in exorbitant efforts (Siegrist, 1996, 1998). Overcommitment can be defined as the person-specific component of the ERI Model, whereas (extrinsic) efforts and rewards comprise the situation-specific component. The present study focuses on the situation-specific component of the ERI Model.

The empirical evidence supporting the ERI Model is growing rapidly over the past few years. Especially, the situation-specific component of the ERI Model has been studied, and the combination of high effort and low reward at work has been found to be associated with adverse health effects (e.g., Bakker, Killmer, Siegrist, & Schaufeli, 2000; Bosma, Peter, Siegrist, & Marmot, 1998; De Jonge, Bosma, Peter, & Siegrist, 2000; Peter, Geißler, & Siegrist, 1998; Peter & Siegrist, 1997; Stansfeld, Bosma, Hemingway, & Marmot, 1998a; Stansfeld, Head, & Marmot, 1998b). Further, it has been suggested that the model may have

a distinctive contribution for explaining job stress for different kinds of occupational groups (Calnan, Wainwright, & Almond, 2000). In this respect, Marmot and colleagues (1999) argued that an imbalance between high efforts and low rewards is frequent among service occupations such as health-care professionals. The present study therefore aims to provide more knowledge about the mechanisms of the ERI Model in health-care work.

Siegrist and Peter (1997) developed measurement instruments to measure both efforts and rewards at work. More specifically, these measures can be considered global indicators as they combine different efforts and rewards in respective scales (De Jonge & Dormann, 2002). This seems to be at least doubtful with regard to the reward construct of the model. The ERI Model defines three experience levels of occupational rewards (i.e., salary, esteem, and job security/career opportunities), with specific rewards on each level. Usually all specific rewards (i.e., salary, adequate support, fair treatment, respect, promotion prospects, no undesirable change, job security, and status consistency) are measured separately and are later summarized into one global reward indicator (see, for example, Peter et al., 1998). The use of one global reward indicator implies that all rewards are equal, or at least equally distributed. The disadvantages of using one global indicator are that it is not clear whether specific rewards can have different effects, and that particular effects of rewards are hard to find since effects may have been averaged (for example, a low score on salary may be compensated by a high score on esteem). To obtain a more precise view of which rewards are related to which indicators of employee health, we will measure three occupational rewards separately (representing the three experience levels of rewards: salary, esteem and security), and accordingly analyse them separately, from an effort–reward imbalance point of view.

From a theoretical perspective, it could be argued that occupational rewards such as salary and security are conceptually different from rewards such as esteem. For example, Maslow's need hierarchy (1954) suggests that there is an hierarchical order in needs and need fulfillment. That is, more basic needs have to be fulfilled, before higher order needs can be fulfilled (cf. Kamalanabhan, Uma, & Vasanthi, 1999). With regard to occupational rewards, it might be expected that salary and security can be considered safety needs (a more basic kind of need), whereas esteem can be considered a social need (a higher order need). Thus, if employees have worries about their salary or job security, they might be less likely to pay a lot of attention to the esteem they receive. But, if those basic needs are satisfied, more motivational aspects in the job might become more important.

From a practical perspective, it also seems important to distinguish specific rewards, especially in health-care work. In human service work, it is often mentioned that employees see their profession as a vocation/mission. For example, Harrison (1983) notes that the predominant motivation for "helpers" to continue their work is the knowledge that they have a beneficial effect in a

selected part of the social environment. For health-care workers this could mean that rewards related to the knowledge that they have a beneficial effect on their clients are most important. The meaning of the reward is more important than the reward itself. If the reward conveys the message that the employee did a good job (i.e., beneficial effects on clients), this is more important than a predetermined reward. Furthermore, health-care work is based on working with people, which places high psychosocial and emotional demands on the employees. Therefore, esteem in particular, as a social resource, might be an adequate compensation for those client-related demands, rather than rewards that are more related to job conditions (De Jonge & Dormann, 2002).

In conclusion, esteem seems to be one of the most important rewards in health-care work. Basic needs (such as salary and job security) mostly have been fulfilled, and therefore social needs seem more important. In addition, esteem is directly related to recognition and therefore includes the message that employees are competent in their job, and esteem seems to be the best resource to counteract demands in health care.

As financial budgets are low in today's health care, it is difficult to reward employees by means of a high salary. The salaries are restricted by rules in collective agreements, and are seldom used as recognition for the job. Because it is possible to give an employee a salary increase for motivational reasons, we believe it is a more important reward than job security. Since today's health-care sector has a shortage of good qualified personnel (Pool & Van Dijk, 1999), job security is relatively high (at least in The Netherlands). Therefore, job security is (at this moment) not considered an important reward in terms of recognition in health-care work. Besides, most health-care workers are still part-time workers and/or secondary earners. Secondary earners are more concerned about intrinsic satisfaction than about extrinsic rewards at work, such as salary and prestige (Calnan et al., 2000; Martin & Hanson, 1985). Hence, being a secondary earner, job security and salary are probably not the main reasons to work in health care.

To summarize, it can be argued that it is important to measure occupational rewards separately rather than using a global reward indicator, because of their different values and meanings for health-care workers. This has practical implications for health-care organizations as well, as more specific interventions could be suggested on the basis of specific rewards. Almost needless to say, a pat on the back is very different from receiving a pay rise as a reward, both for employees and the organization.

Based on the ERI Model, it is generally hypothesized that a combination of high efforts and low rewards (i.e., a global measure of rewards) will have an adverse effect on employee health outcomes. Furthermore, it is specifically hypothesized that: (1) effort–reward imbalance (i.e., high efforts in combination with low rewards) using esteem as a reward indicator will have the most adverse effect on health outcomes in health-care workers; (2) effort–reward imbalance

involving salary as a reward indicator will have a moderate effect on employee health outcomes; and (3) effort–reward imbalance using job security as a reward indicator will have the least profound effects on employee health. Finally, negative affectivity (i.e., the disposition to react negatively to questionnaires) was included as a control variable. Negative affectivity may act as a nuisance variable by inflating correlations between work characteristics and self-reported health (Brief, Burke, George, Robinson, & Webster, 1988; Dollard & Winefield, 1998).

METHOD

Procedure and participants

The study sample consisted of 167 out of 244 employees from two Dutch nursing homes (response rate was 68%). Mostly, the sample included nurses' aides (65.2%). The other professions included in the sample were housekeeping (9.6%), kitchen staff (10.8%), receptionists (6.0%), administration (1.8%), technical department (1.2%), P&O (1.2%), and an unclassified category (4.2%). In the spring of 1999 self-report questionnaires were distributed in the two organizations. In order to guarantee anonymity, the completed questionnaire could be returned in a sealed envelope. Demographics indicate that 94% of the respondents were female and 6% were male. Age ranged from 16 to 58 years (M = 39.0, SD = 9.9). The mean job tenure was 7.6 years (SD = 6.4). Respondents worked 19.0 hours a week (SD = 8.9) on average, and 39% worked in regular duty and 61% in unregular duty.

Measures

Gender, age, working hours (full-time, part-time), job sector, and managerial level (high, middle, low) were included as control variables, because they may confound the relationship between work factors and health outcomes (e.g., Bosma et al., 1998; Schaufeli & Enzmann, 1998). Negative affectivity was measured by the negative affectivity subscale of the PANAS (Watson, Clark, & Tellegen, 1988), containing 10 items. Respondents were asked to indicate how they feel in general on a five-point scale (ranging from 1 "very slightly or not at all" to 5 "extremely"). For instance, "I feel irritable in general". Cronbach's alpha is .80.

Perceived efforts (i.e., psychological job demands). These were measured by an eight-item scale of De Jonge, Landeweerd, and Nijhuis (1993). The questionnaire measures both qualitative and quantitative demanding aspects of the job, such as working under time pressure, working hard, strenuous work, and job complexity. The questionnaire has a five-point response scale ranging from 1 "never" to 5 "always", and the internal consistency (Cronbach's alpha) is .92.

The items of "perceived efforts" as well as the items of "occupational rewards" have been included in the Appendix.

Occupational rewards. These were measured with 10 items, using a four-point response scale ranging from 1 "certainly not" to 4 "most certainly". The items belong to three subscales, which reflect the occupational rewards in the ERI Model. The subscales are:

- *Salary* was measured by one original and one reformulated item of the Dutch questionnaire on the Experience and Evaluation of Work (Van Veldhoven, de Jonge, Broersen, Kompier, & Meijman, in press). The items are about being paid enough and being paid fairly for your work. The items have an intercorrelation of .76 ($p < .01$).
- *Esteem,* reflected by respect and adequate support was measured with four items of the Dutch Organizational Stress Questionnaire (Bergers, Marcelissen, & de Wolff, 1986). Cronbach's alpha is .70.
- *Security,* reflected by job security, was assessed with four (reformulated) items of the Dutch Organizational Stress Questionnaire (Bergers et al., 1986) and of the Maastricht Risk Inventory (De Jonge & Nijhuis, 1995). Cronbach's alpha is .77.
- In addition, *Composite reward* consisted of all rewards as suggested by Siegrist and Peter (1997). This measure was also used in a previous study among ancillary health-care workers (Van Vegchel, de Jonge, Meijer, & Hamers, 2001).

Psychosomatic health complaints. These were measured by a 13-item questionnaire (cf. Dirken, 1969; Jansen & Sikkel, 1981; Joosten & Drop, 1987). The questionnaire consisted of the responses 1 "yes" and 0 "no". The internal consistency, as indicated with KR-20, is .76. An example item is: "Were you troubled by headaches, during the past six months?"

Physical health symptoms. These were measured by four items derived from a well-validated questionnaire developed by Hildebrandt and Douwes (1991) with the possible response 3 "yes", 2 "sometimes" and 1 "no". An example item is: "During the past six months, did you have trouble with your lower back?" Cronbach's alpha is .68. The questionnaire asks whether the respondent was troubled by the following physical symptoms during the past six months: (1) neck/shoulders, (2) middle of your back, (3) lower back, and (4) limbs (arms or legs).

Exhaustion. This was assessed by a subscale of the general Utrecht Burnout Scale (UBOS; Schaufeli & van Dierendonck, 2000), the Dutch version of the Maslach Burnout Inventory—General Survey (Schaufeli, Leiter, Maslach, &

Jackson, 1996). Contrary to other burnout scales, this scale can be used independently of the kind of job. The scale contained five items with a seven-point response scale ranging from 0 "never" to 6 "always, daily". Cronbach's alpha is .89. An example item is: "I feel emotionally drained from my work."

Statistical analyses

Multivariate logistical regression analyses[1] were used to determine the relationships between effort–reward imbalance and employee health. To make those analyses possible, dichotomous variables of demands and rewards had to be created, as suggested by Siegrist and Peter (1997). First, average scores on demands ("efforts") were dichotomized by coding the most adverse tertile as 1 ("high demands") and the other two tertiles as 0 (cf. Bosma et al., 1998). Second, in a similar vein, the three reward indicators (i.e., salary, esteem, and job security) were all dichotomized separately, using the most adverse tertiles to indicate low rewards. Finally, for all three different rewards (i.e., salary, esteem, and security), an effort–reward imbalance indicator was computed by creating four independent categories (cf. De Jonge et al., 2000; Karasek & Theorell, 1990): (1) low efforts and high rewards (i.e., the reference group), (2) high efforts and high rewards, (3) low efforts and low rewards, and (4) high efforts and low rewards.

Following Menard (1995), the indicators for employee health were constructed by coding the adverse 10% of the average employee health scores as poor employee health (which is the highest part for psychosomatic health complaints, physical health symptoms, and exhaustion). Multivariate odds ratios (ORs) and 95% confidence intervals (CIs) were derived from the logistic regression models. Since the reference group is always coded as 1.00, the OR is significant when 1.00 is beyond the range of the CI (i.e., indicating whether a specific group differs significantly from the reference group). In all analyses, gender, age, employment status (full-time, part-time), job sector, managerial level (high, middle, low), and negative affectivity were controlled for. Except for age and negative affectivity (continuous variables), these variables were in the analyses represented as dummy variables.

RESULTS

Pearson correlations of the study variables are shown in Table 1. Perceived efforts were positively correlated with all outcome variables (i.e., psychosomatic health complaints, physical symptoms, and emotional exhaustion). The

[1]In the present study multivariate logistic regression analyses were performed, as suggested by the founders of the ERI Model. In addition, this allows a fair comparison with other ERI studies published. However, as our study sample is relatively small, we also conducted several analyses of variance for each outcome variable. These analyses showed in general that the results were nearly identical to the results produced by multivariate logistic regression analyses.

TABLE 1
Pearson correlations of the study variables (listwise $n = 156$)

		1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Age	—												
2.	Gender	.151	—											
3.	Working hours	.010	.275**	—										
4.	Job sector	.100	.303**	.032	—									
5.	Managerial level	.051	.381**	.363**	.292**	—								
6.	NA	−.092	.183*	.257**	−.171*	−.045	—							
7.	Perceived efforts	.041	−.026	.495**	−.267**	−.019	.348**	—						
8.	Composite reward	−.054	.067	−.015	−.047	.088	−.134	−.030	—					
9.	Salary	.058	.087	−.271**	.153	.045	−.149	.410**	.342**	—				
10.	Esteem	−.172*	−.013	.032	.025	−.028	.042	.046	.461**	−.048	—			
11.	Job security	.073	−.026	−.032	−.142	−.122	.018	.080	.459**	−.086	.042	—		
12.	Psychosomatic health complaint	.099	−.016	.245**	−.241**	−.070	.371**	.414**	−.095	−.141	−.058	.029	—	
13.	Physical symptoms	.080	−.001	.104	−.239**	−.242**	.300**	.337**	−.132	−.056	−.121	.059	.603**	—
14.	Exhaustion	.020	−.060	.290**	−.239**	.031	.467**	.469**	−.258**	−.282**	−.083	−.093	.606**	.331**

*Correlation is significant at the .05 level.
**Correlation is significant at the .01 level.

composite reward, as well as salary, were negatively correlated with emotional exhaustion.

Table 2 shows the results of the logistic regression analyses using psychosomatic complaints, physical symptoms and exhaustion as outcome variables and effort–reward imbalance as the independent variable. The first row containing rewards shows the results of the hierarchical regression analyses using one global reward indicator/composite measure. The ERI indicator (i.e., high efforts and low rewards) is associated with elevated risks of physical symptoms and psychosomatic health complaints. The risk of physical symptoms is almost nine times as high for employees who reported high efforts and low rewards (OR = 8.88) as that for employees who have low efforts and high rewards. The risk of psychosomatic complaints is about five and a half times as high for employees who have both high efforts and low rewards (OR = 5.49). However, the OR for exhaustion was not significant in the high effort—low reward imbalance condition. Remarkably, health-care workers who have high efforts as well as *high* rewards have an elevated risk of exhaustion and physical symptoms (ORs are 9.39 and 6.23, respectively).

To obtain a more refined view of the specific rewards involved in the relation between effort–reward imbalance and employee health, results will be presented of the logistic regression analyses, using salary, esteem and job security, respectively, as reward indicators.

Salary

One effect of an effort–reward imbalance (i.e., high efforts and low reward/salary) could be found for exhaustion with salary as a reward indicator (shown in the second row containing rewards of Table 2). The risk of exhaustion is more than seven times as high for employees with both high effort and low salary than for employees who report low effort and high salary (OR is 7.77). Remarkably, for all health indicators (i.e., psychosomatic complaints, physical symptoms, and exhaustion) an elevated risk is found for employees with both high efforts and *high* rewards/salary (ORs are 9.51, 4.55, and 5.08, respectively).

Esteem

As can be seen from the third row with rewards in Table 2, the effort–reward imbalance indicator, using esteem as the reward measure, is associated with all employee health indicators. The risk of exhaustion and psychosomatic complaints is very high for employees with both high effort and low esteem in comparison with employees who report jobs with low effort and high esteem; more than 15 times as high for exhaustion, and almost 14 times as high for psychosomatic complaints (ORs are 15.63 and 13.95, respectively). Furthermore, the risk for physical symptoms is almost six times as high (OR is 5.88). Also, elevated risks are found for health-care workers with both high effort

TABLE 2

Odds ratios (ORs)* and 95% CIs of poor employee health by ERI using salary, esteem, and job security as reward indicators (n = 167)

Efforts = psychological demands	*Psychosomatic complaints*	*Physical symptoms*	*Exhaustion*
Number (events)	167 (21)	167 (22)	167 (35)
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Composite rewards			
Low efforts and high reward	1.00	1.00	1.00
High efforts and high reward	2.89 (0.87–9.56)	6.23 (1.24–31.18)	9.39(1.35–65.23)
Low efforts and low reward	1.59 (0.37–6.79)	5.71 (0.92–35.39)	5.64(0.49–64.25)
High efforts and low reward	5.49 (1.36–22.11)	8.88 (1.47–53.57)	6.80(0.84–54.93)
Salary			
Low efforts and high salary	1.00	1.00	1.00
High efforts and high salary	9.51 (2.22–40.71)	4.55 (1.12–18.55)	5.08(1.46–17.62)
Low efforts and low salary	0.60 (0.04–8.14)	0.00 (0.00–1.22^{E+30})	3.14(0.60–16.29)
High efforts and low salary	2.44 (0.48–12.43)	2.15 (0.50–9.30)	7.77(2.15–28.10
Esteem			
Low efforts and high esteem	1.00	1.00	1.00
High efforts and high esteem	3.63 (0.64–20.65)	6.18 (1.17–32.76)	8.35(1.85–39.43)
Low efforts and low esteem	1.67 (0.29–9.41)	2.41 (0.47–12.36)	5.11(1.06–24.63)
High efforts and low esteem	13.95 (2.59–74.99)	5.88 (1.03–33.36)	15.63(3.15–77.62)
Job security			
Low efforts and high job security	1.00	1.00	1.00
High efforts and high job security	4.17 (0.96–18.03)	2.91 (0.71–11.98)	7.87(2.02–30.64)
Low efforts and low job security	0.69 (0.11–4.29)	0.81 (0.16–4.24)	3.57(0.76–16.73)
High efforts and low job security	9.00 (1.57–51.76)	7.37 (1.28–42.58)	10.96(2.02–59.42)

* Adjusted for gender, age, working hours (full–time vs. part–time) , job sector, managerial level and negative affectivity.

and *high* esteem of physical symptoms and exhaustion (ORs are 6.18 and 8.35, respectively). For exhaustion an elevated risk is also found for employees with both *low* efforts and low esteem (OR is 5.11).

Job security

The results in the last row of Table 2 show that the effort–reward imbalance indicator (i.e., high efforts and low job security) is associated with elevated risks of psychosomatic complaints, physical symptoms and exhaustion. The risk of psychosomatic complaints, for example, is nine times as high for employees who have both high efforts and low job security (OR = 9.00) as that for employees with low efforts and high job security. The risks of physical symptoms and exhaustion are about seven and eleven times as high (ORs are 7.37 and 10.96, respectively). Also, it is worth mentioning that employees who have high efforts as well as *high* job security have an elevated risk of exhaustion (OR is 7.87).

In general, there are nine possible conditions as a result of the logistic regression analyses using specific rewards (i.e., effort–reward imbalance indicator using three specific rewards by three health indicators). For all conditions, the strongest odds ratios are found for health-care workers who report high efforts at work. Six times a combination of high efforts and low rewards (i.e., effort–reward imbalance) shows the highest odds ratios, and three times a combination of high efforts and high rewards is the strongest predictor for adverse health. The strongest elevated risks are found with regard to emotional exhaustion. Finally, the strongest odds ratios involving exhaustion are all in the expected direction, that is the strongest elevated risks are found for employees who report both high efforts and low rewards.

DISCUSSION

The purpose of the present study was to evaluate the Effort–Reward Imbalance Model (Siegrist, 1996, 1998) in health-care work, incorporating both a global and a multidimensional measure of occupational rewards into the model. In general, it was hypothesized that health-care employees with high efforts in combination with low occupational rewards (global measure) would show an elevated risk of impaired health. Using specific measures of rewards, it was assumed that (1) a high effort–low reward imbalance incorporating esteem as a reward would have the most detrimental health effects, (2) salary was hypothesized to have average adverse health effects, and (3) job security was assumed to have the lowest adverse health effects. The findings demonstrate that indeed there are different results for different types of rewards, indicating the importance of separating the different types of occupational rewards.

Effort-reward imbalance theory

In general, the results indicate that it is useful to make a distinction between different types of rewards; that is, salary, esteem, and job security. Further, different kinds of rewards are, in combination with a psychological effort indicator, differentially associated with the various health outcomes (i.e., psychosomatic complaints, physical symptoms, and exhaustion). This result is strengthened by the analysis using one global reward indicator making it possible to compare those results with the results of the more specific rewards. Using the global reward indicator, no effects of a high effort–low reward imbalance were found for exhaustion. By conducting the analyses with the different reward indicators, effects can be discovered for exhaustion for *all* reward indicators. A possible explanation is that by using only one global reward indicator the effects were averaged accompanied by a loss of power. As a result, employees who are at risk caused by a specific reward are wrongly categorized, ending up into the high effort–high reward category instead of the high effort–low reward category. By using specific reward measures respondents are properly classified in the category where you expect them to be. The same applies to psychosomatic complaints and physical symptoms, albeit to a lesser extent. The inferred health outcomes of rewards and psychological demands vary depending on the specific facet of reward.

A high effort–low reward imbalance shows the strongest elevated risks with regard to exhaustion. For exhaustion this imbalance leads to elevated risks, regardless the type of reward used. For psychosomatic complaints, high effort–low reward was twice the strongest predictor of poor employee health, while only once was it the strongest predictor for physical symptoms. This sequence in outcomes is not very surprising, considering the ERI Model initially has been developed to explain cardiovascular diseases (CVD) and related outcomes (Siegrist, 1996; Siegrist & Matschinger, 1989). Appels and colleagues (Appels & Mulder, 1988; Appels & Schouten, 1991) found that vital exhaustion, a concept very close to our measure of exhaustion, was predictive of future cardiac events. Furthermore, they reported that the state of vital exhaustion before myocardial infarction was associated with an earlier state of being burned out (exhaustion is the most important component of burnout). In another study, Appels, Siegrist, and de Vos (1997) found strong independent effects of vital exhaustion and chronic workload (operationalized as a high effort–low reward imbalance) on acute myocardial infarction. Those results suggest that an effort–reward imbalance (i.e., high efforts and low rewards) could lead to cardiac events, but also that this relationship could be mediated by (vital) exhaustion.

Six out of nine specific logistic regression analyses showed that the most adverse health effects were found for employees reporting an effort–reward imbalance (i.e., high efforts and low rewards), supporting the ERI Model. The other three times a combination of high efforts and high rewards was the

strongest predictor for poor health. To gain more insight into the particular relationship between each specific reward (i.e., salary, esteem, and job security) in combination with psychological effort on the one hand, and employee health on the other hand, we will focus on each reward indicator separately.

Salary. Although, salary once showed an elevated risk was found due to an effort–reward imbalance (i.e., high effort and low salary), more important was the combination of high effort and *high* salary, which showed elevated risks for all outcome variables. A possible explanation might be that salary has a constant effect after a certain threshold: Health neither improves nor deteriorates by adding more salary (cf. Vitamin Model of Warr, 1987). Or in Maslow's terms (1954), if the basic need of salary has been fulfilled (i.e., safety need), the higher order needs become more important (for example, social needs).

Another explanation could be that salary is only an adequate compensation factor ("reward") for specific health outcomes (cf. De Jonge & Dormann, 2002). In general, occupational rewards and health outcomes will be more closely related if they are connected by qualitatively similar processes. Ideally, for instance, emotional-laden rewards should buffer emotional-laden health outcomes. Exhaustion as measured in our study is merely based on affective and emotional aspects, whereas psychosomatic and physical health outcomes are less emotional. Our measure of salary is also affective and emotional in nature (i.e., fair and enough salary). This would imply that salary is a less adequate compensation factor for psychosomatic and physical health complaints.

Esteem. All health indicators showed an elevated risk for employees who reported high efforts and low esteem. In addition, an elevated risk for physical symptoms was found for employees with both high efforts and *high* esteem. A possible cultural explanation could be that nurses (or their aides) do not complain easily and the most respected employees are the ones who work hardest (for example, take care of the most difficult/heavy clients, wash more clients in less time). This means that it is possible that employees put a lot of (extra) effort into their job to deserve respect from their colleagues. Being respected, in turn, could motivate the employee to put even more effort into the job. This could lead to a physical overload in the long run. This also indicates that esteem probably is not the right reward to counteract physical symptoms during high psychological demands (cf. De Jonge & Dormann, 2002). For example, ergonomic improvements are more likely to be effective against physical symptoms.

For exhaustion, all odds ratios were significant. Since the reference category exists of employees with both low efforts and high esteem, the significant odds ratios can be interpreted as a main effect of high effort and a main effect of low esteem, with in addition an interaction effect of both high efforts and low rewards.

Job security. Employees reporting a mismatch between their (high) efforts and (low) rewards (i.e., job security) had elevated risks for psychosomatic complaints, physical symptoms, and exhaustion (all health indicators). In addition, an elevated risk for exhaustion was found for employees with both high efforts and *high* job security. Possibly, employees with a permanent position (high job security) work harder, since the interaction effect has been explained mostly by the effect of high effort and high job security (this could also be true for psychosomatic complaints, although this result did not reach significance).

Effort–reward balance? Significant effects were also found for the *high* effort–*high* reward condition as well. These results are in line with previous research, which also found some effects of the "high-high" situations (see also De Jonge et al., 2000; De Jonge & Hamers, 2000). Two implications can be drawn from this. First of all, it seems important to distinguish between the four work situations (i.e., low effort–high reward, high effort–high reward, low effort–low reward, and high effort–low reward). Second, sometimes significant odds ratios were reported for both the high effort–low reward condition and the high effort–high reward condition. On the one hand, this implies a main effect of high efforts, especially on exhaustion (and also on physical symptoms). This result indicates that high efforts (i.e., demands) are primarily related to exhaustion (cf. Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). On the other hand, it could be that particular efforts should match the reward measure in order to enhance or diminish employee health (cf. "match"-hypothesis; Cohen & Wills, 1985; Frese, 1999). That is, effects as a result of a high effort–low reward imbalance are more likely to be observed if particular efforts are investigated that are theoretically similar to specific rewards.

Methodological considerations

Several limitations of this study need to be taken into account. First, this study is based on a cross-sectional design. Theoretically, the ERI Model guided our main hypothesis about causal relationships, which was empirically supported by a few longitudinal studies (cf. Bosma et al., 1998; Stansfeld, Fuhrer, Shipley, & Marmot, 1999). Further, though we used proxy measures for effort and reward, we still found support for the ERI Model, indicating an effect of effort–reward imbalance regardless of the original or proxy measure being used. Although those results are in favour of our study, more specific longitudinal studies are required to interpret the causal connections between effort–reward imbalance using specific rewards and employee health in health-care work (see Zapf, Dormann, & Frese, 1996).

Second, since the current results were obtained solely by self-report questionnaires they may be contaminated by common method variance. We did try to reduce this problem by controlling for negative affectivity (e.g., see Dollard

& Winefield, 1998). Added to this, we operationalized job characteristics in quite different terms than the outcome variables (i.e., a minimum of cognitive processing) and measured the indicators with different response formats (cf. De Jonge, Mulder, & Nijhuis, 1999).

Third, the research group is relatively small in order to provide a robust model test, which might also be a reason for the relatively large confidence intervals. Further research, incorporating a larger sample of health-care workers, would be valuable in extending and cross-validating the present findings.

CONCLUSION

The main assumption of the ERI Model was supported. That is, the most adverse health effects were found for health-care workers who reported both high efforts and low rewards. Moreover, employee health outcomes varied depending on the specific reward indicator. In line with our assumptions, the strongest effects of a high effort–low reward imbalance were found when esteem was used as a reward indicator. In case of salary as a reward indicator, the high effort–low reward condition did not show significant elevated risks for psychosomatic complaints and physical symptoms. However, high efforts in combination with high salary did show elevated risks. That is, salary can be seen as an appreciation for work, and therefore is merely an adequate compensation for emotional aspects (such as emotional exhaustion). Contrary to our assumptions, job security was also an important reward indicator. The effort-reward imbalance indicator using job security as a reward showed elevated risks for all health outcomes. Although in general job security showed less adverse health effects in comparison with esteem during effort–reward imbalance (i.e., high efforts and low rewards), job security did have more severe health effects than salary during effort–reward imbalance. A possible explanation might be that, although it is easy to find a job for health-care workers, people feel better having a steady job to cope efficiently with costs in society (such as paying a mortgage). All in all, the present study shows that the ERI Model is an important model for explaining employee health and that a distinction between specific rewards might be a fruitful extension of the ERI Model, especially in health-care work.

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APPENDIX

Effort and reward scales (translated from Dutch)

Perceived efforts (i.e., psychological demands)

In the unit where I work:

1. Work is carried out under time pressure
2. There are peaks in the work
3. Staff have to work too hard
4. Too much work has to be done
5. There is too little time to finish the work
6. The pace of work is too high
7. The work is mentally exacting
8. The work is too complicated

Occupational rewards

Salary:

1. Do you think you are being paid enough for the work you do?
2. Do you think you are fairly paid for the efforts you make?

Esteem:

1. To what extent can you count on your supervisor, when you have difficulties at work?
2. To what extent can you count on your colleagues, when you have difficulties at work?
3. Do you feel appreciated in your job, by your supervisor?
4. Do you feel appreciated in your job, by your colleagues?

Security:

1. Do you expect that you will still have a job in 1 year's time?
2. Do you expect that you will still be in your current position next year?
3. Do you expect that your knowledge and skills will still be of use in 1 year's time?
4. How secure is your job?