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ORIGINAL REPORT

PREDICTIVE FACTORS FOR DISABILITY OUTCOME AT TWENTY WEEKS AND TWO YEARS FOLLOWING A PAIN SELF-MANAGEMENT GROUP INTERVENTION IN PATIENTS WITH PERSISTENT NECK PAIN IN PRIMARY HEALTH CARE

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Objective: **To explore possible predictors associated with short-term (post-treatment) and long-term (2 years) treatment success in terms of pain-related disability for patients with persistent neck pain following a pain and stress self-management intervention (PASS).**

Methods: **Data from 77 participants assigned to PASS in a randomized controlled trial were explored to identify possible predictors of favourable outcome regarding pain-related disability as measured by the Neck Disability Index (NDI), by use of Pearson correlation analysis, partial least squares (PLS) and ordinary least squares (OLS) regression analyses. Data from self-assessment questionnaires completed by the participants before, post-treatment (i.e. 20 weeks after inclusion) and 2 years after inclusion in the study, were used.**

Results: **Multivariate PLS regression analysis showed that baseline scores in NDI, the Self-Efficacy Scale (SES) and pain intensity explained 31% of the variance in disability (NDI) post-treatment. Multivariate PLS regression analysis showed that post-treatment scores in NDI, SES and pain intensity explained 68% of the variance in disability (NDI) at 2 years.**

Conclusion: **Treatment gains, as measured by post-treatment scores at 20-week follow-up, in disability, self-efficacy and pain intensity were associated with long-term outcome in pain-related disability at 2 years, in patients with persistent neck pain participating in a self-management group intervention in primary health care.**

Key words: coping; disability; long-term follow-up; neck pain; predictors; self-assessment questionnaire; self-management.

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INTRODUCTION

Patients with musculoskeletal pain appearing in primary health care (PHC) settings display a diversity of characteristics with regard to biological, psychological and social factors, despite having the same, or very similar, diagnoses (1). Studies have found considerable heterogeneity among study populations with pain (2, 3), and it has been suggested that patient pre-treatment characteristics could predict specific subgroups of patients who will benefit most from specific interventions (4). Thus, identification of patients who are likely to benefit from interventions is imperative. Tailoring treatment according to patient characteristics, as well as identifying effective treatment components, and ordering of treatment components in interventions directed at patients with persistent musculoskeletal pain conditions would serve to optimize treatment gains (5, 6). Furthermore, factors predicting maintained treatment gains in a long-term perspective after self-management interventions for persistent neck pain have been sparsely investigated (7).

In previously reported short- and long-term follow-up, a multi-component pain and stress self-management group intervention (PASS) had a better effect on pain control, pain-related self-efficacy, disability and catastrophizing than a control treatment; individually administered physical therapy (IAPT) for patients with persistent tension-type neck pain in PHC (8, 9). The self-management intervention being studied represents a complex intervention in a setting where patients with pain display diverse and mixed characteristics.

The assumption for the present study was that some identifiable pre-treatment characteristics would explain which participants would benefit from the PASS treatment in terms of disability and, moreover, that post-treatment scores in self-efficacy, perceived pain control and catastrophizing would explain maintenance of treatment gains in terms of disability in the long run.

The objective was to explore plausible predictors associated with short-term and long-term treatment success in terms of pain-related disability for patients with persistent tension-type neck pain following a PASS, and more specifically: 1) to explore predictors for favourable post-treatment outcome in pain-related disability at the 20-week follow-up, by examining demographic and background data, and baseline self-efficacy, pain intensity, pain control, disability, catastrophizing, anxiety

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and depression, 2) to explore predictors for favourable long-term treatment outcome in pain-related disability at the 2-year follow-up, by examining demographic and background data, baseline and post-treatment self-efficacy, pain intensity, pain control, disability, catastrophizing, anxiety and depression.

METHODS

Study design and procedure

This study had a correlational, longitudinal and prospective design, exploring predictors of favourable outcome regarding pain-related disability at the 20-week and 2-year follow-ups, for the participants assigned to the experimental treatment condition (PASS) in a randomized controlled trial (10). The allocation sequence was prepared by the last author prior to the enrolment of patients to the study, using a random number table, and stratified by PHC centre. The allocation sequence was concealed from all others. The participants were given written and oral information concerning the study and gave their written informed consent. After completing the baseline self-assessment questionnaire, the participants were randomly assigned to either the experimental treatment PASS or to the control treatment IAPT. A physical therapist (PT) or a PT-assistant who was not involved in delivering the treatment administered the questionnaires and the opening of sealed, opaque envelopes containing group allocation. Blinding to treatment was not possible, either for participants or PTs delivering the treatment.

The study was carried out at 9 PHC centres in 8 towns in a county of Sweden. PASS treatment was delivered at each participating PHC centre by PTs. Every participating PHC centre had at least 3 experienced PTs in order to be able to carry out both PASS and control treatment arms without risking contamination between treatment conditions. Each PT was only allowed to deliver one of the treatments. The PTs had 2–30 years of professional experience of rehabilitation in PHC and the level of experience (in number of years) did not differ between the two treatment conditions. The PTs who delivered the PASS were specially trained prior to the study. They attended a course spread over 4 half-days, consisting of lectures and practical exercises based on the written manual for the PASS treatment. To ensure adherence to the treatment manual the PTs had 3 follow-up sessions during the study period.

Follow-up was conducted by means of self-assessment questionnaires that were posted to the participants at: 10 weeks, 20 weeks, 1 year and 2 years after inclusion. The 20-week follow-up was conducted immediately after the last treatment session (the 20-week booster session). In the present study, data from self-assessment questionnaires completed by the participants before, post-treatment (i.e. 20 weeks after inclusion) and at 2 years after inclusion to the intervention, were used.

Short-term effects, at 10 weeks and 20 weeks, and detailed descriptions of design, methods, content of the interventions and sample characteristics have previously been reported (8), as well as long-term effects at 1 year and 2 years (9). The study was approved by the ethics committee of Uppsala University (Ups02-088).

Study subjects

Persons with persistent tension-type neck pain seeking physical therapy treatment at the participating PHC centres in Sweden were consecutively recruited from September 2004 to April 2006. They were examined by a PT and considered eligible if they were 18–65 years of age and had tension-type neck pain of persistent duration, i.e. more than 3 months. Tension-type neck pain was defined as: subjective statements of ache/pain in an area covering the occipital parts of the head to the acromion on the shoulder and following the scapular spine to the fourth thoracic vertebra, together with palpation tenderness in the same area and without signs of neurological symptoms or cervical vertebral or joint pathology as examined by the PT (11). Patients were excluded if they had insufficient fluency in Swedish, had a medical history of psychotic disorder, were pregnant, had previously received the PASS or if they had signs of depression, i.e. ≥11 points on the depression subscale of the Hospital Anxiety and Depression Scale (HADS-D) (12, 13). The latter exclusion criterion was based on experience from a pilot study in which persons with high scores on HADS-D tended to withdraw from the study (14). In the present study, the 77 participants assigned to the PASS treatment condition were included.

Intervention

PASS consisted of 7 weekly group sessions and a booster session at 20 weeks after the initial session; all sessions were 1.5 h long. The booster session targeted maintenance of coping skills. The PASS treatment was carried out with groups of 6–8 patients, including both participants in the study and other patients with musculoskeletal pain referred to the PHC centres. Each session consisted of applied relaxation training, body awareness exercises and short lectures with group discussions concerning issues related to pain self-management, in strict accordance with a written manual (8). The applied relaxation (15) comprised progressive and autogenic relaxation methods, and conditioned relaxation exercises, e.g. cue-controlled relaxation by thinking "Relax!" while exhaling. The rationale was to teach the patient active pain coping skills by identifying personal "risk situations" in everyday life, i.e. activities, movements or thoughts believed to cause the individual's pain, and to apply the relaxation techniques in these daily-life stressful situations to prevent the pain from starting, or to control it. In between group sessions the participants completed individually tailored homework assignments by practicing different relaxation exercises twice a day at home, in addition to applying the relaxation skills in specific everyday-life situations, identified as personal "risk situations". Instructions for practice and feedback on application were continuously supplied during group sessions throughout the course of the treatment. The body awareness exercises (16) were standing movement exercises that served to increase the awareness of oneself in the present moment; i.e. the ability to sustain the attention on mental and bodily signals in a non-evaluative, moment-to-moment awareness, and to provide an opportunity to practice and apply relaxation when standing and during movement. The participants in PASS were not to receive individually administered physical therapy during the 20-week PASS treatment period, but treatment was in no other way restricted. They were not constrained regarding general physical activities, such as walking, cycling, etc.

Data collection

The self-assessment questionnaires comprised background information and data on outcome variables ascertained by questions and instruments frequently used in studies concerning pain conditions.

Dependent variable. The dependent variable was *pain-related disability*. Perceived interference with daily activities due to neck pain was assessed using the Neck Disability Index (NDI) (17, 18) consisting of 10 items, scored from 0 to 5. The total score is expressed as an overall index of 0–100. In the analysis a revised 8-item version transformed into a 0–50 interval Rasch-weighted score, was used (19).

Independent variables

Demographic and background data regarding age, gender and duration of neck pain were collected by the baseline questionnaire. Duration of neck pain was reported on a 4-point scale ("3–6 months", "7–12 months", "1–2 years" and "more than 2 years"). The short-form of Antonovsky's Sense of Coherence Scale (SOC-13), which assesses view-of-life related personal characteristics that influence appraisals of meaning, was used as part of the background data (20).

Pain intensity using a numerical rating scale ranging from 0 to 10 (0="no pain", 10="worst possible pain") (21).

Consumption of analgesics due to neck pain was reported on a 5-point scale ("never", "a couple of days per month", "1 or 2 days a week", "every second day" and "every day"). Data on type of analgesics

(i.e. generic name or pharmacological groups of analgesics) were not collected.

Health care utilization. The number of self-reported health care visits and the number of days on sick-leave related to neck pain, in the 3 months prior to each data collection.

Pain control by the question from the Coping Strategies Questionnaire (CSQ) (22, 23), assessing the overall effectiveness of coping strategies. Participants rated the extent to which they were able to control pain (0 = "no control", 6 = "complete control").

Self-efficacy was assessed by the Self-Efficacy Scale (SES) (24, 25). The participants rated how confident they felt about performing 20 everyday activities in spite of pain (0 = "not at all confident", 10 = "very confident").

Catastrophizing. The propensity to engage in negative thinking and worry in response to pain, was assessed by The Catastrophizing subscale (CSQ-CAT) of the CSQ (22, 23, 26), (0 = "never", 6 = "always").

Depression and anxiety was measured by the Hospital Anxiety and Depression Scale (HADS) (12, 13) consisting of 2 subscales reflecting depression and anxiety, respectively. Recommended cut-off points for each subscale: ≤7"non-cases", 8–10 "doubtful cases" and ≥11 "definite cases" (12).

Pain-related disability. Perceived interference with daily activities due to neck pain assessed by the NDI (17, 18) was also included as an independent variable.

Statistical analyses

In a first step, all possible data were explored in order to identify plausible predictors of favourable outcome regarding pain-related disability. Initial Pearson correlation analyses (27) were performed for all possible variables; by examining demographic and background data collected at baseline, as well as baseline, post-treatment (20-weeks) and 2-years self-efficacy, pain intensity, pain control, disability, catastrophizing, anxiety and depression. Pearson correlation analyses and factor analysis (FA) with varimax rotation of baseline and 20 weeks variables (27), revealed multicollinearity among variables.

In the second step, to evaluate the effect of the independent variables self-efficacy (SES), pain control (CSQ), disability (NDI), catastrophizing (CSQ-CAT), anxiety and depression (subscales from HADS) and questions regarding neck pain and analgesics on the dependent variable pain-related disability (NDI), multiple linear regression analyses were performed (27). Two final models were set up to assess the lag effects of the independent variables on disability (NDI): 1) the independent variables at baseline on NDI at 20 weeks, and 2) the independent variables at 20 weeks on NDI at 2 years.

Multiple linear regression analyses estimated by partial least squares (PLS) were performed. Multicollinearity rendered multivariate regression analysis estimated by ordinary least squares (OLS) inappropriate. PLS is a method that makes multivariate regression analysis possible in the existence of many and/or highly correlated predictors (28–30). Wold's variable importance for projection (VIP) and the estimated standardized coefficients (mean = 0, standard deviation = 1) were used to evaluate the contribution of each predictor on the fitted regression model. The analysis was then performed without covariates displaying a VIP < 0.8 and with low standardized coefficients. To confirm the final results and to produce a measure of uncertainty, univariate OLS linear regression analysis was performed for each covariate included in the final PLS model (27). The analyses were performed using the statistical software's SAS 9.2 (SAS Institute Inc., Cary, NC, USA) and IBM SPSS Statistics 18 (IBM SPSS, Chicago, IL, USA).

Data were analysed according to "intention-to-treat" and included all randomized PASS participants with baseline measures. The imputation method of last value carried forward (31) was used to obtain complete data for all participants. Occasional missing items from the separate questionnaires were substituted with the median of the individual's other item scores on the same scale or subscale (32).

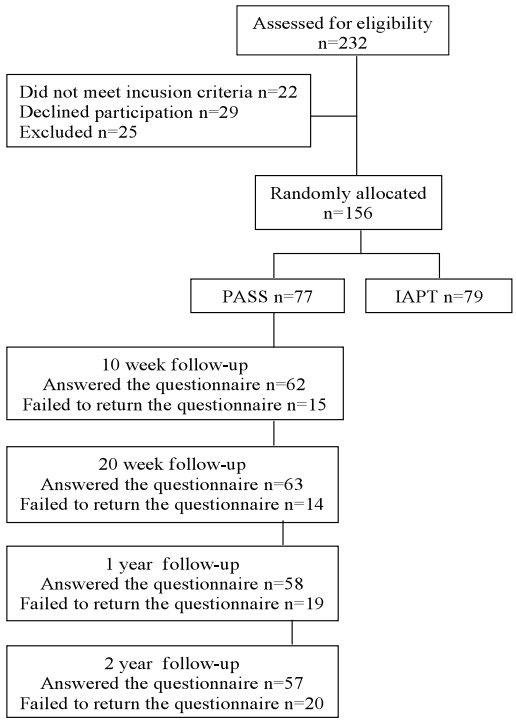

Fig. 1. Flow chart of participation throughout the trial.

RESULTS

Participant flow through the trial

In total, 232 persons were screened for inclusion in the study. A flow-chart of the study is shown in Fig. 1. Twenty-two persons did not meet the inclusion criteria. Twenty-nine persons declined participation. Twenty-five persons were excluded, due to: insufficient fluency in Swedish ($n = 1$), medical history of psychotic disorder ($n = 1$), pregnancy ($n = 1$), already ongoing treatment for neck pain ($n = 5$), having previously received PASS ($n = 1$), or scored ≥11 points on the HADS depression subscale (HADS-D) ($n = 16$). In total, 156 participants (139 women and 17 men) aged 19–65 years were randomly assigned; 77 to PASS and 79 to control treatment IAPT. Baseline characteristics of the 77 PASS participants are shown in Table I.

Eleven participants from the PASS group withdrew without completing the assigned treatment, referring to decreased neck pain or lack of time. The PASS completers attended a mean of 7 (range 4–8) group treatment sessions over the 20-week treatment period.

Correlational analyses

FA suggested a 3-factor interrelationship among baseline variables, showing factor 1: NDI, SES, CSQ pain control, factor 2: HADS depression, CSQ catastrophizing, HADS anxiety, factor 3: pain intensity (Table II). Due to the multicollinearity, possible predictors for favourable treatment outcome in NDI and long-term maintenance outcome in NDI were examined by PLS regression analysis.

Table I. *Baseline characteristics for participants in the pain and stress self-management group treatment (PASS)*

Characteristics at baseline	PASS group ($n=77$)
Gender, *n* (%)	
Female/male	69 (90)/8 (10)
Age, years, mean (SD)	45.7 (11.5)
Age range, years	19–65
Duration of neck pain (1–4), median (IQR)	4 (3–4)
3–6 months, *n* (%)	7 (9)
7–12 months, *n* (%)	4 (5)
1–2 years, *n* (%)	12 (16)
More than 2 years, *n* (%)	54 (70)
Pain intensity, mean (SD)	
Present (0–10)	5.5 (2)
Average (0–10)	6 (1.8)
Worst/maximum (0–10)	8.4 (1.4)
Analgesics due to neck pain (0–4), median (IQR)	1 (1–2.5)
"Never", *n* (%)	12 (16)
"1 or 2 days per month", *n* (%)	28 (36)
"1 or 2 days per week", *n* (%)	18 (23)
"Every 2nd day", *n* (%)	9 (12)
"Everyday", *n* (%)	10 (13)
Health care visits due to neck pain during preceding 3 months, mean (SD)	2.4 (3.2)
Sick-leave during preceding 3 months (0–90), days, mean (SD)	22 (35.2)
Current level of sick-leave (0–4), median (IQR)	0 (0–2)
Not on sick-leave, *n* (%)	52 (67)
25% off work due to sick-leave, *n* (%)	3 (4)
50% off work due to sick-leave, *n* (%)	9 (12)
75% off work due to sick-leave, *n* (%)	3 (4)
Totally off work due to sick-leave, *n* (%)	10 (13)
Self-efficacy: expectancies of ability to work in the future (0–10), mean (SD)	7.9 (3.2)[a]
Neck Disability Index (0–100)	30.8 (10.7)
Self-Efficacy Scale (0–200)	136.7 (39.8)
CSQ-C: Pain control (0–6)	3.3 (1.1)
CSQ: Ability to reduce pain (0–6)	2.9 (1)
CSQ-CAT: Catastrophizing (0–36)	11.3 (7.4)
Hospital Anxiety & Depression Scale: Depression Subscale (0–21)	4.3 (3.1)
Hospital Anxiety & Depression Scale: Anxiety Subscale (0–21)	8.2 (4.1)
Sense of Coherence Scale-Short form (13–91)	65 (12.3)

[a]$n=75$, [b]$n=74$.
CSQ: Coping Strategies Questionnaire; SD: standard deviation.

Table II. *Three-factor interrelationship among baseline variables by factor analysis*

	Factor loadings[a]		
Variables	1	2	3
Depression (HADS-D)	0.869		
Catastrophizing (CSQ-CAT)	0.825		
Anxiety (HADS-A)	0.738		
Pain Control (CSQ-C)		0.733	
Neck Disability Index		0.641	
Self-Efficacy Scale	–0.581	–0.631	
Pain intensity			0.966

[a]Total variance explained: 74.3%.
HADS-D: Hospital Anxiety and Depression Scale Depression Subscale; HADS-A: Hospital Anxiety and Depression Scale Anxiety Subscale; CSQ-CAT: Coping Strategies Questionnaire Catastrophizing Subscale; CSQ-C: Coping Strategies Questionnaire Pain Control.

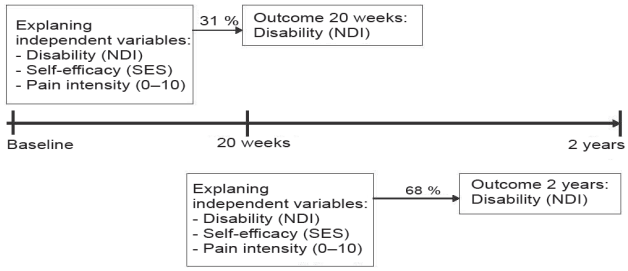

Fig. 2. Overview of the predictive independent variables and the percentage of explained variance in short-term (post-treatment at 20 weeks) and long-term (2 years after treatment) disability outcome. NDI: Neck Disability Index; SES: Self Efficacy Scale.

Fig. 2 provides an overview of the predictive independent variables and the percentage of explained variance in short-term (post-treatment at 20 weeks after inclusion) and long-term (2 years after inclusion) disability outcome. Multivariate PLS regression analysis showed that baseline scores in NDI, SES and pain intensity explained 31% of the variance in disability (NDI) post-treatment (20-week follow-up). Additional univariate OLS linear regression analyses were performed for each variable, which indicated that the variables contributed significantly in explaining the variation in NDI at post-treatment follow-up: NDI ($p<0.001$), pain intensity ($p=0.001$), SES ($p=0.006$). Table III shows the results of the final model of PLS and OLS regression analyses of NDI at 20 weeks.

Multivariate PLS regression analysis showed that post-treatment (20-week follow-up) scores in NDI, SES and pain intensity explained 68% of the variance in disability (NDI) at 2 years follow-up (Fig. 1). Additional univariate OLS linear regression analyses were performed for each variable, and indicated that the variables contributed significantly in explaining the variation in NDI at 2 years follow-up: NDI ($p<0.001$), pain intensity ($p<0.001$), SES ($p<0.001$). Table IV shows the results of the final model of PLS and OLS regression analyses of NDI at 2 years.

DISCUSSION

Treatment gains measured by post-treatment scores at 20-week follow-up, in disability, self-efficacy and pain intensity, were associated with long-term outcome in pain-related disability 2 years after inclusion to the intervention, in patients with persistent neck pain participating in a self-management group intervention in PHC. Pre-treatment characteristics explained only a small proportion of variance in disability post-treatment, and are thus assumed to be associated with treatment success and long-term outcome to a lesser degree.

Initial correlation analyses revealed multicollinearity among variables and subsequent FA suggested a 3-factor interrelationship among baseline variables in this sample of patients with neck pain showing factor 1: NDI, SES, CSQ pain control, factor 2: HADS depression, CSQ catastrophizing, HADS anxiety, factor 3: pain intensity. This is consistent with literature presenting a comprehensive, though somewhat divergent, overview of possible interrelated variables making up characteristics in

Table III. *Results of multivariate partial least squares (PLS) and ordinary least squares (OLS) regression analyses of Neck Disability Index (NDI) at 20 weeks for the pain and stress self-management group intervention-group (*n = *77)*

	Full model PLS		Final model PLS[a]		Univariate OLS regression					
							95% CI			
Covariate	Normalized beta	Beta	Normalized beta	Beta	Beta	Standard error	Lower	Upper	R^2	*p*-value
Pain intensity	0.117	0.333	0.155	0.442	1.020	0.308	0.407	1.632	0.116	0.001
NDI	0.189	0.303	0.251	0.402	0.928	0.151	0.627	1.229	0.325	<0.001
SES[b]	–0.102	–0.015	–0.135	–0.019	0.231	0.085	0.062	0.400	0.192	0.008
SES^2	–0.120	–0.000	–0.159	–0.000[c]	–0.001	0.000[d]	–0.002	–0.000[e]		0.002
Pain control (CSQ)	–0.007	–0.035								
Catastrophizing (CSQ-CAT)	0.068	0.052								
Depression (HADS-D)	0.063	0.116								
Anxiety (HADS-A)	0.062	0.086								

[a]Proportion of variation in NDI at 20 weeks explained = 30.8%; [b]SES and SES^2 estimated within the same OLS regression model; [c]–0.00008886; [d]0.00033299; [e]–0.00043580.

CSQ-C: Coping Strategies Questionnaire Pain Control; CSQ-CAT: Coping Strategies Questionnaire Catastrophizing Subscale; HADS-D: Hospital Anxiety & Depression Scale Depression Subscale; HADS-A: Hospital Anxiety & Depression Scale Anxiety Subscale; CI: confidence interval; SES^2: Self-Efficacy Scale transformed.

the pain population. There is an intuitive appeal in the association between pain-related disability as measured by the NDI and self-efficacy beliefs towards activities that are interfered with by pain. According to Bandura (33), self-efficacy is the belief that one can successfully perform a specific activity. The majority of items in the NDI can be said to measure a person's self-rated activity limitations and/or participation restrictions rather than to be a measure of function (34). The close association emphasizes the importance of addressing and strengthening self-efficacy beliefs in order to reduce pain-related disability, i.e. increase performance of activities. Pain intensity making up a separate factor could be consistent with research suggesting that there is often little correlation between pain intensity and disability in samples of persons with pain conditions (35). Several studies have pointed to the correlation between depression and catastrophizing and that having one or the other factor is associated with more severe pain problems and unfavourable outcome from treatment, and having both problems increase the association substantially (36, 37). Furthermore, studies show that people with a combination of several psychosocial prognostic factors show the highest levels or pain-related disability (38). The importance of assessing and targeting depressed mood and pain catastrophizing in physical therapy interventions has been emphasized as well as tailoring treatments to match patterns of psychosocial prognostic factors (39, 40).

The research question was whether pre-treatment characteristics among participants would predict treatment outcome and possibly also explain long-term maintenance of outcome. However, pre-treatment variables could only explain post-treatment outcome in pain-related disability (NDI) to a limited extent (31%), following a self-management group intervention in PHC. This could be regarded as a small proportion of explained variance. PLS analysis suggested: NDI, SES, pain intensity, as predictors. Pain-related disability (NDI) was the only pre-treatment variable that contributed, according to an additional univariate regression analysis to post-treatment outcome in pain-related disability (NDI). This suggests that pre-treatment variables, with the exception of NDI to a limited extent, were less associated with treatment outcome. Thus, our results could not

Table IV. *Results of multivariate partial least squares (PLS) and ordinary least squares (OLS) regression analyses of Neck Disability Index (NDI) at 2 years for the pain and stress self-management group intervention-group (*n=*77)*

	Full model		Final model PLS[a]		Univariate OLS regression					
							95% CI			
Covariate	Normalized beta	Beta	Normalized beta	Beta	Beta	Standard error	Lower	Upper	R^2	*p*-value
Pain intensity	0.213	0.511	0.300	0.722	1.492	0.218	1.059	1.926	0.377	<0.001
NDI	0.519	0.565	0.401	0.437	0.903	0.070	0.764	1.043	0.685	<0.001
SES	–0.254	–0.046	–0.273	–0.050	–0.103	0.017	–0.138	–0.069	0.311	<0.001
Pain control (CSQ)	–0.080	–0.500								
Catastrophizing (CSQ-CAT)	–0.084	–0.084								
Depression (HADS-D)	0.048	0.099								
Anxiety (HADS-A)	–0.085	–0.139								

[a]Proportion of variation in NDI at 2 years explained = 67.5%.

CSQ-C: Coping Strategies Questionnaire Pain Control; CSQ-CCAT: Coping Strategies Questionnaire Catastrophizing Subscale; HADS-D: Hospital Anxiety & Depression Scale Depression Subscale; HADS-A: Hospital Anxiety & Depression Scale Anxiety Subscale; SES: Self-Efficacy Scale; CI: confidence interval.

support the assumption that pre-treatment patient characteristics would explain disability outcome after a multi-component pain and stress self-management group intervention (PASS) in this sample of persons with neck pain in PHC.

A previously reported long-term follow-up showed that treatment gains following a pain self-management intervention were largely maintained over the 2-year follow-up period and with a tendency to have superior effect compared with the control condition, individually administered physical therapy (9). The present study shows that post-treatment outcomes (at 20-week follow-up) in disability, self-efficacy and pain intensity accounted for a significant part of the variance, 68%, in long-term outcome in disability, 2 years after inclusion in a self-management group intervention. In addition, pre-treatment factors were weakly associated with long-term maintenance of outcome. This suggests that treatment gains in disability, self-efficacy and pain intensity were important to explain long-term outcome in disability following this self-management group intervention in PHC. Thus, the results imply that it is important to address these factors, in order to induce long-term maintenance of treatment gains in disability following a pain self-management intervention.

In accordance with a pragmatic approach, the inclusion criteria were wide in order to include the diversity of characteristics exhibited by persons with neck pain seeking physical therapy treatment in PHC settings. Since specific pre-treatment characteristics accounted only to a limited extent for the outcome in disability following a pain self-management intervention, it is suggested that the intervention appears to be feasible for the majority of persons seeking PHC due to persistent tension-type neck pain.

Study limitations

Persons with signs of depression were excluded from this study, which limits conclusions concerning the possible predictive value from depression. Depression is a common co-morbidity in persons with persistent neck pain (41), which calls for further investigation and studies regarding appropriate treatment options for depressed pain patients. Furthermore, caution should be exercised in generalizing the results to persons with insufficient fluency in Swedish as they were excluded from the study.

An important limitation is that this study relied on self-reported data. It was considered that it would be difficult for most patients to accurately report detailed information regarding what different types of analgesics (i.e. generic name or pharmacological groups of analgesics) they consumed. Therefore only data on frequency of analgesics consumption was collected. Thus, it is not known what kind of analgesics the participants were taking. Also self-reported data on health care visits and days on sick-leave related to neck pain should be treated with caution, as such data might be subject to recall bias.

Conclusion and clinical implications

In conclusion, treatment gains as measured by post-treatment scores at the 20-week follow-up, in disability, self-efficacy and pain intensity, were associated with favourable long-term outcome in pain-related disability, 2 years after inclusion, in patients with persistent neck pain participating in a self-management group intervention in PHC. In contrast, pre-treatment patient characteristics explained only a small proportion of variance in disability post-treatment, i.e. at 20 weeks after inclusion. Thus, the clinical implications are that the intervention appears to be feasible for the majority of persons seeking PHC due to persistent tension-type neck pain, and that self-management programmes for persistent neck pain should address pain-related disability beliefs, self-efficacy beliefs and pain intensity in order to induce long-term maintenance of treatment gains in disability reduction.

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We certify that no party having a direct interest in the results of the research supporting this article has or will confer a benefit on us or on any organization with which we are associated.

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