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Risk-factors for stress-related absence among health care employees: a bio-psychosocial perspective. Associations between self-rated health, working conditions and biological stress hormones

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Abstract

Background: Stress is a major cause of sickness absence and the health care sector appears to be especially at risk. This cross sectional study aimed to identify the risk factors for absence due to self-reported stress among health care employees. Methods: 225 health care employees were categorized into two groups based on presence or not of self-rated sickness absence for stress. Questionnaire data and stress sensitive hormones measurements were used.

Results: Employees with stress related sick leave experienced worse health, poorer work satisfaction as well as worse social and home situations than those employees without stress-related sick leave. No-significant differences were identified regarding stress-sensitive hormones. The risk for employees, not satisfied at work, of becoming absent due to stress was approximately three fold compared to those who reported being satisfied (OR 2.8, 95% confidence interval; (CI) 1.3 - 5.9). For those not satisfied with their social situation, the risk for sickness absence appeared to be somewhat higher (OR 3.2; CI 1.2 - 8.6).

Individual factors such as recovery potential and meaning of life as well as work related factors such as skill development and work tempo predicted employee' s work satisfaction.

Conclusions: Based on cross sectional data, work-site and individual factors as well as social situations appear to increase the risk for absence due to stress among health care employees. Lower recovery potential, higher work tempo and poor leadership appeared to be related to the high degree of work related exhaustion experienced by employees.

Key words: sickness absence, working conditions, stress hormones, health care employees

Introduction

The occupational and public health impact from stress-related disorders is a growing challenge in a large proportion of European countries. In Sweden, statistics indicate that stress-related absence is one of the leading causes for sickness absence. It has been shown that sickness absence is related both to a person's somatic and mental well-being as well as the person's perception of his/her work organisation [1,2]. Several explanations have been put forward for the increase in sickness absenteeism. Risk factors include personal health characteristics, socioeconomic factors such as income and education, work conditions, organisational changes, demands vs. control at work, possibilities to influence at work and dissonance between efforts put in at work and rewards received. Furthermore, studies have identified a large number of factors in the psychosocial work environment that are related to psychological well-being and employee health which in turn is related to absenteeism and delayed return to work following injury and disease. [1-5] Although many studies have reported a large number of risk factors for sickness absence, actually over 200 [3,6-9], there is still no consensus as to the true underlying reason for the increased absence observed in Sweden and many other Western European countries. Some researches, however, suggest that associations between psychosocial work factors and ill health are more widespread among employees in health care than in other occupations [9,10]. Studies have also established that there are significant associations between sick leave and self-rated health, work conditions and biological stress markers [11,12].

The reason why the health care sector appears to be especially at risk for sickness absence is not known. However, within the health care sector there is commonly a collection of risk factors for

sickness absenteeism, including both physically and mentally taxing work conditions [1,9].The nature of the work is demanding with work load, shift work and internal (efficacy, high levels of quality, employees' own demands) as well as external (from patients, social insurance etc) demands [10]. Evidence has also emphasized that sickness absence in the health care sector is associated with poor management style and lack of goals [3, 9]. A study [7], concerning the work environment and well-being among health care employees in Sweden and Great Britain, suggested that the presence of goals, the relationship between employee and employer, personnel development, the possibility of participating in and having influence at work, were factors of importance for employees' well-being and work satisfaction [8,13,14]. Furthermore, physicians who could manage stressful situations in a satisfactory way were more satisfied with their work than those who could not.

In order to improve the management of the current epidemic of increased sickness absenteeism in Sweden, there is an obvious need to better understand the risk factors as well as the protective factors related to sickness absence, especially stress-related absence. Furthermore, we believe that such an assessment should not only include individual, occupational and organizational factors, but also biological markers, which might help to broaden our perspective of risk factors.

More specifically the aim of this study was to investigate the associations between health, social and work-related factors, recovery, as well as biological stress markers among health care employees with and with out sick leave due to self-reported stress (employees at work or sick-listed at the time for the measurement with perceived stress as a reason for their sickness absence during the last year).

Hypotheses

The following hypotheses were tested:

- the risk for stress-related sick leave is higher for employees experiencing poor work conditions than those who are not satisfied in their work.
- Health care employees with stress-related sick leave have a more detrimental stress hormone profile (lower anabolic restorative hormones levels and higher catabolic hormone levels) as compared to employees with no stress-related sick leave.
- Recovery potential is positively associated to the level of self-reported health.

Methods

Based on a high degree of absence due to sickness in a local authority a total of 278 employees in six units from the Division of Elder Care were invited to participate in a bio-psychosocial study.The six units represented all types of activities carried out within the division (home-help service; elderly homes and individual assistance).The population also included the managers from the six units. In total 225 employees (81%) participated in the study, of which about 7% were men. The population was categorized into two groups based on the question "*Have you, during the last year, been on the sick list for something you feel is related to stress?".* Response alternatives were: *yes or no*. One group consisted of employees (n = 145) being at work at the time of the investigation and with no perceived stress related sick leave during the last year, while the other group (n=63) consisted of employees, at work or at sick list, with sick leave, during the last year, due to conditions they perceived were stress-related. This resulted in a total population of 208 employees. The selection resulted in a third group of 17 employees, who were not eligible because they did meet the study criteria, as they had been absent from work due to non-stress related circumstances. The final percentage of men participating in the study was now 5% (n=8), with no men in the stress related sick leave group. After testing for differences between the groups, depending on whether the men were included or not, we did not find any significant differences.Thus we decided to include the men in all of the analyses except for the analyses of the biological hormones. The internal dropout of different variables varies between one to three answers but for the variable gender, the highest dropout rate was 48 missing answers.

The sex, age and education of the population are described in Table 1.

The sample was representative of the entire workforce with regards to all sectors of activities in elderly care. Self-rated questionnaire data and biological blood measurements were used. All data were collected during October-November 2003 and there were no differences in the participation rates between the data collections from the six units.

Questionnaire

The questionnaire included the following areas: background questions (work place, gender, age, educational levels, civil status, gainfully employed, children living at home and existence of sick-leave or not). These questions were presented as multiple-choice questions. Furthermore, single questions relating to self-rated health, meaning of life, work satisfaction, social situation and home situation were included in the questionnaire,

Table 1. Numbers (n) of employees, gender, age and education in the study and in different groups

	No stress-related absence (n)	Stress-related absence (n)	Total (n)
Number of employees in the study[1]	145	63	225
Gender			
Female	107	45	152
Male	8	0	8
Age			
18-34	34	10	44
35-44	35	18	53
45-54	39	17	56
>55	35	18	53
Education			
No specific care profession	40	12	52
High school (with care direction)	14	3	17
Nurse assistant	61	35	96
Nurse	2	3	5
Other education	25	9	34
Marital status			
Married/live-in partner	117	43	160
Single	27	20	47
Gainfully employed at the moment			
Full-time job	65	21	86
Part-time employment	77	35	112
Not at the moment	0	7	7

[1]*There were 17 individuals excluded in the study based on the study design*

these were all measured using a Visual Analogue Scale (VAS) expressed as a percentage from 0% - 100%, with 0 as the lowest possible value and 100 as the highest. All questions have been used in prior studies [1,15].A recovery potential index (R) was constructed from the following recovery and coping questions developed to assess how the participants rate their abilities to recover from and cope with their life stressors: "Do you feel thoroughly rested when you wake up? Do you find it difficult to sleep in the evening?; I devote all the time I need for relaxation; I give priority to recovery in my daily life; and I can easily make a real effort when it its necessary". Each item was measured by VAS from 0 – 100 percentage. The constructed index had a Cronbach's alpha of 0.62.

In part, the Quality Work Competence (QWC) questionnaire [15,16] was used, which is a valid and published questionnaire that has been designed for the assessment of organizational and employee well-being. In this study we used nine indices from the QWC questionnaire, called enhancement areas: work climate, work tempo, work-related exhaustion, participatory management, skills development, and clarity of organizational goals, leadership, employee ship and efficiency. Each enhancement index consists of three to seven items with standard Likert check-off scales. Response alternatives were typically: disagree strongly, disagree somewhat, agree partly to agree strongly, or alternatively no-never, no-rarely, yes – sometimes and yes – most of the time. All indices were converted into percent scores. The percentage scores on the enhancement indices ranged from a possible low of 0% to a high of 100%. The indices have a target level that is recommended for organizations to achieve or surpass. For all scales except work tempo and work- related exhaustion, higher scores are more desirable [1,11,15]. The QWC assessment areas and target levels for each enhancement area are presented in Table 2.

The questionnaire was coded and distributed to all employees by a respective supervisor during a two week period. The answers were sent back anonymously to the director of research.

Stress-related hormones

Blood samples were taken and analyzed for the stress-responsive hormones: serum cortisol, prolactin, testosterone and DHEA-S (dehydroepiandrosteronesulphate), these hormones have been examined in a number of studies with the aim to measure work-related stress [16-20]. A nurse from the Occupational Health Care System was responsible for taking all of the blood samples. The total number of participants who provided blood samples was 79% (n=219). The blood samples consisted of venous blood taken in the morning between 07.30 – 09.30 a.m. after fasting overnight in order

Table 2. The QWC assessment areas and Target levels

QWC index	Assessment areas	Target level
Work climate	Positive atmosphere at work, cohesion among co-workers, supportive atmosphere among co-workers.	›70
Work tempo	Time for planning work duties in advance, sufficient time to execute tasks, time to reflect upon/consider how tasks had been carried out, time to consider how work processes could be improved in ones department.	35-40
Work related exhaustion	Feelings of emptiness after work, feeling of exhaustion after work, and tired when thinking about work.	‹30
Participatory management	Latitude for deciding how work should be done, latitude for deciding what tasks should be done, sufficient influence in relationship to responsibilities, opportunity to influence workplace decisions, opportunity to comment on the information received from immediate supervisor, actual influence over workplace decisions in relationship to how you would like it to be.	›80
Employee-ship	Open for changes and development of working routines, take responsibility for competence and professional development, and initiate changes and development at work, take responsibility for getting the latest information at work.	›85
Skills development	Opportunity for professional development, immediate supervisor provides employee with opportunities for competence development, current job tasks offer professional development	›70
Goal clarity	Workplace goals are: well-defined, realistic, influenceable, and assessable.	›70
Efficiency	Planning of work tasks, employees strive toward the same goals, resources used optimally at work, the decision making process works well.	›65
Leadership	Immediate supervisor is clear in his/her communication, acts consequently, has described how to achieve departmental goals, provide opportunities to develop employee's professional skills, open for change in workplace organization and work routines.	›70

to control for circadian variations in blood hormone levels. Blood samples were sent directly to a university laboratory with an approved QC/QA program, certified by the Swedish Accreditation Body (SWEDAC), as specified in SS-EN ISO/IEC 17025 and EN/ISO 15189.

All individuals received personal feedback in the form of written reports with interpretations and recommendations based on their own biological results. They were also provided with a physicians' contact information if they requested more detailed information.

Statistical Analyses

Statistical analyses were performed using SPSS statistical software for Windows XP (version 12.0.1, 2004). Questionnaire data were answered anonymously and coded with the same code as the blood samples. Group differences (employees at work with no stress-related history vs. employees with stress related absence during the last year) were tested statistically by T-test.

Discrete variables were tested using chi-squared analysis. Pearson correlation was used to examine the relationship between health, social-home-and work- related factors and biological stress-indicators. Only significant differences ($p<0.05$, two sided test) are discussed.

Logistic regression analysis was performed on work satisfaction as well as social and home situations in order to calculate risks for sickness absence among those reporting stress-related sick leave compared to those with no reported stress-related sick leave. We did not control for age and education in this analysis. Thus the logistic analysis indicated a significant risk for sickness absence for those with an unsatisfactory work situation; a multiple stepwise linear regression analysis was used in order to determine predictors for work satisfaction. As independent variables (predictors) in the multiple regression analysis we used the background variables of age, material status and education, as well as the individual factors of recovery potential, meaning of life and work related factors (QWC-areas in Table 2). Finally we also used a multiple stepwise linear regression analysis to find the predictors of work-related exhaustion. As independent variables we used the background variables of age, material status and education as well as the individual factors of recovery potential, meaning of life and work related factors (QWC-areas in Table 2).

Results

The results did not show any statistically significant differences between the two groups (with and without self-reported stress-related sick leave) with regards to the background variables of gender, age and education. With regards to material status and extent of gainful employment there was a significant difference between those with and without stress-related absence in that non-married employees and employees in part-time employment were overrepresented among those employees reporting stress-related absence.

Concerning the differences between the two groups, results were significant for the following variables: self-rated health ($F_{(1,205)} = 53.0, p<.001$), social situation ($F_{(1,203)} = 20.34, p<.001$), home situation ($F_{(1,205)} = 11.11, p<.01$), work satisfaction ($F_{(1,188)} = 27.47, p<.001$), meaning of life ($F_{(1,204)} = 34.56, p<.001$) and recovery potential ($F_{(1,201)} = 53.25, p<.001$); means, standard deviations and significances are presented in Table 3.

The results (means, standard deviations and significances) for stress-sensitive hormones are available in Table 4. There were no significant differences between those with and without stress-related absence.

However, a correlation test (Pearson bivariate, two-tailed) revealed a significant association between the stress-sensitive hormone DHEA-S and the index recovery potential ($r= -.19, p<.05$). There were also significant correlations between the hormones testosterone and cortisol ($r =.32, p<.001$) as well as the catabolic hormones prolactin and cortisol ($r=.18, p<.001$).

When measured QWC areas, the results show (mean, standard deviations and significances) significant differences between the two groups in most of the QWC areas: work climate ($F_{(1,199)} =9.52, p<.01$), work tempo ($F_{(1,200)} =7.08, p<.01$), work-related exhaustion ($F_{(1,196)} =24.46, p<.001$), participatory management ($F_{(1,190)} =6.33, p<.05$), skill development ($F_{(1,193)} =10.17, p<.01$) and leadership ($F_{(1,191)} =5.02, p<.05$). As for the areas: goal clarity, employee ship and efficiency, there were no significant differences between the two groups. The strongest significance and largest absolute difference between the groups was noticed for work-related exhaustion ($F_{(1,196)} =24.46, p<.001$), Table 5.

According to the T-test analyses, employees with stress related sick leave experienced a lower level of quality for work satisfaction as well as social-

Table 3. Self-rated individual factors and recovery potential. Means, (SD) and Significance

	No stress-related absence	Stress-related absence	Significance between groups
Self-rated Health	70.2 (27.6)	39.7 (28.3)	.000***
Social Situation	78.2 (24.0)	60.7 (28.8)	.000***
Home Situation	84.1 (21.8)	71.9 (29.2)	.001**
Work Satisfaction	65.6 (28.6)	41.4 (29.3)	.000***
Meaning of Life	77.2 (25.1)	53.3 (30.1)	.000***
Recovery Potential	65.2 (20.5)	42.9 (19.0)	.000***

*T-test, * = p<0.05; ** = p<0.01; *** = p<0.001*

Table 4. Biological indicators. Means, (SD) and Significance level

	No stress-related absence	Stress-related absence	Significance between groups
Cortisol, nmol/L	605.5 (242.6)	576.6 (175.9)	.477 ns
Prolactin, ug/L	14.8 (17.8)	11.1 (5.5)	.178 ns
Testosterone, nmol/L	1.5 (2.0)	1.6 (2.0)	.823 ns
DHEA-S	4.4 (2.1)	5.0 (2.3)	.151 ns

T-test, ns = no significance; men are excluded

Table 5. Scores on QWC- areas. Means, (SD) and Significance level for the groups

QWC-areas	No stress-related absence	Stress-related absence	Significance between groups
Work climate	72.7 (19.1)	63.0 (23.6)	.002**
Work tempo	26.9 (21.4)	35.9 (23.8)	.008**
Work- related exhaustion	41.4 (25.5)	61.3 (26.7)	.000***
Participatory Management	68.7 (20.1)	60.9 (19.3)	.013*
Skills development	56.3 (21.6)	45.1 (24.7)	.002**
Goal clarity	62.3 (26.9)	57.7 (18.7)	.258 ns
Leadership	62.1 (22.6)	53.7 (27.1)	.026*
Employee ship	77.5 (14.9)	74.7 (17.0)	.242 ns
Efficiency	70.0 (17.4)	65.2 (17.9)	.083 ns

*T-test, * = p<0.05; ** = p< 0.01; *** = p< 0.001; ns = no significance*

and home situations than employees without stress- related sick leave.

In order to get a better picture of the risks for being absent due to stress (self-reported), we carried out a logistic regression analysis. The results indicate that the risk of becoming absent due to stress was significantly higher among employees who were dissatisfied with their work situation compared to those who were not. The odds ratio (OR) for rating unsatisfying work (compared to sufficient) was approximately three times higher, 2.8; 95% confidence interval (CI 1.3 - 5.9), and for employees with an unsatisfying social situation the odds ratio for becoming sickness absent due to stress was somewhat higher, OR 3.2, (CI 1.2 - 8.6). There was no significant risk of becoming sickness absent among those with an unsatisfactory home situation.

To examine the associations between work satisfaction and individual and organizational factors, a multiple stepwise linear regression analysis was used. Group (no stress related absence/stress related absence), age, material status and education were included as independent variables together with individual factors (recovery potential and meaning of life) and work related factors (QWC- areas in Table 2). The results from the analysis using work satisfaction as the dependent variable, showed, that opportunities for skills development, recovery potential, meaning of life and work tempo appear to predict 49% of work satisfaction (R^2 = .49; $F_{(4,154)}$ =37.4, p<.001). The result indicates that health care employees, who express poor work satisfaction also, had lower opportunities for skills development, predicting (30%) of work satisfaction, a lower recovery potential, predicting (13%), a lower meaning of life (3%) and a higher degree of work tempo (3%) compared to those employees with a strong sense of work satisfaction. Whether they were in the group with no stress-related absence or not was not a significant predictor to work satisfaction.

Since work-related exhaustion was high in both of the groups in comparison to the recommended target value (<30%), a multiple stepwise regression analysis was used in order to find predictors for work-related exhaustion. The background factors of age, material status and education, and the individual factors of recovery potential, meaning of life and work related factors (QWC-areas in Table 2) were included as independent variables. The results identified recovery potential, work tempo and leadership as significant factors of work-related exhaustion among employees (R^2 = .49; $F_{(3,153)}$ =49.9, p<.001). Recovery potential accounted for 37% of the variance in work related exhaustion. Lower recovery potential, higher work tempo and poor leadership were apparently related to higher levels of work related exhaustion.

Discussion

Overall results revealed significant associations between stress-related sick leave among health care employees and work-related factors, such as poor opportunities for skills development and high work tempo. Other contributing factors were the employees' social and home situation. They also tended to have poorer recovery ability than those employees not on stress-related sick leave. In addition, an inability to recover is a high risk factor for subsequent work-related exhaustion [21-23].

The current study, further contributes to prior knowledge on this topic, suggesting a close relationship between individual, work-specific, organizational, social and home life factors in understanding stress related behaviours of employees [9,22,24,25]. In testing the current study, we assessed the importance and interrelationship of four different perspectives: social, work-related, individual and psycho-physiological. We found significant associations between psychosocial factors and stress-related (self-reported) sickness absenteeism among health care employees, including self-rated health, social and home situations along with work factors, both individual and organizational. The study is also based on the assumption, which was confirmed by this study, that the risk for becoming absent due to stress is higher for health care employees, who experience poor work satisfaction than employees who perceive that they are more satisfied with their work situation. Furthermore, we assumed that stress related sick leave was positively correlated to the classical stress hormone cortisol as well as prolactin, but inversely to anabolic hormones, such as testosterone and DHEA [16]; this assumption however was not verifed by this study.

Firstly, it would appear from the results that those with and those without stress-related sick leave differ from each other with respect to a number of factors including material status and extent of full- time employment. However, age and sex were not found to be significant risk factors.

Secondly, it appears that those with sick leave due to stress, scored significantly lower on a number of health, work and organizational specific-factors (QWC-areas). These differences

support our first hypotheses that health care employees with stress-related sick leave experience poorer work conditions compared with those without stress related sickness absence, which in turn is at risk for stress related sick leave.

Our findings also show associations between stress related absence and the individual's social situation. These results also confirm the results of previous studies concerning sick leave and its association to unsatisfactory work conditions, worse health as well as social situations [7,9,26-28]. The results also confirm findings from previous research on stress, whereby stress is viewed as an imbalance between the individual's resources and the demands surrounding them [5,29,30], regardless of whether the demands originate from their work, social or home situations. Furthermore, the greater the stress and work related demands the greater the number of complaints experienced by health care workers with stress related sick leave.

As aforementioned, the biological measurements of stress sensitive hormones did not differ between the groups and the values for the stress markers were extremely common whether the employees belonged to those with sickness absence or those without any absence. In the light of prior findings, these results were unexpected; we had hypothesized that stress-related hormones were positively associated with stress-related sickness absence [8,11,22,28,31]. Possible explanations for this are that work-related exhaustion was rated highly by both groups, which indicates stress among most of the employees, even though not all of them had reported sick leave due to stress during the past year or was currently on the sick list. Another explanation is that those who were absent due to self-reported stress consider stress differently than employees without self-reported stress.

The most likely explanation for the lack of correlation between stress hormones and stress related sickness absence is the current study's cross sectional design. A comparison of stress hormones in a longitudinal study could possibly explain the non-significant results. Another question that arises is: to what extent individual factors, for example, ability to cope and attitudes towards life, such as a sense of coherence [32], could explain the results? Obviously, those with no stress-related absence have about the same level of stress hormones, yet at the same time they experience a more meaningful life as well as more satisfactory work conditions than those with a stress-related absence. It is therefore important when assessing stress to determine to what extent are personality factors such as, ability to cope with stress and sense of coherence, positively associated with the individuals' experiences of stress [33].

The results showed that the value of the employees' stress hormones in both of the groups does not correspond to the values of their self-rated health and/or work situation to the extent expected. Possibly, our results indicate that stress sensitive hormones seem to have no or little value in explaining self-reported sickness absence due to stress among health care employees in this kind of cross sectional study.

One can establish that the anabolic hormone DHEA-S has a significant correlation to recovery potential. DHEA-S is a recovery hormone and it has been suggested in previous studies to be related to recovery [34]; our study also found an association between the level of DHEA-S and perceived recovery potential. However, the results of the biological stress hormones do not appear to confirm our second hypothesis completely.

Employees with stress-related absence report a lower level of self-rated health and also tend to have a reduced capacity to recover compared to those employees who have not been absent due to stress [21]. The result seems to confirm our third hypothesis that good reported recover potential is positively associated to the level of self-rated health. Another finding was that lower recover potential largely depended on lower experienced meaning of life and a higher level of work tempo.

The most likely explanation for sick leave due to self-reported stress was poor work satisfaction. In previous studies it has also been stated that sickness absence, and especially long-term sickness absence, has a significant association to unsatisfactory work conditions [35,36]. Another result of interest was that work-related exhaustion was a determinant factor of stress-related sick leave among health care employees. High work tempo, low skills development and meaning of life were all closely associated with work-related exhaustion, which has been documented in previous studies concerning health care employees [7,10].

In conclusion, the present study confirms many of the risk factors for sickness absence reported in the literature [36,37]. In this study we found that sick leave due to self-reported stress seemed to have an association to lower ratings of both one's own health and the workplace's organizational characteristics. It would also appear from the results that biological stress measures are not

sufficient or have a limited ability to explain stress-related absence in a cross sectional study. Self-reported health, coping strategies and the individuals' own interpretation seem to have a greater influence on the significant differences associated with sickness absence [33,38]. We also found, as with previous studies [22], support for the notion that there are significant associations between factors such as possibility of recovery, meaning of life, coping ability and stress-related sickness. It is reasonable to interpret, that a low level of recovery potential and low level of meaning of life, have a negative impact on the perception of one's work, or might it be the other way around? We also found, in line with previous studies, that non-married employees and employees with part-time employment were overrepresented among employees with stress-related sick leave (Table 1.).

It is a great challenge to improve the ill health and to reduce the absence due to stress among employees in health care organizations. Obviously there is a need for further research, and in the light of these results, to increase our knowledge about the associations between stress-related sick leave and diseases on organizational, individual and medical levels. Further research is required using an interdisciplinary perspective, focusing more on the individual's own subjective criteria when it comes to assessing the consequences of sickness absence and the individuals return to work. An interesting area that requires further investigation is the relationship between an individual's experience of health and returning to work. Furthermore, to what extent does returning to work depend on the individual's interpretation of his/her overall situation and his/her ability to manage the situation that he or she faces at work, socially or in the home environment as compared to medical judgement?

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