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ORIGINAL REPORT

QUASI-EXPERIMENTAL EVALUATION OF A STRESS MANAGEMENT PROGRAMME FOR FEMALE COUNTY AND MUNICIPAL EMPLOYEES ON LONG-TERM SICK LEAVE DUE TO WORK-RELATED PSYCHOLOGICAL COMPLAINTS

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Objective: **To evaluate the effects of a stress management intervention among 24 female patients on sick leave due to work-related psychological complaints.**

Methods: **The study design was quasi-experimental. All participants received a standard individual treatment for stress at a company healthcare unit. Half of the sample was also enrolled in a group intervention aimed at coping with psychological/somatic symptoms of stress. Data were collected before and after treatment and at 6- and 12-month follow-ups, through questionnaires and blood sampling. Rates of return to work were assessed for up to 5 years.**

Results: **Levels of depression decreased in both conditions and these improvements were maintained at follow-up. The experimental condition was superior in alleviating burnout, as measured with the Karolinska Exhaustion Scale. Paradoxically, these improvements were accompanied by significant increases in levels of glycated haemoglobin in both groups. At 5-year follow-up 40% of participants in both conditions had returned to work.**

Conclusion: **The stress management intervention seems to have beneficial effects on self-rated symptoms, but is comparable to treatment as usual with respect to rates of return to work. More studies are needed to investigate the impact of this intervention on physiological parameters.**

Key words: psychological stress, burnout, intervention, glycated haemoglobin.

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INTRODUCTION

Stressful situations, whether during work or leisure time, elicit a state of psychophysiological arousal that may lead to negative health consequences (1, 2). The organism responds to such situations by activating the sympathetic branch of the autonomic nervous system, and the hypothalamic-pituitary-adrenal (HPA) axis. In turn, this leads to immune activation, increased respiratory rate, enhanced muscular tonus, increased heart rate and blood pressure, increased levels of low-density cholesterol, triglycerides, free fatty acids, and blood glucose (3–6). While these responses are adaptive in the short-term, chronic stress may facilitate pathogenetic mechanisms, such as the metabolic syndrome, a constellation of risk factors for cardiovascular disease including dyslipidaemia, hypertension, impaired glucose tolerance, insulin-resistance, central adiposity, and a pro-inflammatory and pro-thrombotic state (7–9). Furthermore, stress has been associated with impaired immunity, sleep impairments, musculoskeletal pain, and psychological distress (10–12). The latter conditions include burnout, a constellation of emotional exhaustion, physical fatigue, and cognitive difficulties, which reflect the chronic depletion of an individual's energetic resources (13). This state is frequently accompanied by perturbed sleep (14, 15) and has been linked to physiological indicators of stress, e.g. inflammatory markers, levels of glucose and lipids, and HPA-functioning (for a review see 16). In the clinical setting, symptoms of burnout that can be linked to one or more stressors as primary or overriding causative factors, fit within the diagnosis Reaction to Severe Stress (ICD 10; F43.9) (17) and, since 2003, also with "syndrome of exhaustion", a medical diagnosis that has been introduced in Sweden by the National Board of Health and Welfare (18). A number of stress-related complaints, e.g. anxiety, depression, sleep impairment, and fatigue, have become increasingly frequent in the Swedish general population and account for a large percentage of cases of work disability. Between 1996 and 2000, the number of people on long-term sick leave increased more in Sweden than in any other European country, tripling in just 4 years. The increment was most pronounced among municipal and county employees, among women and particularly among those in their fifties. Of employers in the public sector, the municipalities had the highest proportion of workers on long-term sick leave. In the municipal schools, healthcare centres, kindergartens and home help services, approximately 75% of employees are women. Their work environment is characterized by time-pressure, emotionally demanding human interactions, low salaries and an unfavourable balance between demands and control. In many cases, poor leadership and organizational injustice have been reported. Frequent reorganizations in these already strained workplaces have been proposed as causes behind the increased rates of sick leave (18–22).

Stress management interventions based on cognitive behaviour therapy (CBT) have been shown to be efficacious in decreasing emotional distress in relatively healthy samples of individuals at work (e.g. 23). The few studies that have been performed among clinical samples have yielded mixed results in terms of amelioration of symptoms and work resumption (e.g. 24–28). In Sweden, only 3 studies have been conducted among burnout patients. In a randomized trial, Perski & Grossi (29) compared a multi-component treatment with a waiting list/control condition, and reported significant decreases in symptoms of burnout, vital exhaustion and sleep impairment in both groups. No superiority of treatment could therefore be demonstrated. At a 6-month follow-up, 61% of patients had returned to work, at least part-time, compared with 19% at baseline. In another Swedish trial (30), patients were randomized to a CBT-oriented group intervention and to a physical activity programme, but, again, no superiority of either condition could be established in terms of amelioration of symptoms. In a third Swedish study Stenlund et al. (32) randomized patients to either a combination of CBT-oriented rehabilitation and Qigong, or to Qigong alone. Also these authors reported improvements in self-rated psychological symptoms and in rates of sick leave in the whole patient sample. The CBT-oriented intervention tended to have a greater efficacy, but no superiority of this condition could be demonstrated. As in one of the previous studies (29), the lack of differences between conditions could be ascribed to the fact that patients in the control groups participated in a number of individual treatments during the study period.

There is clearly a great need for more studies evaluating the efficacy of interventions for patients on sick leave due to stress-related psychological complaints. There is also a lack of studies evaluating the impact of such interventions on physiological variables that are known to be affected negatively by stress. The general aim of this quasi-experimental study was to compare the effects of an intervention among 24 female patients, in terms of self-reported symptoms, physiological markers of stress and working capacity. This study differs from earlier ones in that the combined intervention was explicitly aimed at teaching patients to cope with physical and psychological symptoms, and in that physiological markers were used as outcome measures.

The study was carried out jointly by the company health service for municipal employees, and the Ergonomics Centre, both in Eskilstuna (a Swedish town of population ~90,000 inhabitants). At the time of the study (2002–03) the company health service in Eskilstuna municipality had already established a stress treatment programme involving teams that included physician, nurse, psychologist, wellness consultant and physiotherapist, as recommended by the Swedish Psychiatric Association (32). The specific aim of this study was to determine whether complementary therapy based on a group treatment programme given under the auspices of the Ergonomics Centre, called *Rehabilitation programme for stress-related ill health*, could improve the patients' health, physiological markers and work capacity better than the standard individual treatment programme offered by the municipal company healthcare.

The hypothesis was that the combined intervention, i.e. the company healthcare programme plus the Ergonomics Centre programme, would be superior to the company healthcare programme alone in improving self-reported depression and burnout, rates of return to work, and in such metabolic and immune variables as low-density cholesterol (LDL), total cholesterol, triglycerides, high-density cholesterol (HDL), glycated haemoglobin (HbA1C; an integrated estimate of glucose during the preceding 6–12 weeks), and immunoglobulin G (IgG).

METHODS

Participants

The study was approved by the Board of Research Ethics at Örebro University and comprised an intervention group ($n = 12$) and a control group ($n = 12$). All participants were women who fulfilled the diagnostic criteria for Reaction to Severe Stress according to the International Classification of Diseases (ICD-10; 17). This diagnosis (F 43.9) includes maladaptive responses in which severe, ongoing stress is a primary and overriding causative factor, and which by interfering with successful coping strategies leads to impaired functioning. The Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) diagnosis Maladaptive Stress Reaction was not used as an inclusion criterion in this study because it has been criticized for using too narrow a time limit (under 6 months) and for not including "problems in working life". The diagnosis criteria for syndrome of exhaustion (18) had not yet been published at the time of the study. All participants had been sick-listed by the municipal company health centre in Eskilstuna.

The intervention group was recruited from 15 consecutive patients who visited the company health physician during a 2-week period in October 2002. The only male participant was excluded from the study in order to achieve gender homogeneity. One person did not fulfil the ICD-10 criteria for Reaction to Severe Stress and was therefore excluded. One participant who was in such poor condition as to be unable to participate in the group therapy was given individual treatment instead and therefore dropped out of the study. The intervention group thus consisted of 12 participants.

The intervention group had already been selected when the project began; thus it was not possible to choose a randomized design. The selection of controls therefore had to be made so that they would match the intervention group as closely as possible in terms of age, gender, occupation, diagnosis, and duration of illness. Out of 33 female municipal employees sick-listed due to Reaction to Severe Stress, by the Eskilstuna municipal company health centre, 13 were selected with the aforementioned criteria in mind, to serve as a control group. One person did not respond to all questionnaires and did not provide blood samples in time, and was excluded. This left 12 control patients with complete data on self-rated symptoms and return to work. Two of the patients in the control group were identified as outliers and thus excluded from the analyses concerning physiological variables.

The mean age within the whole sample was 52 (standard deviation (SD) 5) years and the majority of participants were married or cohabiting. Approximately two-thirds were in intermediate or high-level white-collar occupations. The duration of illness ranged from 1 to 3 years, with a mean of 1.8 years. To a varying degree, all participants were on sick leave from their employments in the municipal public sector. Also, all participants reported having received treatment for their condition prior to the present study. As seen in Table I, the 2 groups were comparable in terms of age, marital status, occupation, duration of illness, degree of sick-listing and previous treatments. There was a tendency towards higher depression ($F(1, 23) = 3.61$, $p = 0.07$) and higher HbA1C ($F(1, 21) = 3.98$, $p < 0.06$) in the control group (Tables II and III).

Procedure

All participants were assessed according to the ICD-10, by the municipal company health centre in Eskilstuna. In conjunction with the

Table I. *Participants' socio-demographic characteristics and other background variables before start of treatment. Data are presented separately for the intervention group (n = 12) and the control group (n = 12)*

	Intervention group	Control group
Age, years		
Mean (SD)	52 (4)	52 (6)
Range	46–59	40–62
Marital status, *n* (%)		
Single	1 (8)	0
Married/cohabiting	8 (67)	11 (92)
Divorced	3 (25)	1 (8)
Profession, *n* (%)		
Blue collar	3 (25)	3 (25)
Low-level white collar	1 (8)	0
Mid-level white collar	4 (33)	3 (25)
Top-level white collar	4 (33)	6 (50)
Duration of illness, years		
Range	1–3	1–3
Mean	1.9	1.7
Sick leave, *n* (%)		
100	10 (83)	9 (75)
75	1 (8)	0
50	1 (8)	3 (25)
25	0	0
Prior treatment, *n* (%)		
Doctor	12 (100)	12 (100)
Medication	5 (42)	8 (67)
Psychologist	9 (75)	10 (83)
Physiotherapist	8 (67)	5 (42)

SD: standard deviation.

diagnostic assessment they were also interviewed about their socio-demographic background, duration of illness, and previous treatments for their condition. They were also asked to complete questionnaires concerning depression and burnout (see below), and to permit blood samples to be taken for the assessment of metabolic and immune parameters. The study design was quasi-experimental, with an intervention group and a control group. In order to evaluate the efficacy of the interventions, data sampling by means of interviews, questionnaires, patient records and blood samples, was performed before and after treatment, and at 6- and 12-month follow-ups. The groups had no contact with one another, and all participants came from different work places. Therefore, the risk of "contamination" between conditions was deemed to be low.

Intervention

The combined intervention consisted of 2 components: the standard treatment programme for stress-related disorders provided by the municipal company healthcare centre plus the *Rehabilitation programme for stress-related ill health* offered at the Ergonomics Centre in Eskilstuna.

Standard treatment. The standard treatment was given in accord with the guidelines from the Swedish Psychiatric Association (33). The available treatment strategies, apart from sick-listing, were information about stress, medication for sleep disorders and depression, psychotherapy, relaxation treatment, physical exercise, and rehabilitation at the workplace in cooperation with employers, trade unions and the Social Insurance Agency. During the 12 months preceding the start of our project, both groups had taken part of the standard treatment and had received comparable types and amounts of interventions (see Table I).

Rehabilitation programme for stress-related ill health. While the control group received the standard treatment throughout the entire study period, the intervention group participated in the *Rehabilitation programme for stress-related ill health* offered at the Ergonomics Centre in Eskilstuna for a period of 3 months (November 2002 to February 2003). During this time the intervention group did not receive any of the standard treatments, apart from continued medication and contacts with the treating physician (BS). This measure was taken in order to minimize the overlap between treatment conditions. The *Rehabilitation programme for stress-related ill health* is a course intended to teach how to identify, understand and handle physical and psychological signs of stress. The course was preceded by one or 2 individual consultations with the course leader (a licensed social worker and behavioural scientist) for assessment and analysis of stress. Together with the course leader, each participant assessed stressors, coping resources, personality dispositions and symptoms, and reflected on their current life-situation.

The entire intervention group met for half a day each week to share thoughts and experiences and for theory lessons held by 3 behavioural scientists, one ergonomist and one wellness consultant. These sessions addressed questions of lifestyle, the concept of stress, coping, wellness factors, cognitive attitudes, changing behavioural responses to stress, physical and mental relaxation, Qigong, kinesiology, trust and optimism. A publication from the Swedish Research Council (33) was used as the textbook. Furthermore, 2 groups of 6 participants met for half a day per week, 12 times, to practice relaxation techniques and discuss themes brought up during meetings with all the participants. Based on the teachings from the course, each participant was expected to formulate her own life goals and a plan of action for how they were to be achieved.

In order to follow up the plans of action, the course leader also had another individual session with each participant toward the end of the 12-week programme. The programme ended with yet another individualized follow-up in the form of rehabilitation meetings with physician, course leader, immediate supervisor at work, personnel consultants and contact person at the Social Insurance Office; in addition, 2 class reunions were held in the Spring and Summer of 2003. The course's relatively low intensity and long time-span were considered important prerequisites for success.

When the *Rehabilitation programme for stress-related ill health* was terminated, participants in the intervention group returned to take part in the standard treatment until the 12-month follow-up.

Table II. *Changes in self-rated symptoms within the intervention group (n = 12) and the control group (n = 12)*

Variable and group	Before treatment	After treatment	6-month follow-up	12-month follow-up
BDI, mean (SD)				
Intervention	16.58 (4.58)	11.25 (4.25)**	10.58 (4.34)**	9.67 (4.25)**
Control	21.75 (8.23)	17.25 (9.23)*	17.83 (9.19)	15.50 (8.90)*
KES-Global index				
Intervention	109.75 (19.06)	96.33 (15.10)*	93.17 (17.52)**	89.50 (15.23)**
Control	108.92 (16.96)	102.75 (19.02)	110.08 (20.22)	98.17 (22.13)

*$p < 0.05$; **$p < 0.01$.
SD: standard deviation; BDI: Beck's Depression Inventory; KES: Karolinska Exhaustion Scale.

Table III. *Changes in mean (SD) in physiological variables within the intervention group (n = 12) and the control group (n = 10)*

Variable and group	Before treatment	After treatment	6-month follow-up	12 month follow-up
HbA1C, %				
Intervention	3.86 (0.28)	4.08 (0.21)***	4.12 (0.38)**	4.39 (0.22)***
Control	4.12 (0.33)	4.22 (0.50)	4.38 (0.54)**	4.57 (0.43)**
HDL, mmol/l				
Intervention	1.70 (0.45)	1.68 (0.35)	1.73 (0.35)	1.77 (0.40)
Control	1.60 (0.25)	1.59 (0.31)	1.72 (0.26)*	1.70 (0.26)
Total cholesterol, mmol/l				
Intervention	5.29 (1.05)	5.08 (0.78)	4.94 (1.03)	5.32 (1.05)
Control	6.09 (1.31)	5.88 (1.40)	6.07 (1.42)	6.22 (1.36)
Triglycerides, mmol/l				
Intervention	1.27 (0.66)	1.23 (0.81)	1.22 (0.72)	1.18 (0.51)
Control	1.43 (0.86)	1.18 (0.66)	1.22 (0.72)	1.47 (0.96)
IgG, g/l				
Intervention	12.26 (1.61)	12.11 (1.77)	12.57 (1.99)	12.58 (2.13)
Control	10.80 (2.22)	10.95 (2.51)	10.75 (2.48)	11.05 (2.51)

*$p<0.05$; **$p<0.01$; ***$p<0.001$.
SD: standard deviation; HDL: high-density cholesterol; HbA1C: glycated haemoglobin; IgG: immunoglobulin G.

Measures

Information about socio-demographic background, symptoms, duration of illness, medication and other treatment was collected by interviews, in conjunction with the medical diagnosis. Data concerning the degree of sick-listing, sickness benefits (i.e. sickness pension) and gainful employment were gathered from patient records and telephone contacts with patients who did not attend their appointments in person. This information was collected before and after the *Rehabilitation programme for stress-related ill health* and at the 1-, 3-, and 5-year follow-ups (2002–07).

Participants were also requested to complete Beck's Depression Inventory (BDI; 34) to measure their degree of depression. This scale consists of 21 items with a response scale of 0–3. A total score was calculated, with higher scores indicating increasing levels of depression. The Karolinska Exhaustion Scale (KES; 35) was used to measure burnout, conceptualized as a state of chronic fatigue due to longstanding stress exposure. KES consists of 35 items graded from 1 (never) to 5 (always) enquiring about the frequency of various symptoms of burnout, e.g. cognitive exhaustion, lack of recovery, somatic symptoms and emotional distress. Mean scores for a global KES index were calculated. This instrument has also shown good reliability, as expressed by a Chronbach's alpha for the global index of 0.89. Furthermore, the correlations between the KES and the Shirom-Melamed Burnout Measure (13) and the Maastricht Questionnaire (36) are 0.81 and 0.78, respectively ($n = 153$, $p < 0.001$; unpublished data).

Physiological measurements

Blood samples were taken in the morning between 08.00 h and 10.00 h, from an antecubital vein in seated subjects who had fasted overnight. The samples were frozen and subsequently analysed to determine levels of HbA1C, total cholesterol, HDL, triglycerides and IgG. This data collection was performed at the same intervals as the questionnaires in both intervention group and controls. Blood sampling and laboratory analyses were carried by the accredited and quality-assured laboratory Capio Diagnostik AB at Mälarsjukhuset Hospital in Eskilstuna.

Statistical analyses

Values for HbA1C, triglycerides and total cholesterol were logarithmized due to excessive skewness. Cross-sectional differences between groups were analysed with factorial analysis of variance (ANOVA) and χ^2 tests. Longitudinal between-group differences in continuous data, i.e. BDI and KES scores, and physiological parameters were analysed with repeated measures ANOVA. Within-group changes in these variables were analysed by means of paired, one-tailed *t*-tests. Wilcoxon signed-ranks tests were used to analyse changes in categorical variables, i.e. sick leave and employment status. When significant group differences emerged, effect sizes were calculated in accordance with Cohen's D. Two participants in the control group were identified as outliers and excluded from the analyses of physiological variables. An alpha level of 5% was considered statistically significant.

RESULTS

Within-group and between-group differences in how the participants' psychological health developed are presented in Table II. ANOVAs for repeated measures were performed to ascertain whether treatment was superior to the control condition with regards to the self-rated symptoms. Analyses performed from pre- to post-treatment did not yield any Group X Time interaction effects of ANOVA, indicating that the 2 conditions were equally effective in diminishing symptoms of stress. Analyses employing the data from pre- to post-treatment and 6-month follow-up yielded a significant interaction effect of ANOVA ($F(1, 2) = 4.26$, $p < 0.05$), indicating a superiority of treatment with respect to the global KES-index. This effect was ruled out when including the 12-month follow-up in the analyses.

A paired one-tailed *t*-test showed several improvements within the intervention group from before to after treatment. Mean scores for the BDI ($7(11) = 2.81$, $p < 0.01$), and for the global KES index ($t(11) = 2.67$, $p < 0.05$) decreased significantly over the treatment period. The improvements seen in the intervention group could still be observed at the 6-month follow-up. At that time, the scores for BDI ($t(11) = 3.01$, $p < 0.01$) and the global KES index ($t(11) = 3.06$, $p < 0.01$) were significantly lower than before treatment. At the 12-month follow-up, the scores for the BDI ($t(11) = 3.46$, $p < 0.01$) and the global KES index ($t(11) = 3.23$, $p < 0.01$) were also significantly lower than at baseline.

The control group also showed a significant decrease in BDI scores from before to after treatment ($t(11) = 2.22$, $p < 0.05$). This difference was only marginally significant at the 6-month follow-up, but was statistically significant at 12-months, when

BDI scores were lower than before treatment ($t(11) = 2.24$, $p < 0.05$). The control group showed a significant decrease in scores for the overall KES-index between post-treatment and 6-month follow-up ($t(11) = –2.52$, $p < 0.05$), but at 12-months these scores were insignificantly lower than at baseline.

At post-treatment, there were no significant differences between groups in terms of self-rated symptoms. At the 6-month follow-up, however, the intervention group had significantly lower scores for the BDI ($F(2, 23) = 6.10$, $p < 0.05$; Cohen's $D = 0.91$), as well as the global KES-index ($F(2, 23) = 4.80$, $p < 0.05$; Cohen's $D = 0.82$). These differences were no longer significant at the 12-month follow-up.

Physiological measures

Changes in the patients' physiological variables are shown in Table III. Within the intervention group, HbA1C levels increased significantly from before to after treatment ($t(11) = –5.70$, $p < 0.0001$), and again between 6- and 12-month follow-ups ($t(11) = –3.76$, $p < 0.01$). At this time the levels of HbA1C were significantly higher than at baseline ($t(11) = –8.12$, $p < 0.0001$). No other significant changes in physiological variables could be seen in the intervention group.

In the control group, the levels of HbA1C increased between post-treatment and 6-month follow-up ($t(9) = –4.09$, $p < 0.01$) and again between the 2 follow-ups ($t(9) = –2.59$, $p < 0.05$). At the 12-month follow-up, the levels of HbA1C were significantly higher compared with pre-treatment ($t(9) = –6.60$, $p < 0.0001$). No other significant changes in physiological variables could be seen in the control group. Repeated measures ANOVA did not show any longitudinal group differences in HbA1C.

Sick-listing, sickness benefits and return to work

Developments in the 2 groups' rates of sick leave, sickness benefits and work capacity, which were charted over a period of 5 years, are presented in Table IV. Wilcoxon signed-ranks tests showed that within the intervention group, the degree of sick leave decreased ($z = –3.11$, $p < 0.05$), while sickness benefits ($z = –2.41$, $p < 0.05$), and gainful employment ($z = –2.23$, $p < 0.05$) increased between 1 and 3 years post-treatment. These variables did not change significantly thereafter. At a 5-year follow-up, the degree of sick leave had decreased from 94% to 6% ($z = –3.20$, $p < 0.001$), while the percentage on sickness benefits and in gainful employment increased from 0% to 55% ($z = –2.83$, $p < 0.01$) and from 6% to 40% ($z = –2.11$, $p < 0.05$), respectively. In the control group, the degree of sick leave decreased significantly between 1 and 3 years post-treatment ($z = –2.17$, $p < 0.01$), and decreased to zero between the 3 and 5 year follow-ups ($z = –2.06$, $p < 0.05$). At this time, the degree of sick leave was significantly lower than before treatment ($z = –3.22$, $p < 0.001$). In the same group, the degree of sickness benefits increased between 1 and 3 years post-treatment ($z = –2.46$, $p < 0.05$), and did not change significantly thereafter. Five years post-treatment, the control group's degree of sickness benefits were higher than before treatment (61% vs 0%; $z = –2.85$, $p < 0.01$). Similarly, the degree of gainful employment increased slightly over time, from 12% before treatment to 40% at the 5-year follow-up ($z = –1.97$, $p < 0.05$). There were no significant differences between the groups with respect to sick leave, sickness benefits or gainful employment at any measurement point.

DISCUSSION

The aim of this study was to evaluate the effects of a combined intervention against stress-related ill-health measured as self-reported symptoms and physiological markers, along with degree of sick-listing, sickness benefits and gainful employment.

The results show improvement in terms of self-reported depression scores in both the intervention and the control group

Table IV. *Back-to-work rehabilitation in the intervention group (TG; n = 12) and the control group (CG; n = 12)*

	Before treatment		After treatment		1-year follow-up		3-year follow-up		5-year follow-up	
	TG	CG	TG	CG	TG	CG	TG	CG	TG	CG
Sick leave 100%, *n*	10	9	10	9	9	8	0	3	0	0
Sick leave 75%, *n*	1	0	1	0	1	1	1	0	1	0
Sick leave 50%, *n*	1	3	1	3	2	2	2	1	0	0
Sick leave 25%, *n*	0	0	0	0	0	1	0	1	0	0
Total sick leave, *n*	11.25	10.5	11.25	10.5	10.75	10	1.75	3.75	0.75	0
Degree of sick leave, %	94	88	94	88	90	83	15	31	6	0
Sickness benefits 100%, *n*	0	0	0	0	0	0	4	5	4	5
Sickness benefits 75%, *n*	0	0	0	0	0	0	1	0	1	0
Sickness benefits 50%, *n*	0	0	0	0	0	0	1	2	2	4
Sickness benefits 25%, *n*	0	0	0	0	0	1	1	0	3	1
Total sickness benefits, *n*	0	0	0	0	0	0.25	5.5	6	6.50	7.25
Degree of sickness benefits, %	0	0	0	0	0	2	46	50	55	61
Gainful employment 100%, *n*	0	0	0	0	0	0	1	1	2	2
Gainful employment 75%, *n*	0	0	0	0	0	1	1	1	2	1
Gainful employment 50%, *n*	1	3	1	3	2	2	3	1	2	4
Gainful employment 25%, *n*	1	0	1	0	1	1	1	0	1	0
Total gainful employment, *n*	0.75	1.50	0.75	1.50	1.25	2	3.50	2.25	4.75	4.75
Degree gainful employment, %	6	12	6	12	10	17	30	19	40	40

"Sickness benefits" is a term used for sickness pension and sickness allowance.

over the timeframe of the project. The intervention could not be shown to give superior results on this scale, implying that the 2 treatment strategies are about equally effective in terms of self-scored depression according to the BDI. However, the control group tended to have higher and more heterogeneous BDI scores at baseline, a fact that, together with the small sample size, may have made it more difficult to detect group differences over time.

With regards to KES scores, however, the results presented a different picture, with significant, albeit temporary, improvements exclusively within the intervention group. The relatively large effect size calculated on the KES-scores at the 6-month follow-up indicate that this improvement was not merely of statistical significance, but also important from a clinical point of view. At the 12-month follow-up, however, this difference between groups had been ruled out. This may indicate that booster sessions add to the impact of this intervention. The data presented in Table II do, however, suggest that the lack of significant differences at this time point were due to slight improvements in the control group rather than deteriorations in the intervention group.

Taken together, the findings indicate that conventional treatment for stress-related disorders combined with a course to teach patients to identify, understand and handle symptoms of stress may be more effective than conventional treatment alone in alleviating stress-related exhaustion and the complaints it gives rise to.

The increase in HbA1C that was observed in both groups, contradict the results obtained from questionnaires. During short-term stress, activation of the sympathetic nervous system and of the HPA-axis contributes to elevations in blood glucose, which are part of the organism's energy mobilization for coping with threat (6). Chronic stress has been hypothesized to lead to disruptions in HPA-functioning, leading to low levels of circulating glucocorticosteroids (37). The fatigue experienced by individuals suffering from burnout may, at least in part, be related to a mild state of hypocortisolism (e.g. 38). It could be hypothesized that low levels of circulating glucocorticosteroids would be related to decreased levels of blood glucose, which, in the long term may be indexed in terms of lower HbA1C. It could thus be speculated that the increased levels of HbA1C that were seen among the participants in the present study, are a metabolic reflection of a generally increased energy level. This, however, remains to be elucidated in future studies. Furthermore, levels of HbA1C may be influenced by a number of variables, e.g. smoking, diet, and physical activity, which were not assessed in the present study.

The increase in gainful employment that was seen in the present study was comparable between groups, and amounted to 40% at the 5-year follow-up. This is well below the percentages reported by Perski & Grossi (29) at 6-month follow-up. These discrepancies may be related to differences in sample compositions. While the present study included a homogeneous sample of female employees within a smaller Swedish municipality, the sample taking part in the aforementioned study were younger, more well-educated, comprised both men and women, and were recruited from the greater Stockholm area.

The study has limitations that need to be discussed. A randomized study design would have been preferable, but was impossible for practical reasons. The sample size was small, thus limiting the choice of statistical methods. Furthermore, there were no reliability checks of the interventions, and a number of variables, such as physical mobility, dietary habits, blood pressure, body mass index, HPA-functioning and other pertinent variables were not assessed and controlled for. No formal steps were taken in order to control whether the 2 groups received different types or amounts of the standard treatment. However, the pre-intervention data did not indicate any group differences with this regard. The staff had been instructed to treat all participants equally, but no objective measures of their adherence were taken. The sample consisted of women employed in the municipal sector, thus prohibiting generalization of the results to other populations. Participants in the 2 groups did not have any contact with each other, and they all came from different employers. Therefore, we assess the risk of diffusion between the conditions as minimal. One strength of the study is the careful matching of participants, which rendered very similar groups with respect to socio-demographic variables. Another strength is the low drop-out rate in both groups.

The findings concerning psychological symptoms indicate that there are good reasons for company healthcare centres to offer treatment according to this model as a complement to other therapy targeting ill-health related to long-term stress. Further studies are needed to elucidate the impact of such interventions on physiological variables and rates of return to work among patients on sick leave due to clinical burnout.

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