J Rehabil Med 2005; 37: 152–158

Taylor & Francis
Taylor & Francis Group

PSYCHOSOCIAL DIFFERENCES AS PREDICTORS FOR RECOVERY FROM CHRONIC LOW BACK PAIN FOLLOWING MANIPULATION, STABILIZING EXERCISES AND PHYSICIAN CONSULTATION OR PHYSICIAN CONSULTATION ALONE

Markku Riipinen, Leena Niemistö, Karl-August Lindgren and Heikki Hurri

From the Orton Orthopaedic Hospital, Invalid Foundation, Helsinki, Finland

Objective: **Three psychosocial profile groups are introduced in the Multidimensional Pain Inventory for chronic pain patients. Patients with the dysfunctional profile have shown a more favourable outcome after multidisciplinary treatments, due to the suggested effects of specific psychosocial treatment elements. In this study we explored, among patients with chronic low back pain, whether the Multidimensional Pain Inventory patient profile groups might respond differently to treatment without planned psychosocial elements.**

Methods: **Of 204 voluntarily recruited patients with chronic low back pain, 102 were randomized to a combined manipulation, exercise and physician consultation group (called the combination group) and 102 to a consultation-alone group.**

Results: **Although all subjects showed improvement during follow-up both on the Oswestry index and the Visual Analogue Scale, the dysfunctional profile patients in the combination group improved the most. Their high pre-treatment ratings on Oswestry and Visual Analogue-scales fell at the 5- and 12-month follow-ups to the same level as those of the adaptive copers or interpersonally distressed patients, and they were on a significantly lower level than the dysfunctional profile patients in consultation group during follow-up. All dysfunctional profile patients also showed a decrease in affective distress, equally in combination and consultation groups.**

Conclusion: **We suggest that dysfunctional profile patients are more sensitive to respond even to treatment without any specific psychosocial elements. This should be considered when evaluating any treatment effects. Among dysfunctional profile patients, pain-related anxiety and decreased acceptance of pain may contribute to their sensitivity to treatment.**

Key words: Multidimensional Pain Inventory, psychosocial variables, treatment outcome.

J Rehabil Med 2005; 37: 152–158

Correspondence address: Markku Riipinen, Orton Orthopaedic Hospital, Invalid Foundation, Tenholantie 10, FIN-00280 Helsinki, Finland. E-mail: markku.riipinen@invalidisaatio.fi

Submitted February 2, 2004; accepted July 1, 2004

 ISSN 1650–1977
DOI 10.1080/16501970410022426

INTRODUCTION

How patient characteristics affect rehabilitation outcome is a major challenge in chronic pain rehabilitation. The Multidimensional Pain Inventory (MPI) is a promising method for identifying patient subgroups to aid in predicting rehabilitation outcome. Three patient profiles can be derived empirically from it (1–5). Of these profiles, adaptive copers (AC) report lower levels of pain severity, interference with activities and affective distress, and report greater perceptions of life control and activity level. Those interpersonally distressed (ID) are characterized by lower levels of social support and lower scores on receiving solicitous and distracting responses from their significant others. Dysfunctionals (DYS) are distinguished by a higher level of pain severity, marked interference of pain in everyday life, high affective distress, low perception of life control, and low levels of activity (6). The uniqueness of these profiles has been validated with various patient samples (6–10), measurement instruments (11) and with different translations of the MPI (12, 13).

It is suggested that patients with distinct profiles may respond differently to standard treatment. They may also gain an advantage from different types of intervention targeted to their specific needs (9); for instance, DYS patients may benefit from interventions focusing on psychosocial distress and stress management in addition to physical assessment, whereas ID patients may benefit from a specific focus on interpersonal skills and problem-solving. AC patients, on the other hand, may benefit from a focus only on somatic disorders with no psychosocial components (6, 8, 11).

Few follow-up studies with MPI patient clustering are reported. Rudy et al. (8) had patients with temporomandibular disorders (TMD) participate in conservative, standardized treatment including stress management. Turk et al. (9) attempted to discover whether patients with fibromyalgia syndrome respond differently based on their psychosocial profile to a standard multidisciplinary treatment program. In both studies, DYS patients demonstrated higher levels of pain and interference and higher levels of depression and negative thoughts at the start of treatment, but after rehabilitation on these outcome criteria they showed the greatest improvement. A study by Bergström et al. (12) involving a vocational rehabilitation

program without psychosocial components for chronic spinal pain patients showed, however, no effect favouring any profile group; although all their patients showed improvement in general health status after rehabilitation, DYS and ID patients showed a lower level of general health status than AC patients at pre-treatment and throughout the 18-month follow-up period.

The earlier reports have interpreted their findings to reveal effects of psychosocial treatment elements. The multidisciplinary treatment program may have targeted the special needs of DYS patients, leading to their greater improvement (8, 9). Bergström et al. (12) suggest, correspondingly, that the absence of follow-up differences between their patient profile groups may have resulted from their exclusion of psychosocial treatment elements.

The interpretations above can be considered only tentative, as there have been few studies and no attempt has yet been made to determine whether and how different patients benefit from different treatments. None of these studies included any control groups. One cannot thus conclude whether the improvement of DYS patients was due to psychological treatment elements or to something else. The interpretation of the findings of Bergström et al. (12) is also confusing. In their study, although treatment without psychosocial elements was considered more appropriate for AC than for ID or DYS patients (see 11, 6), their ID and DYS patients improved as much as did their AC patients.

A previous study of ours showed that, among patients with chronic low back pain, combined manipulative, exercise and physician-consultation treatment is more effective in reducing pain and disability than is physician consultation alone (14). Our aim in this study was to test whether the MPI patient profile groups respond differently to this kind of treatment without any psychosocial treatment elements. Although this kind of treatment may favour the AC patients, we wanted to assess whether DYS patients also gain any advantage from the treatment. The main outcome variables were pain intensity and disability. The research questions were:

- Does the effectiveness of the treatment result from all MPI patient groups showing improvement as compared with the physician consultation group?
- Was there any interaction between treatment and MPI profile groups showing that some groups gained more improvement after treatment as compared with the physician consultation group?

METHODS

Subjects

The 204 patients with chronic low back pain (LBP) participating voluntarily in the study were recruited by a widely circulated newspaper advertisement in February 1999. In order to obtain a homogenous group, employed patients between 24 and 46 years of age with LBP of at least 3 months' duration with or without sciatica were included. Their self-rated disability index (Oswestry Disability Inventory, ODI) level was at least 16%. Usually a level of 20% is considered the limit between mild and moderate disability (15). We wanted to set the limit in this study high enough to get clearly symptomatic patients, and at the same time, we wanted to have enough variance in the range of disability. Exclusion criteria were previous spinal operation, severe sciatica with a straight-leg raising test less than 35° or acute paralysis, any inflammatory state, malignancy, or recent vertebral fracture.

Procedure

Patients were randomly assigned either to a combined manipulation, exercise and physician consultation group (called the combination group) or to physician consultation-alone group (called the consultation group); the latter served as the control. There were 102 patients in each group. The fixed allocation randomization procedure was performed to guarantee an equal number of patients in both groups. The assignments were presented in sealed, sequentially numbered envelopes. No stratification was based on prognostic factors (14). Both the combination group and the consultation group received a 25-page educational booklet on basic anatomy and physiology of the spine, principles of ergonomics for patients with LBP, and instructions on how to exercise and to cope with the acute phase of LBP. The clinical findings were explained with the aid of a human skeleton, and the X-ray findings and possible causes of pain were clarified. The patients were told that LBP generally has a benign, self-limiting natural course. They could hasten the process by simple regular exercises and by avoiding immobility. The patients received individual instructions regarding posture and 3–4 exercises aiming to increase spinal mobility, muscle stretch and/or trunk muscle stability based on the clinical evaluation. They were also advised to avoid long-term static work by performing several counter-movements. When lifting heavy objects, they were told to avoid bending and twisting and instead to use their legs. The main principle was to encourage the patients to treat themselves instead of undergoing passive treatment. At the 5-month follow-up, this information was reinforced. Both appointments lasted an average of 1 hour. During the follow-up, the patients were free to use other healthcare services for LBP, use of which they were asked to record. Measurements were taken prior to randomization and at the 5-, 12-, and 24-month follow-ups.

Patients in the combination group attended a 1-hour evaluation, treatment and exercise session 4 times in the course of 4 weeks. An experienced manual therapist, a physiotherapist specialized in orthopaedic manual therapy, conducted the treatment sessions individually. The therapy included manipulation using a muscle-energy technique and stabilizing exercises aiming to correct the lumbopelvic rhythm. Muscle-energy technique is a manipulative treatment procedure that uses a voluntary contraction of the patient's muscles against a distinctly controlled counterforce from a precise position and in a specific direction. No high-velocity, short-leverage thrusts were used. After correction of any dysfunctions in their lumbar or pelvic segments, including muscular imbalances, all patients were taught to perform the isometric stabilizing exercises during their daily activities.

Measurement

SIMPI. We used a Finnish translation of the MPI, SIMPI, which was shown in an earlier study[1] as effective in producing the 3 cluster profiles introduced by Turk & Rudy (4). SIMPI is comprised of 3 sections making up a total of 9 scales. Part I comprises 5 scales: pain severity, pain-related interference in everyday life, perceived life control, affective distress, and perceived support from significant others. Part 2 comprises 3 scales measuring the patient's perception of the responses of significant others to displays of pain and suffering: punishing responses, solicitous responses and distracting responses. Part 3 comprises a list of 18 common activities that patients rate in terms of the frequency with which they perform each one. These activities together form the category of general activity. All scales for Parts 1, 2 and 3 range from 0 to 6.

The SIMPI scale was used also on follow-up to measure changes on affective distress, perceived life control and perceived support from significant others.

Oswestry Disability Inventory. The ODI is a 10-item self-reporting measure, with each item consisting of 6 statements describing the level

[1] Gerlander E, Toppinen-Tanner S, Hurri H. Pain profiles and changes in disability and ability to work during active low back rehabilitation. Unpublished manuscript. Finnish Institute of Occupational Health, Department of Psychology; 1999.

Table I. *Mean SIMPI (Finnish translation of Multidimensional Pain Inventory) scale scores by treatment and cluster before treatment, and descriptive information on the clusters. Standard deviations are given in parentheses*

	Combination group			Consultation group		
	AC $n = 33$	ID $n = 39$	DYS $n = 30$	AC $n = 40$	ID $n = 29$	DYS $n = 33$
Pain severity	2.96 *(0.87)*	2.77 *(0.94)*	4.00*** *(0.63)*	2.81 *(0.96)*	2.70 *(0.77)*	4.08*** *(0.98)*
Interference	2.64 *(1.03)*	2.69 *(0.98)*	4.13*** *(0.75)*	2.61 *(1.04)*	2.58 *(1.07)*	4.54*** *(0.72)*
Life control	4.04 *(0.69)*	3.69 *(0.84)*	3.13*** *(0.84)*	3.91 *(0.85)*	3.68 *(0.76)*	3.31*** *(0.78)*
Affective distress	1.76 *(1.05)*	2.00 *(1.26)*	3.40*** *(0.64)*	1.55 *(0.96)*	1.88 *(1.15)*	3.34*** *(0.96)*
Support	4.25 *(0.98)*	2.46 *(1.11)*	3.77*** *(1.21)*	4.35 *(0.90)*	2.10 *(1.10)*	4.09*** *(1.19)*
Punishing response	0.71 *(0.91)*	1.26 *(1.40)*	1.20 n.s. *(1.39)*	0.48 *(0.57)*	1.38 *(1.52)*	1.64*** *(1.21)*
Solicitous response	3.56 *(0.93)*	1.44 *(0.78)*	2.74*** *(1.04)*	3.64 *(1.10)*	1.53 *(0.95)*	2.88*** *(1.36)*
Distracting response	3.83 *(0.95)*	2.25 *(1.35)*	2.79*** *(0.89)*	3.20 *(1.32)*	2.25 *(1.26)*	2.82* *(1.14)*
General activity	4.08 *(0.61)*	3.48 *(0.83)*	3.06*** *(0.78)*	3.89 *(0.60)*	3.18 *(0.86)*	3.30*** *(0.79)*
Gender, females (%)	18 (55)	21 (54)	17 (57)	24 (60)	15 (52)	15 (45)
Age (years)	40.0 *(5.5)*	38.7 *(5.2)*	36.7 n.s. *(5.6)*	36.7 *(6.0)*	38.5 *(5.1)*	35.3 n.s. *(5.6)*
Married, *n* (%)	26 (79)	23 (59)	23 (77)	33 (83)	25 (86)	20 (61)
Education, *n* (%)						
Compulsory school	12 (36)	12 (31)	15 (50)	19 (47)	10 (34)	16 (49)
High school	14 (43)	14 (36)	9 (30)	16 (40)	8 (28)	13 (39)
Post high school	7 (21)	13 (33)	6 (20)	5 (13)	11 (38)	4 (12)
Employed, *n* (%)	31 (94)	38 (97)	28 (93)	34 (85)	27 (93)	29 (88)
Duration of low-back pain (years)	*(5.6)*	8.9 *(7.7)*	8.8 n.s. *(7.5)*	9.7 *(6.9)*	6.8 *(5.9)*	6.5 n.s. *(7.1)*

Significance levels between adaptive copers (AC), interpersonally distressed patients (ID) and patients with dysfunctional profile (DYS) within combination and consultation group: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

of functioning or disability. Each statement is indicative of the severity of disability of particular life activities such as personal care, lifting, walking, sitting, standing, sleeping, sexual activity, social life and pain intensity. The ODI has been shown to have satisfactory reliability and validity, and, although a self-reporting measure, is highly correlated with the results of physical function examinations (16, 17).

Visual analogue scale (VAS). The VAS is widely used and is a very sensitive measure of pain (18, 19). The subjects were asked to rate the intensity of their pain during the time of measurement.

Statistical methods

The *k*-means cluster analysis was used for clustering the patients (2, 20). The level of ODI and VAS over follow-up was analysed by a two-way ANOVA for repeated measurements. An analysis of covariance (ANCOVA) was used for the interaction effects of treatment, MPI grouping and time of measurement on the main outcome variables. The Huynh-Feldt-correction was used for the possible violations of sphericity in repeated measures in the ANCOVA-analysis. The drop-outs at follow-up were imputed with the Last Observation Carried Forward (LOCF), the most recent previously available follow-up value substituting each missing value in follow-up.

Based on pre-treatment results, *k*-means cluster analysis was carried out on the 9 SIMPI subscales. The group means obtained, e.g. by Turk & Rudy (4), could not be used for the clustering because of revision of the MPI questionnaire. An Euclidean distance measure was used in cluster analysis, supposing an independence between the SIMPI scales. The analysis was carried out several times with different seed numbers and different number of clusters. The three-cluster-solution turned out to be stabile and convenient, as presented in earlier studies (2, 4, 6). Since the means for the 9 subscales did not differ between treatment and control group, profile clusters were computed for all subjects.

RESULTS

Classification of patients

The results for *k*-means cluster analysis are presented in Table I, with subscale means for the 3 clusters, named as AC, ID and DYS, in the combination and consultation groups, together with sex, age, marital status, education, employment and duration of pain.

As shown in Table I, AC patients reported the highest levels of life control, general activity, and social support; and a low level of affective distress. ID patients were low on social support, and on solicitous and distracting responses, and the DYS patients high on pain severity and interference in life, and on affective distress, and low on life control. The number of AC, ID or DYS patient did not differ in the combination or consultation group, and no difference existed in age, sex, marital status, education, employment status or duration of pain between clusters, either within or between the combination and the consultation group. The drop-out rates at 24-month follow-up in the combination group were 6 AC, 4 ID and 10 DYS patients, and in the consultation group 7 AC, 6 ID and 9 DYS patients.

Pain and disability

The results on ODI and VAS for patient profile groups at pre-treatment and the 5-, 12-, and 24-month follow-ups are presented in Fig. 1, with standard deviations in Table II. In Fig. 1, a marked decrease is apparent on both ODI and VAS at the 5-month follow-up within both the combination and the consultation group; a two-way ANOVA show a significant effect for time of measurement ($F_{1,196} = 207.363$, $p < 0.001$ for ODI, and $F_{1,196} = 165.087$, $p < 0.001$ for VAS). A difference is also shown among DYS patients depending on treatment.

In Fig. 1a the DYS patients showed the highest level on ODI at pre-treatment. At 5-month follow-up they were on the same level on ODI with AC and ID patients in the combination group, but in the consultation group they were approaching the level of

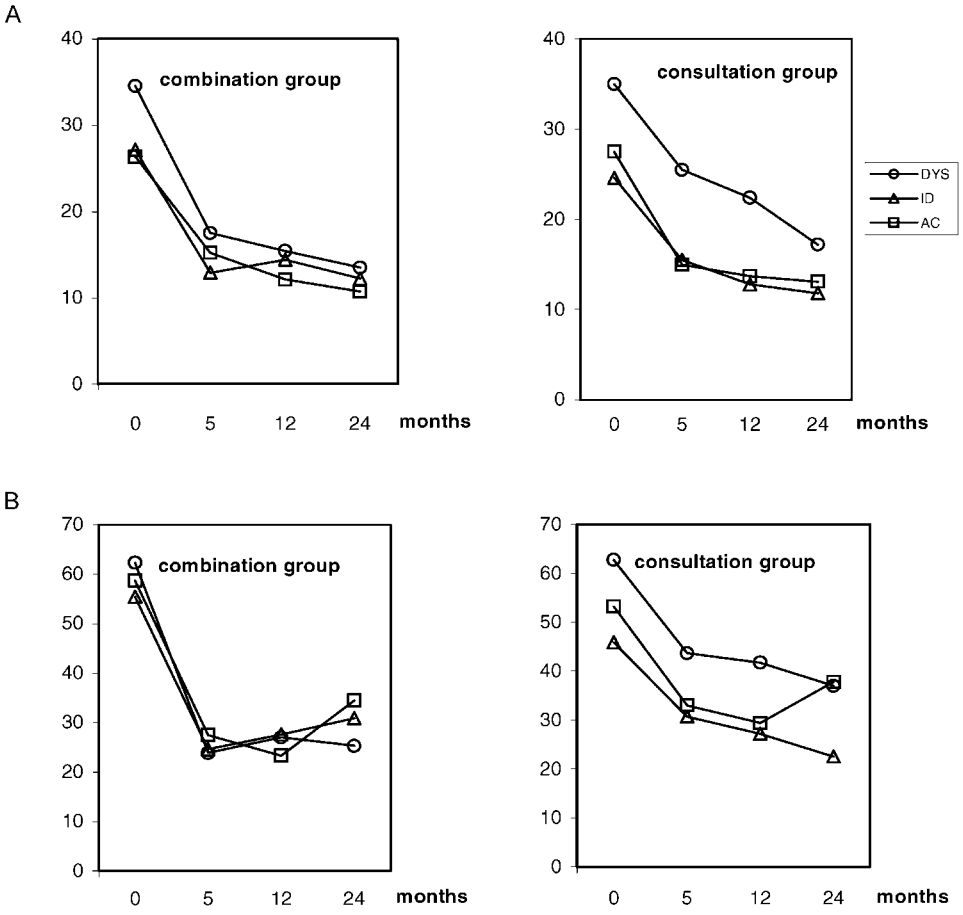

Fig. 1. Mean values for the Oswestry Disability Inventory (ODI) and Visual Analogue Scale (VAS) in the combination and consultation groups for dysfunctionals (○), interpersonally distressed (△) and adaptive copers (□).

AC and ID patients at 24-month follow-up. An ANCOVA with repeated measurements for ODI among all patients up to 12-month follow-up, with pre-treatment ODI as a covariate, showed a significant effect for treatment × time of measurement ($F_{2,378} = 3.667, p < 0.05$; for LOCF, with 6 patients imputed, $F_{2,390} = 2.972$, $p = 0.052$), and for treatment ($F_{1,189} = 6.145$, $p < 0.05$; for LOCF, $F_{1,195} = 4.702$, $p < 0.05$). The decrease on ODI was thus significantly greater in combination group up to 12-month follow-up. This was due to the decrease shown by the DYS patients; an ANCOVA within all the DYS patients also showed a significant interaction effect for treatment × time of measurement ($F_{2,112} = 4.862$, $p < 0.01$; for LOCF with 3 patients imputed, $F_{2,118} = 4.526$, $p < 0.05$). Among all the AC and ID patients the interaction was non-significant

Table II. *Means and standard deviations for Oswestry Disability Inventory (ODI) and Visual Analogue Scale (VAS) in combination and consultation group. Standard deviations are given in parentheses*

	Combination group			Consultation group		
	AC	ID	DYS	AC	ID	DYS
ODI						
Pre-treatment	26.33 *(7.46)*	27.13 *(7.59)*	34.47 *(12.28)*	27.50 *(9.67)*	24.55 *(6.54)*	35.03 *(9.83)*
Follow-up						
5-month	15.18 *(13.75)*	12.87 *(10.95)*	17.52 *(12.72)*	15.00 *(7.99)*	15.52 *(9.10)*	25.52 *(11.53)*
12-month	12.06 *(8.09)*	14.42 *(13.07)*	15.41 *(11.92)*	13.74 *(12.29)*	12.83 *(8.05)*	22.38 *(12.66)*
24-month	10.74 *(8.49)*	12.23 *(11.55)*	13.50 *(15.15)*	13.09 *(10.66)*	11.83 *(8.42)*	17.21 *(9.79)*
VAS						
Pre-treatment	58.67 *(22.17)*	55.40 *(20.55)*	62.33 *(23.26)*	53.18 *(21.25)*	45.86 *(19.18)*	62.75 *(18.91)*
Follow-up						
5-month	27.53 *(26.23)*	24.62 *(22.81)*	23.76 *(19.18)*	32.97 *(22.73)*	30.72 *(23.38)*	43.69 *(24.01)*
12-month	23.26 *(18.15)*	27.55 *(25.05)*	26.96 *(21.56)*	29.35 *(27.25)*	27.17 *(18.89)*	41.71 *(25.48)*
24-month	34.48 *(22.41)*	30.94 *(25.34)*	25.30 *(25.67)*	37.84 *(26.39)*	22.49 *(20.40)*	37.00 *(24.81)*

AC = adaptive copers, ID = interpersonally distressed, DYS = dysfunctionals.

($F_{2,268} = 0.614$, n.s.; for LOCF with 3 patients imputed, $F_{2,274} = 0.547$, n.s.). At 24-month follow-up a one-way ANOVA among all DYS patients showed no effect for treatment ($F_{1,42} = 0.960$, n.s.).

In Fig. 1b the DYS patients in combination group showed a greater decrease on VAS at 5-month follow-up than those in consultation group, and a lower level through follow-up. An ANCOVA with repeated measurements for VAS among all patients up to 24 month follow-up, with pre-treatment VAS as a covariate, showed a significant effect for treatment × time of measurement ($F_{3,450} = 3.698$, $p < 0.05$; for LOCF with 41 patients imputed, $F_{3,573} = 3.649$, $p < 0.05$). The interaction was significant also in ANCOVA among all the DYS patients ($F_{3,120} = 4.281$, $p < 0.01$; for LOCF with 18 patients imputed, $F_{3,174} = 4.251$, $p < 0.01$), but not among all the AC and ID patients ($F_{3,333} = 1.074$, n.s.; for LOCF with 23 patients imputed, $F_{3,402} = 0.950$, n.s.).

The psychological outcomes of the treatment were evaluated with changes in MPI scales for affective distress and perceived life control during follow-up. The scale for social support was also considered because this was one of the sociopsychological features most clearly differentiating between the patient profile groups.

Affective distress

The DYS patients are characterized by a high level of affective distress (Table I). Fig. 2a shows a decrease on affective distress among these patients at 12-month follow-up in both groups with no treatment effect. A two-way ANOVA with repeated measurements for affective distress showed a significant effect for patient group × time of measurement ($F_{4,292} = 4.195$, $p < 0.01$; for LOCF with 43 patients imputed, $F_{4,378} = 7.086$, $p < 0.001$) and for time of measurement ($F_{2,292} = 19.438$, $p < 0.001$; for LOCF, $F_{2,378} = 19.042$, $p < 0.001$).

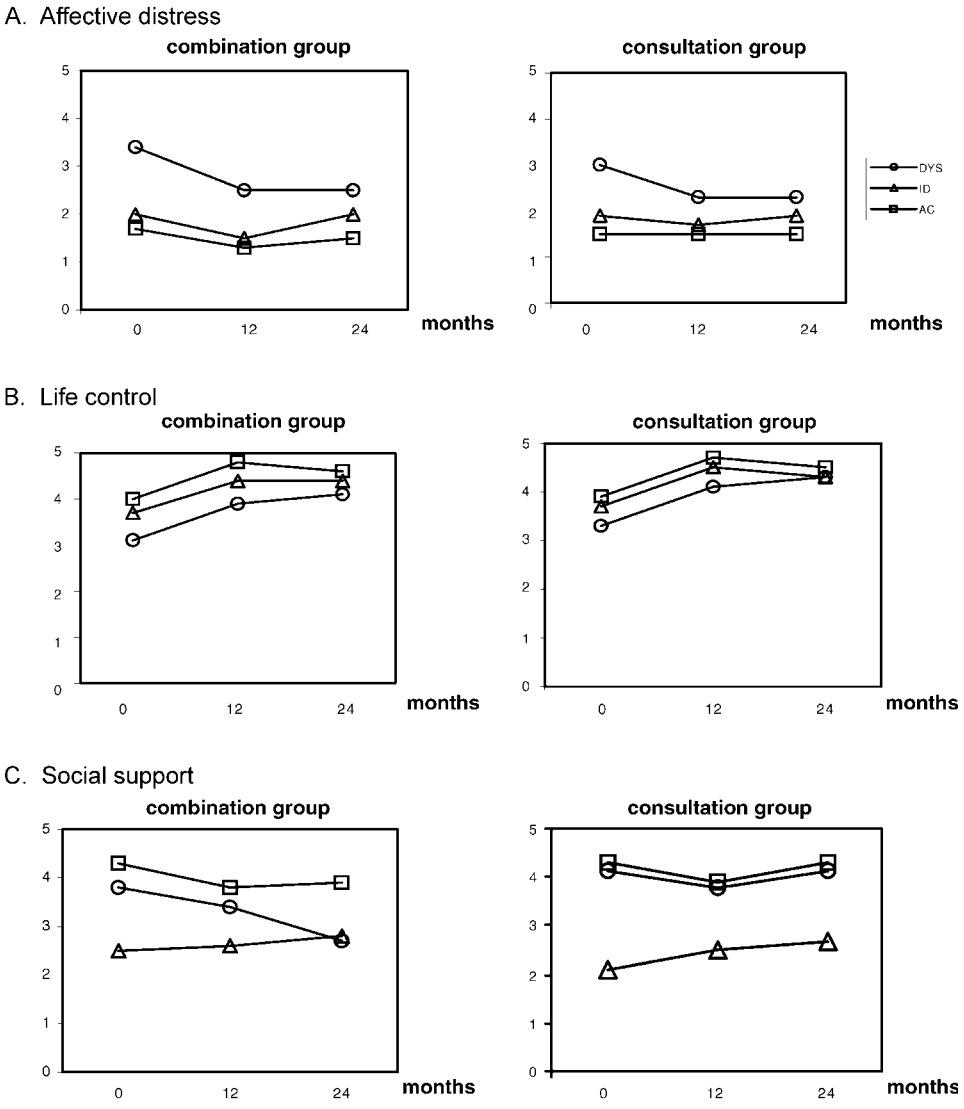

Fig. 2. Mean values for affective distress, life control and social support in the combination and consultation groups for dysfunctionals (○), interpersonally distressed (△) and adaptive copers (□).

Life control

The DYS patients are also characterized by a low level on life control (Table I). Fig. 2b shows an increase in all patients at the 12-month follow-up with no treatment effect. A two-way ANOVA with repeated measurements for life control showed a significant effect only for time of measurement ($F_{2,292} = 56.573$, $p < 0.001$; for LOCF with 43 patients imputed, $F_{2,378} = 64.746$, $p < 0.01$).

Social support

The DYS patients in the combination group show a decrease on social support during follow-up, and the ID patients an increase in both groups. A two-way ANOVA with repeated measurements for social support showed a significant effect for time of measurement × profile group ($F_{4,290} = 6.345$, $p < 0.001$; for LOCF with 43 patients imputed, $F_{4,378} = 6.438$, $p < 0.001$). The effect for time of measurement × treatment tended to be significant ($F_{2,290} = 2.764$, $p = 0.065$). At 24-month follow-up the DYS patients in the combination group reported a significantly lower level on social support than those in the control group ($F_{1,39} = 19.468$, $p < 0.01$; for LOCF, $F_{1,57} = 4.467$, $p < 0.05$).

DISCUSSION

The aim of this study was to test whether the MPI patient profile groups predict the effectiveness found in combined manipulative, exercise and physician-consultation treatment when compared with physician consultation alone. The results show that the effectiveness of the treatment was due to the advancement gained by the DYS patients. They gained an advantage from treatment both for perceived disability (ODI) and pain intensity (VAS). Their high pre-treatment ratings on perceived disability also diminished to the same level as the AC or ID patients at 6-month follow-up after treatment. The advantage for perceived disability had disappeared on 24-month follow-up due to the diminishing trend among the control DYS patients, but the advantage for pain intensity remained through follow-up. For the AC and ID patients, manipulation, stabilization exercises and physician consultation were as effective as physician consultation alone.

Our results, unlike previous ones (6, 8, 11), suggest that the DYS patients may benefit also from treatment without any need for specific psychosocial elements. Ours correspond with earlier findings concerning multidisciplinary treatment elements (8, 9). The decrease in perceived disability among the DYS patients to a level comparable to that among AC or ID patients was even more dramatic than in those studies. The patient groups do, however, differ; for instance, DYS patients of Turk et al. (9), all of whom had fibromyalgia, reported higher ODI indexes than did our patients and they were also older than our patients. Our results raise, however, the question whether DYS patients in previous studies would have also improved with less comprehensive treatment and to what extent the psychological treatment elements contributed to this improvement.

The level of pain among our subjects corresponds to that reported by Bergström et al. (12) with chronic back pain patients, but their rehabilitation method, "minus our control group", was similar to ours, favouring any of the patient groups. Corresponding to their findings, this study found no improvement favouring any of the patient groups regarding pain intensity within the combination group. Among the DYS patients, however, a marked difference appeared between the combination and the consultation group. As Bergström et al. used no control group, it remains unclear whether their DYS patients would have shown less improvement without treatment. The lower level of improvement among our DYS patients without treatment may be related to findings that without treatment DYS patients may show an inclination to develop a chronic illness (21).

In the earlier studies, the DYS patients report a decrease in affective distress after treatment (8, 9). The same improvement also occurred in our study both in the combination and the consultation group. The greater decrease in pain and disability in the combination group was not associated with any greater decrease in affective distress. The question concerning the previous studies without any control groups is whether there also would have been changes in affective distress with less comprehensive treatment.

There are some limitations in our study. The comparatively low level of disability observed among our patients may limit the generalizability of our findings. In addition, the present sample was focused only on patients with LBP. The results may also have been affected by the regression to the mean, i.e. the changes in scores occurring with repeated testing when the measures are less than perfectly reliable (22). Our results from the comparison with the consultation group, however, make it unlikely that regression to the mean is the full explanation for observed results. We have also assumed an interval scale measurement for VAS, although the scale can be considered as ordinal.

The improvement shown by our DYS patients may be related to the suggested association between pain and affective distress, and the resulting non-acceptance of pain and avoidance behaviour especially among these patients (23–27). It is possible that the DYS patients were helped to face their fear of pain and disability in a safe and reinforcing environment in our treatment, thus helping them to accept their situation in a positive and realistic manner. As a result, they showed greater reduction of pain and disability than did the control group. It is also possible that the associates of DYS patients, after treatment, were less considerate in determining whether their DYS individuals could also manage by themselves, thus resulting in a reported decrease in social support. Finally, the interpretation suggests that there may have been hidden activating elements in the type of treatment we used here, supporting DYS patients in particular, although more or less unintentionally. If so, therapists should focus more on supporting the specific needs of unadjusted DYS patients.

ACKNOWLEDGEMENTS

We thank the Social Insurance Institute of Finland for supporting this study and PT Tiina Lahtinen-Suopanki for the treatment of our subjects.

REFERENCES

1. Kerns RD, Turk DC, Rudy TE. The West-Haven-Yale Multidimensional Pain Inventory (WHYMPI). Pain 1985; 23: 345–356.
2. Rudy TE, Turk DC, Zaki HS, Curtin HD. An empirical taxometric alternative to traditional classification of temporomandibular disorders. Pain 1989; 36: 311–320.
3. Turk DC, Rudy TE. Toward a comprehensive assessment of chronic pain patients: a multiaxial approach. Behav Res Ther 1987; 25L: 237–249.
4. Turk DC, Rudy TE. Toward an empirically derived taxonomy of chronic pain patients: integration of psychological assessment data. J Consult Clin Psychol 1988; 56: 233–238.
5. Waddell G, Turk DC. Clinical assessment of low back pain. In: Turk DC, Melzack R, eds. Handbook of pain assessment. New York: Guilford; 1992, pp. 15–36.
6. Turk DC, Rudy TE. The robustness of an empirically derived taxonomy of chronic pain patients. Pain 1990; 43: 27–35.
7. Dahlstrom L, Widmark G, Carlsson SG. Cognitive-behavioral profiles among different categories of orofacial pain patients: diagnostic and treatment implications. Eur J Oral Sci 1997; 105: 377–383.
8. Rudy TE, Turk DC, Kubinski JA, Zaki HS. Differential treatment responses of TMD patients as a function of psychological characteristics. Pain 1995; 61: 103–112.
9. Turk DC, Okifuji A, Sinclair D, Starz TW. Differential responses by psychosocial subgroups of fibromyalgia syndrome patients to an interdisciplinary treatment. Arthritis Care Res 1998; 11: 397–404.
10. Zaza C, Reyno L, Moulin DE. The multidimensional pain inventory profiles in patients with chronic cancer-related pain: an examination of generalizability. Pain 2000; 87: 75–82.
11. Jamison RN, Rudy TE, Penzien DB, Mosley, TH Jr. Cognitive-behavioral classifications of chronic pain: replication and extension of empirically derived patient profiles. Pain 1994; 57: 277–292.
12. Bergström G, Jensen IB, Bodin L, Linton SJ, Nygren ÅL. The impact of psychologically different patient groups on outcome after a vocational rehabilitation program for long-term spinal patients. Pain 2001; 93: 229–237.
13. Lousberg R, Groenman N, Schmidt A. Profile characteristics of the MPI-DLV clusters of pain patients. J Clin Psychol 1996; 52: 161–167.
14. Niemistö L, Lahtinen-Suopanki T, Rissanen P, Lindgren KA, Sarna S, Hurri H. A randomized trial of combined manipulation, stabilizing exercises, and physician consultation compared to physician consultation alone for chronic low back pain. Part I. Spine 2003; 28: 2185–2191.
15. Fairbank J. Use of Oswestry Disability Index (ODI). Spine 1995; 20: 1535–1537.
16. Blunt KL, Rajwani MH, Guerriero RC. The effectiveness of chiropractic management of fibromyalgia patients: a pilot study. J Manipulative Physiol Ther 1997; 29: 389–399.
17. Deyo, RA. Comparative validity of the Sickness Impact Profile and shorter scales for functional assessment in low back pain. Spine 1986; 11: 951–954.
18. Scott V, Huskisson EC. Graphic representation of pain. Pain 1976; 2: 175–184.
19. Twycross RG. The measurement of pain in terminal carcinoma. J Int Med Res 1976; 4: 58–67.
20. Milligan GW, Cooper MC. An examination of procedures for determining the number of clusters in a data set. Psychometrika 1985; 50: 159–179.
21. Epker J, Gatchel RJ. Prediction of treatment-seeking behavior in acute TMD patients: practical application in clinical settings. J Orofac Pain 2000; 14: 303–309.
22. Levin JR. An improved modification of a regression-toward-the-mean demonstration. Am Statistician 1993; 47: 24–26.
23. Summers JD, Rapoff MA, Varghese G, Porter K, Palmer RE. Psychosocial factors in chronic spinal cord injury pain. Pain 1991; 47: 183–189.
24. Asmundson GJG, Norton GR, Allerdings MD. Fear and avoidance in dysfunctional back pain patients. Pain 1997; 69: 231–236.
25. McCracken LM. 'Attention' to pain in persons with chronic pain: a behavioral approach. Behav Ther 1997; 28: 271–284.
26. McCracken LM. Learning to live with the pain: acceptance of pain predicts adjustment in persons with chronic pain. Pain 1998; 74: 21–27.
27. McCracken LM, Spertus IL, Janeck AS, Sinclair D, Wetzel, FT. Behavioral dimensions of adjustment in persons with chronic pain: pain-related anxiety and acceptance. Pain 1999; 80: 283–289.