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Predictors for outcome of a multi-modal cognitive behavioural treatment program for low back pain patients—a 12-month follow-up study

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Low back pain patients ($n=142$) on sick leave for at least 8 weeks were given a multi-modal cognitive behavioural treatment program (MMCBT) that lasted for 4 weeks. Before treatment, all patients were tested with a comprehensive test battery. The outcome at 12-month follow-up was predictable from the pretest, but only when combining medical and psychological data. Patients who returned to work (Returners, 50%) in the MMCBT group were characterised by less pain, more psychological strength, were evaluated by the physiotherapist as having a good prognosis for return to work, and were less educated. Patients who did not return to work (Non-returners) in the MMCBT group felt tense and unfit, felt hopelessness concerning the future, were less physically active, thought their complaints would worsen if they continued working, and reported fewer difficulties driving a car. Returners to work (58%) in the randomised control group ($n=81$), who received ordinary physical therapy, were characterised by high levels of energy, less subjective health complaints, less exhaustion for a condition test, and did not work in positions giving a constant load on the back. There was no significant differences between number of patients who had returned to work in the MMCBT and the control group. Non-returners in the control group lacked energy, trained less regularly, worked in occupations that gave an almost constant load on the back, and did not expect to be back to work in the course of a couple of weeks. It seems to be important to develop further diagnostic tools to identify those who might benefit from extensive or specific treatments.

INTRODUCTION

Low back pain continues to be among the most common causes of sick leave, indicating the need for optimal treatment interventions. There seems to be consensus on the complexity of this problem. Therefore, by combining several treatment modalities, various aspects of the low back pain problem can be dealt with simultaneously. This is the rational behind multi-disciplinary treatment programs [e.g. multi-modal cognitive behavioural treatment (MMCBT), Jensen *et al.*, 1994] for low back pain. The programs usually include physical rehabilitation methods, as well as educational, psychological, social, and vocational components.

Groups in the USA have found that this treatment has a better effect on the return to work rates compared to conventional methods (Mayer *et al.*, 1987; Hazard *et al.*, 1989; Kinney *et al.*, 1991; Moreno *et al.*, 1991). Some Scandinavian studies have not confirmed these results (Estlander *et al.*, 1991; Härkäpää *et al.*, 1991; Oland & Tveiten 1991; Alaranta *et al.*, 1994), but a recent randomised Danish follow-up study confirmed the efficacy of a multi-dimensional treatment program (Bendix *et al.*, 1997).

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The ideal patient for multi-disciplinary treatment has not been identified (Hazard 1995; Bendix *et al.*, 1996). Reports of therapeutic success are so far inconsistent concerning the impact of medical, demographic, work related and psychological data in predicting return to work. Previous research shows that age (Fredrickson *et al.*, 1988; Hazard *et al.*, 1991), surgical history (Polatin *et al.*, 1989; Burke *et al.*, 1994) and physical measurements, especially lateral spinal mobility (Mayer *et al.*, 1985; Mellin *et al.*, 1993) may predict return to work. However, physical variables showed limited predictive value in the study by Hildebrandt *et al.* (1997). The Beck Depression scale had a predictive value in the study by Polatin *et al.* (1989), while the Minnesota Multi-phasic Personality Inventory (MMPI) did not predict return to work (Fredrickson *et al.*, 1988). In a recent randomised controlled study of an MMCBT program (Haldorsen *et al.*, 1998) for patients on sick leave for at least 8 weeks for low back pain, there were no significant differences in return to work between the treatment (50% return to work) and the control group (ordinary physical therapy) (58% return to work).

The purpose of the present study was to investigate the predictive value of a wide range of variables for distinguishing patients who showed a favourable treatment response from those who did not. The MMCBT is costly. Identifying the patients that might benefit from this expensive treatment might reduce the costs, and increase the effects of therapy.

MATERIALS AND METHODS

Subjects

A total of 223 low back pain patients, 142 in the MMCBT group and 81 in the control group [mean age 43 (SD = 10.8)], participated in this study. These patients were part of a general study of musculoskeletal pain called 'The Bergen Study: Back to work.'

The design was a randomised controlled clinical study. Patients on sick-leave for 8 weeks for muscle pain, systematised through the International Classification of Primary Care (ICPC) diagnostic system (Lamberts & Wood, 1987), were approached by the National Health Insurance inviting them to participate in the treatment experiment.

Inclusion criteria were more than 50% sick leave for ICPC diagnoses given by general practitioners indicating low back pain (ICPC-diagnosis L02, L03, L84, or L86). The subjects had to be employed, and were excluded if they were pregnant, had insufficient knowledge of the Norwegian language, had loss of vision or hearing, or were registered substance abusers. Medical exclusion criteria were active rheumatological disease, progressive neurological disease, serious cardiac or other internal medical conditions, or decreased lung capacity, malignant basic diseases, acute traumas, infections or acute vascular catastrophes.

Procedure

In the 'Bergen Study: Back to work', a total of four categories of patients with musculoskeletal pain were included: back pain patients, patients with neck/shoulder pain, generalised muscle pain, and other conditions of more localised musculoskeletal disorders (ICPC diagnoses L01–05, 08, 09, 18–20, 26–29, 81–86, 92, 93, and 99, and N02). The present paper is based on the back pain patients only. In ICPC musculoskeletal health problems are classified in one chapter— Chapter L—'Musculoskeletal'. Each chapter in ICPC is divided into two parts, one part for symptoms/complaints with codes from 1–29, and one part for diseases with codes from 70–99.

A total of 1776 individuals from Bergen and five surrounding municipalities, were invited to participate in the program. The inclusion criteria were met by 1683 of the 1776, and 1071 (64%) of the 1683 answered the invitation, 498 (46%) explained that they did not wish to be considered for the program, and 573 (54%) accepted the invitation by signing a consent form.

The procedure was explained in the invitation letter. It was emphasised that participation was voluntary and had no consequences for their insurance status. It was also explained that they might be allocated to the control group, which would receive ordinary treatment through their general practitioner. A pilot group of 43 patients

was allocated at random, either to a MMCBT or to a control group. They were not tested by a physiotherapist, but answered both pre- and post-test questionnaires, and were therefore included in the material.

The remaining 530 individuals (573–43) were invited to go through a pre-test. The patients received a questionnaire by mail, which was brought to the pre-test examination given by a physiotherapist. For practical reasons two in three of the patients were examined at Bergen College, Department of Health and Function, and one in three at Danmarksplass Physiotherapy Centre, Bergen. These physiotherapists were not involved in the treatment program. After the pre-test an additional psychological test questionnaire was administered.

Immediately after the pre-test, the individuals were allocated at random to one of two groups, the treatment group, or the control group, by means of a sequence of pre-labelled cards contained in sealed envelopes. The allocation sequence was prepared beforehand by a physician attached to the Department of Health and Social Welfare (one of the authors: KK). The allocation sequence followed an unequal randomisation, updated continuously, giving a bias for or against selection to the MMCBT group to ensure that the treatment groups always were filled, and that the patients never had to wait for more than one treatment period. This bias never exceeded 2:1 in favour of any group. There was no seasonal variance or any systematic bias in this selection procedure.

Patients who had been sick-listed for more than 6 months at the time of the pre-test, who did not have a low back pain diagnosis, and patients who had not answered the pre-test questionnaire, were excluded in this present study. The randomisation resulted in 142 low back pain patients in the MMCBT group, and 81 to the control group.

Treatment

Patients in the control group were followed up by their general practitioners, without any feedback or advice on therapy. These patients, therefore, were subjected to ordinary treatments given by the general practitioners, particularly physiotherapy.

The multi-disciplinary rehabilitation program lasted for 4 weeks, with 6-h sessions 5 days per week. The program included physical treatment, cognitive behavioural modification, education, and workplace-based interventions.

The treatment team consisted of a neurologist, a general practitioner, a psychologist, two registered nurses, and four physiotherapists. Each patient underwent a structured examination by this team, which was the basis for classifying and diagnosing the patients, and decide individual aspects of the treatment program. The patients were given clear diagnosis, feedback from the examinations, information, relevant lessons, and physical training schemes.

The treatment was based on a cognitive-behavioural approach. The intervention aimed at improving pain coping skills and changing illness behaviour to health related behaviours. The patients were encouraged to take responsibility for their own health and lifestyle. They were given assistance to identify factors that may maintain the pain level. Instruction in lifestyle management involved training in behavioural goal setting, problem solving and self-rewards as techniques for maintaining or developing healthy habits. Cognitive coping strategies were discussed and advice was given. The patients also learned about physical and psychological symptoms of stress and how they could reduce these symptoms.

The treatment was given partly as group activities, partially as individual training and therapy. The group activities were: morning exercise, body awareness training, relaxation training, stretching, cardioactive training, exercises in a heated pool, work training, individually based medical training therapy (MTT) and exercises. The patients were encouraged to think of the functional level they could achieve, and not focus on the pain. The individually adjusted treatment was based on the diagnosis and the results of the pretesting in the clinic. The patient carried out his/her personal training program in the exercise room, with directions from a physiotherapist.

The education sessions involved different subjects, such as anatomy, pain, physical and mental coping strategies, work, and lifestyle. The education sessions involved all categories of pro-

fessionals in the inter-disciplinary team: physician, physiotherapists, psychologist and the nurses.

Physical and psychological strains at the work place were examined by a structured interview. Telephone conferences with the company health service and/or the work supervisor and a visit to the work site, were done in certain cases to negotiate any possible job modifications. The situation was discussed with the patient concerning continuation in the same job as previously, or if re-education was an alternative. If re-education was an alternative, this was arranged with the local health insurance company.

All the parts described above constitute an integrated and inter-dependent 'package' which we refer to as the multi-modal cognitive behavioural treatment (MMCBT).

After the 4-week treatment period, the patients were re-examined. They were also followed up with individual advice at 2, 6, and 10 months at the clinic. At the 6-month follow-up, the patients were also retested by a physiotherapist. Besides this follow-up, there were also telephone contacts after 2 weeks, and after 4 and 8 months. Patients who were regarded clinically as 'risk patients,' were given individual follow-ups at the clinic. The classification of a patient as a 'risk patient' was a team decision, based on clinical findings, pain reports and responses to psychological questionnaires. For some 'risk patients', follow-ups were performed once a week for a short period of time.

Post-test

Besides the regular follow-up of the patients at the clinic, the Bergen Study itself also had a thorough test of the MMCBT group and the control group after 12 months by the same person, at the same physiotherapy clinic that performed the pre-test. As far as possible, these independent physiotherapists avoided asking questions on the experience from the clinic, and tried also to be blind as to whether the patient had been treated at the clinic at all.

The post-test included physiotherapy testing and the same medical and psychological test batteries that were given at the pre-test.

Measurements

A standardised physiotherapy examination (functional ability, spinal mobility, relaxation ability, pain, aerobic capacity test ($VO_{2\,max}$), practical skills) were carried out for all the patients before the randomisation and at the 12-month follow-up. The physiotherapist also should evaluate the patient's health, psychological resources, social resources, experimential and educational pre-suppositions to continue working, give a prognosis for decrease of the complaints, and evaluate the patient's work ability.

A comprehensive questionnaire was administered to the patients both at pre- and post-test. Besides collection of demographic variables, the questionnaire covered work-related conditions, physical activity and training, subjective health, sleep and pain, former treatment for musculoskeletal complaints, smoking and alcohol habits, social support, disability indexes, pain intensity, evaluation of personal work ability and pain figure drawing. Quality of life was measured by six items related to health, ability to manage daily activities, work situation, social situation, life in general and economy. The responses were rated on a five-point scale, from very unsatisfactory to very satisfactory. Subjective well-being was rated on seven-point scales for six pairs of items (worthwhile–useless, meaningful–meaningless, ideal–intolerable, rewarding–disappointing, satisfied–dissatisfied and strong/fit *vs* tired/exhausted).

Pain

Information concerning pain location, type and intensity was evaluated by a pain drawing test (modified after Ransford *et al.*, 1976; Spangfort, 1994) and by using a 100-mm Visual Analogue Scale (VAS) with the anchors of 'no pain' and 'worst imaginable pain' (Carlson, 1983). The ratings were done three times per day for the following 4 days. Three pain indexes were constructed based on these four ratings: pain in the morning ($VAS_{morning}$), pain in the middle of the day ($VAS_{middle\ of\ the\ day}$) and in the afternoon ($VAS_{afternoon}$).

Daily activities

The amount of pain caused by each of 18 common daily activities, such as walking, bending, sitting,

standing, driving, and the like, was measured by a Norwegian version of the Activity Discomfort Scale (ADS) (Turner & McCreary, 1983). The internal consistency of the scale in this material was 0.88 (Cronbach's alpha) (Cronbach, 1951).

Subjective health

This was measured by Ursin's Health Inventory (UHI) (Ursin *et al.*, 1988) which consists of 29 questions regarding common somatic and psychological complaints over the last 30 days on a four-point intensity scale (0 = no complaint, 3 = severe complaint). The internal consistency of the scale was 0.82. Based on factor analysis four indexes were constructed. Three were used in this study: musculoskeletal pain [headache, pain in the neck, shoulders, arms and upper back (Cronbach's alpha = 0.81)], psychological problems (anxiety, depression, sleep problems, and tiredness, with Cronbach's alpha = 0.69), and allergy (allergic skin rash and eczema, with Cronbach's alpha = 0.65). The index of stomach was excluded from further analysis because of low alpha value (Cronbach's alpha 0.42).

Subjective work ability

This was measured by a Graded Reduced Work Ability scale (GRWA), constructed for the Norwegian Ministry of Health and Social Affairs. The scale consists of six items deciding the perceived working capacity of the patient in relation to the complaints they are sick-listed for. Five items were rated on five-point scales. The questions are as follows: (1) to what extent is your ability to carry out your ordinary work reduced because of the complaints you are sick-listed for? (2) To what extent is your ability to do other work reduced because of the complaints you are sick-listed for? (3) How many of your activities and duties are affected by the complaints you are sick-listed for? (4) How serious are the complaints you are sick-listed for concerning your well-being and health? (5) If you continue working, what effect will that have on your complaints? Finally, other complaints affecting well-being and health were rated with a three-point scale (yes, no, don't know).The internal consistency of the scale was 0.60 (Cronbach's alpha).

Health locus of control

This was measured by the Multidimensional Health Locus of Control questionnaire (MHLC Form A) (Wallston *et al.*, 1978). The test has been translated to Norwegian by Aarø (1986), and has been validated in several Norwegian studies (e.g. Haug *et al.*, 1994). The MHLC contains 18 items on beliefs about responsibility for health, answered on a six-point Likert scale from 'strongly disagree' to 'strongly agree.' For the total scale, the internal consistency was 0.72. Three dimensions of the health locus of control are measured: 'internality,' the extent to which the respondent believes that power to affect his state of health lies within his own control; 'powerful others,' beliefs that others, in particular health professionals, have a decisive influence upon one's state of health; and 'chance externality,' fatalistic beliefs about health and illness. The internal consistencies for the three subscales were: internal (Cronbach's alpha = 0.75), chance (Cronbach's alpha = 0.60) and powerful others (Cronbach's alpha = 0.70).

Anxiety

This was measured by Spielberger State-Trait anxiety Scale (STAI I-II) (Spielberger, 1983) (Norwegian version: Håseth *et al.*, 1990; 1993), which comprises separate self-report scales for measuring two distinct anxiety concepts: State-anxiety (STAI-I) and Trait-anxiety (STAI-II). Subjects respond to STAI items (20 on each test) by rating themselves on a four-point scale; for the State Anxiety test from 'not at all' to 'very much' and for the Trait Anxiety test from 'almost never' to 'almost always.' The internal consistency for the State Anxiety was 0.92, and 0.91 for the Trait Anxiety scale.

Psychological distress

This was measured by a brief version of the Hopkins Symptom Check List (HSCL) (Derogatis *et al.*, 1974) (Norwegian version: Central Bureau of Statistics of Norway, 1987) with 23 questions referring to anxiety and depression (HSCL-23). Four alternative answers are given to each question, ranging from 'not at all' to 'much.' The internal consistency of the anxiety

scale was 0.77, and 0.87 for the depression scale. The internal consistency of the total scale was 0.90 (Cronbach's alpha) in this material. According to Derogatis *et al.* (1974), the patient is considered a psychiatric case in need of treatment if the mean rating is $\Leftrightarrow 1.75$. The HSCL total score was significantly correlated with the State-Trait Inventory (state: $r=0.57$; trait: $r=0.72$) and the neuroticism score on the Eysenck Personality Inventory ($r=0.58$).

Personality

This was measured by Eysenck Personality Inventory (EPI Form A) (Eysenck & Eysenck, 1964) (Norwegian version: Håseth, 1969). The form is a 57-item yes/no questionnaire, designed to measure two dimensions of personality: neuroticism-stability and extroversion-introversion. Neuroticism (EPI-N) (Cronbachs alpha = 0.80 in this study) contains items as emotional lability, over-responsiveness and lability to a neurotic breakdown under stress. The higher the neuroticism score, the greater is the degree of emotional over responsiveness. The extroversion score (EPI-E) (Cronbachs alpha = 0.61 in this study) covers 'outgoingness' and uninhibited social tendencies of the subjects (Bond, 1971). The Lie scale (EPI-L), supposed to signify 'faking good,' was excluded from this study due to low Cronbachs alpha (0.51).

Ethics

All subjects were thoroughly informed by personal instruction and a written informed consent was obtained at inclusion. The study was accepted by the Regional ethic committee and it was performed according to the Helsinki declaration. The project was approved by the Norwegian Data Inspectorate.

Outcome measures

The explicit goal of the treatment was return to work. All registered patients (including non-responders) are followed by data regarding sickness benefits from the National Health Insurance Register for 5 years. This report is based on follow-up after 1 year.

Statistics

Statistical analyses were conducted by means of the Statistical Package For Social Sciences (SPSS/Windows 6.0) (Norusis, 1993). Differences between groups were evaluated by one-way analysis of variance with Bonferroni correction for overall error rate and chi-square tests. Differences were considered statistically significant when $p<0.05$).

Separate predictive discriminant analyses (PDA) were carried out to classify subjects into one of two groups concerning return to work based on variables that individually made a significant contribution between the groups. Test for multivariate normality and test for equal variance–covariance matrices were performed before the discriminant analysis. In addition, the correlation matrices of the predictor variables were examined. Most of the variables were not normally distributed. A logarithmic transformation was performed to approximate a normal distribution, reduce the impact of extreme values, and create equal variances in Returners and Non-returners. However, the results for the discriminant analyses were almost identical both with and without a logarithmic transformation.

A significant Pearson chi-squared statistic is necessary but not sufficient to conclude that a rule yields better than chance classification (Huberty, 1984, 1994). This is because only the diagonal entries are of interest as far as the significant question is concerned. Because of this, we have tested the statistical significance of the improvement in accuracy of classification over chance for each sample, using a Z-test for the significance of a proportion.

RESULTS

The MMCBT group did not differ from the control group on medical variables, demographic variables, pain, function in daily activities, subjective health complaints, quality of life, work ability, physical activity and psychological variables.

TABLE 1. Descriptive information for low back pain patients in the MMCBT group who have returned to work (Returners) and patients still on sick-leave (Non-returners) at 12-month follow-up.

	Total ($n=142$)	Returners ($n=71$)	Non-returners ($n=71$)
Age (years)			
Mean (SD)	43 (10.5)	42 (10.1)	44 (10.8)
Range	22–65	23–62	22–65
Sex			
Man	70 (49%)	40 (56%)	30 (42%)
Woman	72 (51%)	31 (44%)	41 (58%)
Marital status			
Married	82 (58%)	43 (60%)	39 (56%)
Cohabit	21 (15%)	7 (10%)	14 (20%)
Separated/divorced	18 (13%)	7 (10%)	11 (16%)
Unmarried	14 (10%)	9 (13%)	5 (7%)
Widow	6 (4%)	5 (7%)	1 (1%)
Number of children			
None	16 (12%)	8 (12%)	8 (12%)
One	16 (12%)	5 (8%)	11 (16%)
Two	47 (35%)	24 (37%)	23 (34%)
Three or more	41 (41%)	28 (43%)	27 (38%)
Education			
Primary school (7 years)	20 (14%)	11 (16%)	9 (13%)
10 years	5 (4%)	2 (3%)	3 (4%)
Primary school (9 years)	28 (20%)	12 (17%)	16 (23%)
Technical school	33 (24%)	15 (21%)	18 (27%)
High school	30 (22%)	16 (23%)	14 (21%)
University	22 (16%)	14 (20%)	8 (12%)
Occupation			
Industry, building and construction	31 (23%)	15 (21%)	16 (25%)
Farming, forestry, fishing, seaman	6 (4%)	3 (4%)	3 (5%)
Office, health service	53 (39%)	25 (36%)	28 (43%)
Teacher, science	9 (7%)	5 (7%)	4 (6%)
Transport	17 (13%)	13 (19%)	4 (6%)
Administration	3 (2%)	3 (4%)	—
Others	16 (12%)	6 (9%)	10 (15%)
Income (month)			
Mean	14 248	14 763	13 750
Range	2400–38 000	2400–27 000	3335–38 000

At the time of follow-up, 12 months after the pre-test, the MMCBT and the control groups were split into the low back pain patients who had returned to work (Returners, 50% in the MMCBT group, 58% in the control group) and those who had not (Non-returners).

No significant differences in demographic variables were found between Returners and Non-returners in the two groups (see Table 1 and Table 2).

Returners and Non-returners in the MMCBT group

Psychological factors

The Non-returners, compared to the Returners, had significantly more psychological problems (UHI: anxiety, depression, tiredness, sleep problems) [$F(1,134)=5.96, p<0.02$], showed more psychological distress (H S C L) [$F(1,137)=8.48$, $p<0.005$], reported less psychological strength [$F(1,135)=5.54$, $p<0.02$], felt less meaningful [$F(1,108)=6.15$, $p<0.02$], did not believe that

TABLE 2. Descriptive information for low back pain patients in the Control group who have returned to work (Returners) and patients still on sick-leave (Non-returners) at 12-month follow-up.

	Total ($n=81$)	Returners ($n=47$)	Non-returners ($n=34$)
Age (years)			
Mean (SD)	43 (11.4)	42 (10.9)	44 (9.3)
Range	19–66	19–61	22–66
Sex			
Man	35 (43%)	20 (43%)	15 (44%)
Woman	46 (57%)	27 (57%)	19 (56%)
Marital status			
Married	52 (64%)	32 (68%)	20 (59%)
Cohabit	12 (15%)	5 (11%)	7 (21%)
Separated/divorced	8 (10%)	3 (6%)	5 (14%)
Unmarried	7 (9%)	5 (11%)	2 (6%)
Widow	2 (2%)	2 (4%)	—
Number of children			
None	10 (13%)	6 (13%)	4 (12%)
One	13 (16%)	9 (20%)	4 (12%)
Two	26 (33%)	13 (28%)	13 (39%)
Three or more	30 (38%)	18 (39%)	12 (37%)
Education			
Primary school (7 years)	10 (12%)	5 (11%)	5 (15%)
10 years	4 (5%)	1 (2%)	3 (9%)
Primary school (9 years)	21 (27%)	17 (37%)	4 (12%)
Technical school	21 (27%)	7 (16%)	14 (43%)
High school	13 (16%)	8 (17%)	5 (15%)
University	10 (13%)	8 (17%)	2 (6%)
Occupation			
Industry, building and construction	19 (24%)	10 (22%)	9 (27%)
Farming, forestry, fishing, seaman	—	—	—
Office, health service	44 (58%)	25 (56%)	19 (58%)
Teacher, science	1 (1%)	1 (2%)	—
Transport	5 (6%)	5 (11%)	—
Administration	1 (1%)	1 (2%)	—
Others	8 (10%)	3 (7%)	5 (15%)
Income (month)			
Mean	13 320	14 225	13 320
Range	3000–37 000	4510–37 000	3000–37 000

their complaints would be less during the first couple of weeks [$F(1,130)=4.49$, $p<0.04$] and thought that permanent disability might be the best solution [$F(1,131)=5.20$, $p<0.02$], measured at pre-test. These psychological factors resulted in a non-significant classification accuracy of 61% of the Returners and 55% of the Non-returners.

Seventeen percent of the Returners, compared with 31% of the Non-returners had a mean score on HSCL higher than or equal to 1.75. A closer examination of the HSCL scale showed that the following six single items (one related to anxiety and five to depression) discriminated significantly between the groups: Non-returners felt more tense or keyed up [$F(1,134)=7.71$, $p<0.007$], reported low energy, [$F(1,137)=3.73$, $p<0.05$], had to a greater extent feelings of hopelessness concerning the future [$F(1,137)=10.41$, $p<0.002$], were feeling more lonely [$F(1,137)=5.04$, $p<0.03$], were more often worried [$F(1, 137)=4.28$, $p<0.04$], and reported to a greater extent feeling everything was an effort [$F(1,138)=9.84$, $p<0.003$]. Sixty-three percent of the Returners, compared to 56% of the Non-returners, were

correctly classified concerning return to work based on variables related to psychological distress (Wilks lambda = 0.89, $p = 0.02$).

Pain

The Non-returners had significantly more baseline musculoskeletal pain (UHI: e.g. pain in the neck, shoulder, arms and upper back) [$F(1,134) = 4.39$, $p<0.04$], more pain measured by the VAS-scale$_{\text{the middle of the day}}$ [$F(1,96) = 4.31$, $p<0.04$], and more pain on the pain drawing front [$F(1,117) = 9.43$, $p<0.003$] and back [$F(1,117) = 9.15$, $p<0.004$], and reported less pain driving a car [$F(1,120) = 4.68$, $p<0.04$], than the Returners. The patients report of pain gave 80% correct classification of the Returners and 69% for the Non-returners (Wilks lambda = 0.67, $p = 0.0000$).

Work

The Non-returners, compared with the Returners, worked more frequently with their hands lifted above their shoulders and higher [$F(1, 133) = 9.16$, $p<0.003$], lifted more bags heavier than 20 kg [$F(1,136) = 4.65$, $p<0.03$], reported more physical work load [χ^2 (2, $n = 139$) = 13.8, $p = 0.001$] and expressed that the complaints would be worse if they continued working [$F(1, 122) = 4.54$, $p<0.04$]. Work related variables resulted in the same classification accuracy for both the Returners and Non-returners, 63 and 64%, respectively (Wilks lambda = 0.89, $p = 0.01$).

Subjective health complaints

The Non-returners reported significantly more subjective health complaints (UHI) [$F(1,120) = 5.51$, $p<0.03$], and rated their health condition as more poor [$F(1,133) = 5.5$, $p = 0.02$], than the Returners. Evaluations of subjective health gave a classification accuracy of 66% for the Returners and 52% of the Non-returners (Wilks lambda = 0.94, $p = 0.3$).

Physical activity

The Non-returners, compared to the Returners, were less physical active [$F(1,135) = 5.89$, $p<0.02$].

Clinical judgement by the physiotherapists

The physiotherapists pretest evaluation of future ability to work for patients in the MMCBT group were basically correct. Non-returners were considered as having a poorer prognosis [$F(1, 134) = 13.56$, $p<0.0004$] and that return to work would increase the pain [$F(1,135) = 15.78$, $p<0.0002$]. They were also evaluated as having more reduced work capacity for other types of work [$F(1, 135) = 4.31$, $p<0.04$], generally worse health than Returners [χ^2 (2, $n = 135$) = 9.57, $p<0.009$], fewer psychological resources [χ^2 (2, $n = 92$) = 6.89, $p<0.04$], and poorer experience and educational resources to continue their work [χ^2 (2, $n = 135$) = 3.9, $p = 0.04$]. Compared to the Returners, the Non-returners also performed significantly poorer on a lifting test [modified PILE-test (Progressive Isoinertial Lifting Evaluation), Mayer *et al.*, 1988] [$F(1,113) = 7.5$, $p = 0.007$). A discriminant model based on this set of variables resulted in 69% correct classification of the Returners and 55% correct classification of the Non-returners. The improvement over chance was significant for the Returners ($Z = 2.7$, $p<0.001$), but not for the Non-returners.

Discriminant models—combination of factors

Returners

The classification of the Returners improved when medical, psychological and social factors were combined in the analysis. Low back pain patients with good prognosis from an MMCBT program were evaluated as having a good prognosis for return to work by their physiotherapist, reported less muscle pain, more psychological strength, and were less educated. Based on these variables 82% of the Returners could be correctly classified (see Table 3). The evaluations of prognosis by the physiotherapist and reported pain on a pain drawing test were most closely related to the discriminant function, with a structure coefficient of 0.76 and 0.68, respectively. The improvement over chance was significant for the Returners ($Z = 4.4$, $p<0.001$), but not for the Non-returners (62% correctly classified). This discriminant model resulted in a high classification

TABLE 3. The predictive value of combined sets of variables for low back pain patients with good or poor prognosis for return to work at 12 months follow-up, for both the MMCBT group and the Control group.

Combined sets of variables	Wilks lambda	Percent correctly classified
MMCBT group		
Good prognosis	0.79	82%
Poor prognosis	0.71	88%
Control group		
Good prognosis	0.68	77%
Poor prognosis	0.73	80%

accuracy also when tested on men and women separately.

Non-returners

Low back pain patients with a poor prognosis from an MMCBT program felt tense and unfit, reported hopelessness concerning the future, were less physically active, thought their complaints would be worse if they continued working, and reported fewer difficulties driving a car. As seen in Table 3, these five variables classified correctly 88% of the Non-returners. Feeling tense and unfit, and hopelessness concerning the future were most closely related to the discriminant function with a structure coefficient of 0.52 and 0.50, respectively. The improvement over chance was significant for the Non-returners ($Z=5.7$, $p<0.001$), but not for the Returners (61% correctly classified). All variables in this discriminant function discriminated significantly between Returners and Non-returners also when controlling for age and sex.

Returners and Non-returners in the control group

There are few significant differences between Returners and Non-returners in the control group.

Psychological factors

Non-returners, compared to the Returners, did not believe that they would be back to work after a couple of weeks [$F(1,70)=4.19$, $p<0.05$].

Twenty percent of the Returners, compared with 42% of the Non-returners had a mean score on HSCL higher than or equal to 1.75. A closer examination of the HSCL scale showed that the Non-returners reported less energy [$F(1,78)=9.40$, $p<0.003$], had significantly more trouble falling asleep ($F(1,78)=4.11$, $p<0.05$], and more headaches [$F(1,76)=5.03$, $p<0.03$] than the Returners. These factors resulted in 63% correct classification of the Returners and 72% of the Non-returners (Wilks lambda $=0.77$, $p=0.003$).

Pain

Non-returners showed more musculoskeletal pain (UHI) [$F(1,78)=6.07$, $p<0.02$], than the Returners.

Work

Non-returners, compared to the Returners, worked more often with repeated movements [$F(1, 73)=3.79$, $p<0.05$].

Subjective health

Non-returners reported significantly more subjective health complaints (UHI) [$F(1,67)=6.25$, $p<0.02$] than the Returners, and expressed that the physical condition testing was more exhausting [$F(1,67)=5.4$, $p=0.02$].

Physical activity

The Non-returners reported to have trained less regularly during the last year [$F(1,79)=10.01$, $p<0.003$].

Clinical judgement by the physiotherapists

The physiotherapist did not evaluate the two groups significantly differently.

Discriminant models—combination of factors

Returners

Low back pain patients who returned to work after ordinary treatment reported higher level of energy, less subjective health complaints, did not perceive the physical condition test as exhausting, and did not work in positions given a constant load on the back. Based on these variables, 77% of the Returners and 76% of the Non-returners could be correctly classified (Wilks lambda = 0.68, $p = 0.0006$). Energy level and subjective health complaints were most closely related to the discriminant function with structure coefficients of 0.80 and 0.57. This set of variables resulted in a high classification accuracy for both men and women.

Non-returners

Low back pain patients who did not return to work after ordinary treatment at 12-month follow-up, lacked energy, felt everything went slower than before, trained less regularly, worked in occupations that gave an almost constant load on the back, and did not expect to be back to work in a course of a couple of weeks. These variables showed a classification accuracy of 80% of the Non-returners (see Table 3). Lack of energy and regular physical training were most closely related to the discriminant function with a structure coefficient of 0.64 and 0.59, respectively. The improvement over chance was significant for the Non-returners ($Z = 3.7$, $p < 0.001$), but not for the Returners (73% correctly classified). All variables in this discriminant function discriminated significantly between Returners and Non-returners also when controlling for age and sex.

Discriminative values across treatments

When the discriminant function from the MMCBT program was tested for predictive value in the control group, the classification accuracy for the Non-returners was reduced from 88 to 52%. The discriminant function from the control group (ordinary treatment) did not discriminate between Returners and Non-returners in the MMCBT program (reduced from 80 to 54%).

DISCUSSION

The 12-month prognosis for concerning returning to work depends on complex sets of variables which differ with the treatment given. Patients with a good prognosis in an MMCBT program were evaluated by the physiotherapist as having a good prognosis for return to work, reported less pain, more psychological strength, and were less educated (82% correctly classified). Patients with a poor prognosis from an MMCBT program felt tense and unfit, felt hopelessness concerning the future, were less physically active, thought their complaints would be worse if they continued working, and reported fewer difficulties driving a car (88% correctly classified). Patients with a good prognosis from 'ordinary' treatment (the control group) had high level of energy, less subjective health complaints, perceived the physical condition test as less exhausting, and did not work in positions given a constant load on the back (77% correctly classified). Patients with a poor prognosis from the control treatments lacked energy, trained less regularly, worked in occupations that gave an almost constant load on the back, and did not expect to be back to work in a course of a couple of weeks (82% correctly classified).

Severities of anxiety and depression at admission, as measured by the HSCL, appeared the two most important factors in predicting a poor prognosis for both groups. Non-returners in the MMCBT group felt tense and unfit and felt hopelessness concerning the future, while Non-returners in the control group were characterised by low energy. As many as 31% of the Non-returners in the MMCBT group and 42% in the control group were depressed according to the criteria of Derogatis *et al.* (1974), compared to about 20% of the Returners in the MMCBT group and in the control group.

The prevalence of depression in chronic pain population varies, according to different studies,

between 10 and 100% (for a review, see Romano & Turner, 1985). Main and Waddell (1984) reported that the incidence of psychological disturbance in chronic pain patients is 15–20% *vs* 5% in the normal population. It seems common for the chronic low back pain patients to have some symptoms of depression, but not enough to meet the diagnostic criteria of depression. The depression seen in low back pain patients may also be atypical (Joukamaa, 1994). Some items of depression may be a consequence of the pain problem itself (sleep problems, fatigue, lack of energy) and may be more related to chronic pain than other indicators of depression (e.g. feelings of guilt, feelings of helplessness, despair) (Romano & Turner, 1985; Estlander *et al.*, 1995). Depressive symptoms may have a negative influence on therapeutic success (Doan & Wadden, 1989; Polatin *et al.*, 1989; Hasenbring *et al.*, 1994) and on the complaints themselves (Main *et al.*, 1992). The depression may be related to 'universal helplessness,' that is, the patients attribute their aversive situation to factors that neither themselves nor others can control. This may interfere with the therapy. If, however, the perceived helplessness is reduced, this may also lead to a reduction of passive coping and pain intensity. In our material, the feelings of helplessness remained unaffected by therapy for the Non-returners. Alternative therapeutic strategies may be necessary to enhance the return to work rate in this subgroup of low back pain patients. The more depressed patients may require anti-depressive drugs to deal with serious depressive symptoms in addition to conventional therapy.

Another important variable distinguishing Returners from Non-returners seems to be the work situation. Non-returners in the MMCBT group reported that they believed their complaints would be worse if they continued working, and they also reported a heavier physical work load in their work situation. In addition, Non-returners in the control group did not believe that they could return to work during the first couple of weeks. In a recent study by Hildebrandt *et al.* (1997), return to work during a 12-month follow period was low when patients were initially pessimistic about their return to work. Similar findings have been reported by Carosella *et al.* (1994) and Härkäpää *et al.* (1996).

Low back pain has become the most frequently diagnosed work-related disorder (Dembe, 1996). In a recent review by Westgaard and Winkel (1996) concerning the physical work load concept, the author states that there is a limit to the amount of physical work an employee can perform without developing musculoskeletal pain. In a study by Tellnes *et al.* (1992), 43% believed that their back pain could have been prevented, and 16% reported that they would have been able to continue to work if their jobs had been adjusted to their capacity. Considerable efforts have been made to reduce physically demanding work conditions. However, these efforts have not diminished the number of chronic low back pain patients. As a part of the MMCBT program physical and psychological strains at the work place were examined by a structured interview. Telephone conferences with the company health service and/or the work supervisor and a visit to the work site were done in certain cases to suggest job modifications. In certain cases, the situation was also discussed with the patient concerning continuation in the same job as previously, or if re-education was an alternative. If re-education was an alternative, this was arranged with the local health insurance company. There is, however, no indication in the material that this had any serious impact on prognosis. In one of the MMCBT programs in Sweden, a 1 day training course for supervisors has been included, but with modest impact (Haldorsen *et al.*, 1997). However, follow-up meetings between supervisors and employees may be important in enhancing work environmental changes and increase employees return to work (Haldorsen *et al.*, 1997).

Level of physical activity reported at the pretest contributed to the discriminant models. Non-returners in both groups were more physically inactive than the Returners. The MMCBT program encourages active participation in the management and prevention of back pain, and the patients are given their own physical training schemes. However, this does not seem to

have any beneficial effect on the Non-returners. The literature suggests that inactivity for low back pain patients has detrimental effects, and may lead to delayed return to normal activity, and to negative physiological effects (loss of mobility, muscle strength and fitness) and psychological effects (loss of self-esteem, depression, somatic pre occupation) (see Campello *et al.*, 1996 for a review). In a study by Indahl *et al.* (1995), low back pain patients participating in a light mobilisation program reduced their sick-listing by 50% after 6 months compared to a control group who received ordinary treatment. Hansen *et al.* (1993) found that intensive, dynamic back-muscle training was most effective for persons with light or sedentary jobs. In the same study, patients with moderate or hard physical jobs responded better to conventional physiotherapy. Returners to work in the MMCBT group reported less pain on a pain drawing test. The pain drawing test has been used clinically for more than 40 years (Øhlund *et al.*, 1996) and provides clinical information about the physical and emotional characteristics of the patient's pain. However, the ability of the pain drawing as a screening tool has been questioned (Parker *et al.*, 1995), mainly because of lack of consensus concerning the scoring system. Correlations have been reported for low back pain patients who draw widespread pain and are frequently sick-listed, unemployed and of a poor prognosis (Murphy & Cornish, 1984). These patients also show a tendency to somatize and to display pain behavior (Schwartz & DeGood 1984; Øhlund *et al.*, 1996). Widespread pain on a pain drawing test is uncommon among patients with clear organic pain (Uden & Landin, 1987).

In this report, we have used return to work as our measure of outcome because it is easy to determine and has clear economic implications. This measure outcome has so far been considered as an objective measure. However, results from a recent study by Haldorsen *et al.* (1996) showed that there is no consensus among general practitioners (GP) as to when to grant sickness certification for musculoskeletal pain. The decision level seemed to correspond to a random level (Haldorsen *et al.*, 1996).

The final decision on sickness compensation depends on personal characteristics and values of the GP (Tellnes *et al.*, 1990) as well as those of the patient. The results demonstrate the complexity of these factors. However, a broad, multimodal, multi-disciplinary treatment does not give any better results concerning return to work than the regular therapy offered by the general practitioners. It seems to be important to develop further diagnostic tools to identify those who do not recover by themselves or by regular therapies, and that might benefit from more extensive or specific treatments.

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