Patients' expectations:

Haanstra, T.M.

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CHAPTER 7

Treatment success in neck pain: the predictive value of psychosocial variables in addition to clinical variables.

R. Groeneweg, T. M. Haanstra, C. A. W. Bolman,
R. A. B. Oostendorp, M. W. van Tulder, R. W. J. G. Ostelo

Abstract

The objective of this study was to prospectively examine whether psychosocial variables are predictive factors for treatment success (i.e. global perceived effect, daily functioning and pain), in addition to clinical variables in patients with subacute and chronic non-specific neck pain undergoing physiotherapy or spinal manipulative therapy. Psychosocial factors in this study were treatment outcome expectancy, treatment credibility, health locus of control, and fear avoidance beliefs. Patients (N=181) were recruited in 16 primary care practices. The measurements were at baseline, 7 and 26 weeks after baseline.
The sample of which 61.9% were females, had a mean age of 49.0 years (SD = 12.5).
Hierarchical logistic regression analyses showed that treatment outcome expectancy predicted outcome success. These expectancies explained an additional 6-18% of variance in the various outcomes above and beyond clinical and demographic variables.
Both locus of control and fear avoidance beliefs did not significantly predict any of the outcomes. Our results suggest that treatment outcome expectancy is of potential interest in clinical practice for determining the prognosis of these patients and influence treatment outcomes.

Introduction

Neck pain is an important individual, social and economic health problem. Worldwide, neck pain is ranked fourth in the list of causes of Years Lived with Disability[1]. If complaints exist longer than six months the average severity of neck pain remains fairly stable[2].

It is clinically and economically relevant to prevent complaints becoming chronic. There are several interventions for neck pain. However, it is not clear which interventions are most effective and whether subgroups of neck pain patients benefit more from specific interventions[3-5]. Besides intervention-specific factors (biomechanical and neurophysiological effects[6,7]) the effectiveness of treatment may also be predicted by psychosocial factors affecting neck pain related outcomes. A model in which these factors are taken into account is the biopsychosocial disease model[8]. Psychological and social factors appear to be consistently associated with the onset and persistence of neck pain[9-11]. Potentially (some) psychosocial factors can be modified. This makes research on the psychosocial factors of importance to improve treatment of neck pain. By detecting essential psychosocial factors patients can be identified that are at risk for poor outcomes or developing and maintaining chronic symptoms.

A number of psychosocial factors are hypothesized to predict the effects of treatment for neck pain: treatment outcome expectancy, treatment credibility, locus of control and fear avoidance beliefs. Multiple studies showed that treatment outcome expectations may play a role in the prognosis of (neck) pain in various fields, including rehabilitation[12-18], psychotherapy[19-22] and placebo research in general[23,24]. The response expectancy theory is one of theories that try to explain the relationship between expectations and outcomes. It states that a person's expectations will affect their experiences. This is the process that (possibly) underlies the placebo and nocebo effect which is supported by research showing that subjective and physiological responses can be changed by influencing one's expectations[23,25], as confirmed in functional magnetic resonance imaging (fMRI) studies[26].

Delsignore et al.[27] state that the locus of control construct includes explicit prognostic beliefs. They refer to the degree to which individuals attribute their health condition to their own behavior (internal locus of control) or outside of their personal control (external locus of control).

Fear avoidance beliefs are seen as an important mediator in developing and maintaining chronic pain[28], and can be used to predict outcomes of treatment[29-32].
The objective of this study is to explore whether treatment outcome expectancy, treatment credibility, locus of control and fear avoidance beliefs predict treatment success of manual therapy and physical therapy for patients with non-specific neck pain. In order to investigate the relative importance of these variables, the predictive value and cut-off points of treatment success will be evaluated above and beyond demographic and clinical variables that have been shown to be predictive of outcome in previous studies

and are commonly used in clinical practice. Secondary aim is to investigate whether type of treatment (physical therapy vs manual therapy) is an effect modifier in the relationship between the psychosocial factors and treatment outcome.

Methods

Design and setting

This study is a secondary analysis of a pragmatic randomized controlled trial (RCT), which was conducted in primary care practices in the Netherlands (ClinicalTrials.gov Identifier: NCT00713843). Ethical approval was obtained from the Medical Ethics committee CMO Arnhem-Nijmegen (NL21128.091.08).

Study population

Patients aged 18 to 70 with non-specific sub-acute and chronic neck pain, with or without radiation to the shoulder region or the upper extremities, with or without headache, were included. Exclusion criteria were: presence of red flags, pregnancy, whiplash trauma as cause of the complaint, and treatment for neck pain in the previous three months. All patients signed informed consent.

Interventions

In this RCT patients received either manual therapy or physical therapy. In the manual therapy arm the manual therapist performed a number of protocol-based patient assessments. In these assessments, the natural asymmetry of shape, posture and movement was recorded. The interpretation of the assessment allows for determining the direction and position of movement axes in the joints of the patient. Mobilization techniques were performed very softly, generally pain-free, and passive for the patient. Giving advice on activities of daily living and lifestyle, and recommending home exercise and exercises is common in manual therapy. In the physical therapy arm treatment consisted of active exercises aimed at improving strength, mobility and movement coordination; exercises to improve posture and to promote relaxation; manual traction for pain reduction; and massage therapy for relaxation. Specific manual mobilization techniques, known as manual therapy techniques, were not part of physical therapy. The physical therapist spent at least two-thirds of treatment time on active exercise. Giving advice on activities of daily living and lifestyle, and recommending home exercise is common and was therefore equal in both conditions.

Measurements (baseline and follow up on 7 and 26 weeks)

At baseline, a range of demographic and clinical variables that are commonly queried in daily clinical practice (age, gender, previous symptoms, pain, functioning and general physical and mental health) were measured. The psychosocial variables that are the main interest of this study were measured at baseline except for expectancy and credibility, which were measured after the first treatment session. Follow-up assessments were done at 7 and 26 weeks after baseline, the follow-up questionnaires contained a measure of general perceived effect, the neck disability index and the numerical rating scale pain.

Psychosocial factors

Credibility Expectancy Questionnaire (CEQ)

The CEQ has shown to be a reliable instrument, which measures the credibility and outcome expectancies (each scale three questions, scored 1-9) regarding a proposed treatment. The questionnaire has shown good internal consistency and test-retest reliability[33]. Sum scores for each scale range from 3-27; the higher the score, the higher the expected outcome or the more credible the treatment is to the patient. Smeets et al.[18] translated and validated this questionnaire into Dutch and confirmed the two factor structure (credibility/expectancy)[18].

Multidimensional Health Locus of Control (MHLC)

This questionnaire contains 18 items on beliefs about responsibility for health. Items are scored on a six-point Likert scale ranging from ‘strongly disagree’ to ‘strongly agree’. The three subscales of the questionnaire (6 items each, range between 6 and 36 for each subscale) are: (1) internal health locus of control (ILOC), where individuals feel that events are more under their own control; (2) external health locus of control (ELOC), where other people such as caregivers and family play a big role in determining patients’ health; and (3) the chance locus of control (CLOC), where people believe that their health is affected by chance or luck [34].

Higher scores represent higher control. This questionnaire has been tested in different patient populations and has shown a satisfactory internal consistency[35]. The three dimensions are relatively independent of each other[34].

Fear Avoidance Belief Questionnaire (FABQ - DV)

This questionnaire focuses on pain-related anxiety in patients using fear avoidance components. The FABQ includes 16 items which are answered on a 7-point likert scale, besides a total score two subscales, which are physical activity (five items) and work (11 items). Summary scores can be calculated score for the entire questionnaire (range: 0-96), or for two separate subscales namely physical activity (5 items, range 0-30) and work (11 items, range 0-66). Higher scores represent higher fear avoidance beliefs. Cronbach’s alpha and test-retest reliability were good [36,37].

Dependent (outcome) variables measured at 7 and 26 weeks

Global Perceived Effect (GPE)

Global Perceived Effect was measured with one item, scored on a 7-point ordinal scale

('To what extent are you recovered from your neck complaints since the beginning of treatment' from 'much worse' to 'full recovery'). Test-retest reliability of the GPE is excellent[38]. The GPE was dichotomized in success and no success. On the 7-point scale, the answers 'fully recovered' and 'much improved' were recoded as success and 'somewhat improved', 'no change', 'slightly worse', 'much worse', and 'worse than ever' as no success of treatment.

Neck Disability Index –Dutch version (NDI-DV)
The NDI-DV consists of 10 items related to daily functioning, each with six possible answers (scored 0-5). The maximum score is 50 and a higher score indicated more restrictions. The reliability, validity and responsiveness[39,40] of the NDI are good. The Minimal Clinically Important Change (MCIC) of NDI-DV is 3.5[40,41] or 30%[42]. We dichotomized this outcome based on this clinically relevant change, whereby 30% improvement in these scores was defined as a cut of point to indicate success.

Numeric Rating Scale on Pain (NRS-P)
The NRS-P is a single item scale (11 points, from 0 for no pain to 10 for maximum pain) that measures the intensity of pain that the patient has experienced over the past week. It has good psychometric properties[43,44]. The NRS-P is a sensitive instrument similar to the VAS[45,46]. The Minimal Clinically Important Change (MCIC) of the NRS-P in patients with neck pain was 2.5 points[40] or 30%[42]. Similar to the NDI-DV and the literature the NRS-P was dichotomized by defining 30% improvement as a cut-off point to indicate success.

Statistical analyses

Demographic variables such as gender and age, clinical variables such as duration and severity of symptoms, and comorbidity were described as percentage or mean (standard deviation SD). Associations between demographic and clinical variables and psychosocial baseline characteristics and outcome success were explored using Pearson's correlation coefficients for continuous variables and Spearman correlation coefficients for categorical or dichotomous variables.
As clustering by treatment center or intervention was not present as demonstrated in the primary analyses of these data[47], in the current analyses a multi-level approach was not employed.
To explore the added value of the psychosocial variables, a series of hierarchical logistic regression analyses were performed on the dependent variables global perceived effect, function and pain at 7 and 26 weeks.

Candidate demographic and baseline clinical variables were selected and entered as fixed block 1 in the regression models based on the p-value ($P \leq 0.15$) of their correlation with the outcome variables. In block 2 the subscales of the psychosocial variables were entered separately; respectively treatment credibility, treatment outcome expectancy, internal locus of control, external locus of control, chance locus of control, fear avoidance beliefs subscale work and subscale physical activity. Thus, seven hierarchical logistic regression analyses were performed for three outcome variables, all on two measurement times, resulting in a total of 42 regression models.

Psychosocial factors that showed statistical significant predictive value in the hierarchical regression analyses were explored in further analyses. These were performed to investigate the importance of these factors relative to the other psychosocial factors from the same measurement tool. This was done by adding the psychosocial variables in block 2 and 3 (and if necessary further blocks) to the hierarchical logistic regression model. The order of input of the respective psychosocial variables in the blocks was separately performed. The change in the R^2 value between the blocks indicates the relative contribution of the variables in each block to the variance in outcome.

Finally, for individual subscales with significant predictive value, the sensitivity and specificity of the subscales were calculated and plotted on a Receiver Operating Characteristic (ROC) curve. The point on the curve closest to the upper left corner represents the value with the best diagnostic accuracy, and this point was selected as the cut-off point for a positive test[48]. An area under the curve (AUC) of at least 0.7 was seen as acceptable to determine a cut-off point.

All procedures were performed with adjustment for intervention type. Possible interactions between the psychosocial variables and intervention type (MT vs PT) were explored in all analyses by adding an interaction term. If significant interaction occurred further analyses were done stratified for type of intervention. The missing values of this study were treated with listwise deletion. All statistical analyses with treatment as interaction term were performed according to the intention-to-treat principle. All patients, including dropouts from treatment and patients with poor compliance, remained in the group to which they were randomized. Data were analyzed with IBM Statistics SPSS 21.

Results

Sixteen primary care practices participated in the trial with a total of 181 patients. The mean age was 49 years (SD = 12.5), and about 62% were women. Most patients (67%) had previous episodes of neck pain and the majority had multiple musculoskeletal complaints (see Table 1). At baseline, no differences were shown between the two intervention groups. The scores on the treatment credibility and treatment outcome expectancy subscale of the CEQ were high (around 22 out of a maximum of 27).
Based on the correlations between demographic and clinical variables with the outcomes, the following variables were selected for block 1 of the hierarchical regression analyses: age, baseline functioning, and pain.

Table 1. Baseline characteristics

Gender, female % (N)	61.9 (112)
Age, years, mean (SD)	49.0 (12.5)
Complaints thoracic spine (yes, %)	23.2
Complaint lumbar spine (yes, %)	16.6
First time neck complaints (ja, %)	66.9
Last Year visit any therapist for neck (yes, %)	40.3
Intervention (MTU, %)	49.7
Measurements, Mean (SD)	
NDI	12.1 (6.2)
NPRS	5.7 (1.9)
CEQ-Expectancy	20.8 (3.9)
CEQ-Credibility	22.2 (3.3)
FABQ-Total	29.8 (15.7)
FABQ-Physical Activity	15.1 (5.5)
FABQ-Work	14.7 (12.8)
MHLC-Intern	19.8 (4.7)
MHLC-extern	25.6 (5.0)
MHLC-chance	24.2 (4.2)
SF-36-PCS	44.6 (7.5)
SF-36-MCS	46.8 (11.3)
Complain intensity main complaint (NRS)	6.9 (1.3)

Abbreviations: N - number;; SD - Standard Deviation; MTU - Manual Therapy Utrecht; NDI - Neck Disability Index; NPRS - Numeric Pain Rating Scale; CEQ - Credibility Expectancy Questionnaire; FABQ - Fear Avoidance Questionnaire; MHLC - Multidimensional Health Locus of Control; SF - Short Form; PCS - Physical Component Scale; MCS - Mental Component Scale.

Tables 2a and 2b show the results of the hierarchical logistic regression analyses on treatment outcome success. Treatment credibility added 3.4% to the variance explained in GPE, 5.9-11.2% to the variance explained in functioning and 1.8-2.7% to the variance explained in pain after respectively 7 and 26 weeks. Treatment outcome expectancy added 10.0-13.2 % to the variance explained in GPE, 17.3-17.7% to the variance explained in functioning and 5.6-7.5% to the variance explained in pain after 7 and 26 weeks. Further analyses showed that when treatment outcome expectancy was added to the models in block 2 and credibility in block 3, credibility did not significantly add to the explained variance in any of the outcomes. Thus, treatment outcome expectancy is a variable which has additional predictive value above and beyond clinical and demographic variables. Health locus of control and fear avoidance beliefs did not add to the variance explained in any of the outcomes at both time points.
There were no significant interactions between the intervention and psychosocial variables in any of the analyses of the outcome measures and measurement moments, other than an interaction between intervention and credibility in the model where functioning at 7 weeks was the dependent variable. MTU credibility showed an explained variance of 32.9% compared to 6.5% in the PT group.

A Receiver Operating Characteristics (ROC) curve was created based on the calculation of sensitivity and specificity, wherein a cut-off point was determined to predict treatment success from the psychosocial subscales that showed significant predictive value in the logistic regression analysis. Only the CEQ subscale expectancy showed an area under the curve (AUC) of at least 0.7 on GPE and functioning (NDI) after 7 and 26 weeks. The cut-off value was shown to be 22.5 points (out of 27) on this scale. The optimal cut-off point corresponded to a sensitivity of 0.6 for both outcome variables after 7 and 26 weeks, and a specificity for GPE after 7 and 26 weeks of 0.6, and functioning after 7 and 26 weeks of 0.7. For all other (sub) scales and time points the AUC was less than 0.7.

Table 2a. Summary hierarchical logistic regression analysis of added values of the psychosocial variables at 7 weeks on treatment outcome success.

Model steps and entered variables	Stand. β	S.E.	Sig.	Nagelk. R^2	Added values
GPE 7 weeks					
Block 1, N=146				.541	
Age	-.010	.013	.468		
NRS-P baseline	.112	.104	.276		
NDI baseline	-.056	.032	.078		
Block 2, respectively					
Credibility	.103	.052	.047**	.065	.034
Expectancy	.206	.055	.000**	.166	.135
Block 1, N=157				.030	
Age	-.008	.013	.521		
NRS-P baseline	.118	.099	.233		
NDI baseline	-.057	.031	.071		
Block 2, respectively					
Internal locus of control	-.037	.033	.261	.036	
External locus of control	.040	.031	.194	.040	
Chance locus of control	.024	.037	.518	.033	
FAB - Physical Activity	-.026	.028	.354	.029	
FAB - Work	-.007	.012	.541	.026	
NDI 7 weeks					
Block 1, N=146				.061	
Age	-.026	.015	.080		
NRS-P baseline	.188	.113	.099		
NDI baseline	-.021	.033	.530		
Block 2, respectively					
Credibility	.140	.015	.013**	.120	.059
Expectancy	.241	061	.000**	.234	.173
Block 1, N=155				.028	
Age	-.019	.014	.197		
NRS-P baseline	.114	.107	.287		
NDI baseline	-.011	.032	.732		

Model steps and entered variables	Stand. β	S.E.	Sig.	Nagelk. R^2	Added values
Block 2, respectively					
Internal locus of control	-.044	.035	.219	.044	
External locus of control	-.023	.034	.497	.035	
Chance locus of control	-.019	.040	.642	.033	
FAB - Physical Activity	-.025	.032	.441	.033	
FAB - Work	-.017	.016	.289	.038	
NRS-P 7 weeks					
Block 1, N=146				.060	
Age	.001	.014	.964		
NRS-P baseline	.264	.107	.964		
NDI baseline	-.066	.032	.039		
Block 2, respectively					
Credibility	.075	.051	.142	.078	.018
Expectancy	.127	.049	.009**	.120	.060
Block 1, N=157				.052	
Age	.002	.013	.857		
NRS-P baseline	.242	.120	.017		
NDI baseline	-.062	.031	.048		
Block 2, respectively					
Internal locus of control	-.036	.034	.284	.060	
External locus of control	.063	.033	.057	.079	
Chance locus of control	.031	.038	.637	.057	
FAB - Physical Activity	-.033	.032	.293	.055	
FAB - Work	-.017	.015	.983	.057	

Abbreviations: Stand. β - Standardized Beta; S.E - Standard Error; Sign.-Significant; ** - p<.05; Nagelk. R2 - Nagelkerke R square; N- number; NDI - Neck Disability Index; NRS-P - Numeric Rating Scale for Pain; FAB- Fear Avoidance Beliefs

Table 2b. Summary hierarchical logistic regression analysis of added values of the psychosocial variables at 26 weeks on treatment outcome success.

Model steps and entered variables	Stand. β	S.E.	Sig.	Nagelk. R^2	Added values
GPE 26 weeks					
Block 1, N=146				.116	
Age	-.046	.015	.003		
NRS-P baseline	.028	.114	.806		
NDI baseline	-.071	.037	.055		
Block 2, respectively					
Credibility	.115	.058	.046**	.150	.034
Expectancy	.187	.057	.001**	.217	.101
Block 1, N=157				.100	
Age	-.041	.015	.005		
NRS-P baseline	.010	.108	.0926		
NDI baseline	-.069	.036	.054		
Block 2, respectively					
Internal locus of control	-.042	.036	.241	.111	
External locus of control	.006	.034	.855	.101	
Chance locus of control	-.035	.041	.399	.106	
FAB - Physical Activity	-.011	.033	.740	.098	
FAB - Work	.009	.017	579	.100	
NDI 26 weeks					
Block 1, N=146				.008	
Age	.002	.016	.902		
NRS-P baseline	.095	.122	.434		
NDI baseline	-.031	.039	.428		
Block 2, respectively					
Credibility	.210	.064	.001**	.120	.112
Expectancy	.239	.064	.000**	.170	.162
Block 1, N=157				.013	
Age	.000	.015	.994		
NRS-P baseline	.110	.118	.354		
NDI baseline	-.044	.039	.258		
Block 2, respectively					
Internal locus of control	-.032	.038	.411	.020	
External locus of control	-.009	.038	.812	.014	
Chance locus of control	.012	.044	.793	.014	
FAB - Physical Activity	-.027	.037	.462	.017	
FAB - Work	-.012	.018	.497	.016	
NRS-P 26 weeks					
Block 1, N=146				.087	
Age	.006	.016	.713		
NRS-P baseline	.321	.125	.010		
NDI baseline	-.104	.040	.009		
Block 2, respectively					
Credibility	.103	.061	.091	.114	.027
Expectancy	.158	.057	.006**	.162	.075
Block 1, N=157					
Age	.003	.015	.824		
NRS-P baseline	.311	.119	.009		
NDI baseline	-.106	.039	.007		
Block 2, respectively					
Internal locus of control	-.036	.038	.340	.093	
External locus of control	.030	.037	.418	.091	
Chance locus of control	.006	.045	.900	.086	
FAB - Physical Activity	-.070	.038	.061	.112	
FAB - Work	-.026	.017	.125	.102	

Abbreviations: Stand. β - Standardized Beta; S.E - Standard Error; Sign.-Significant; ** - p<.05; Nagelk. R2 - Nagelkerke R square; N- number; NDI - Neck Disability Index; NRS-P - Numeric Rating Scale for Pain; FAB- Fear Avoidance Beliefs.

Discussion

Patient's expectancy regarding treatment outcome appears to be of added predictive value in treatment success (measured at 7 and 26 weeks follow-up in terms of global perceived effect, functioning and pain) in addition to demographic and clinical variables in patients with non-specific sub-acute and chronic neck pain. Treatment credibility showed no additional predictive value above and beyond expectancy. Health locus of control and fear avoidance beliefs at baseline were also not predictive for treatment success.

To our knowledge this is the first study that analyzed these factors in addition to demographic and clinical variables, so a consideration can be made whether these variables must be added to patient assessment. The results of this study are in line with previous literature, wherein, in particular, expectancy shows to have a positive relationship with treatment outcome for other musculoskeletal conditions[12,13,15,16]. To the best of our knowledge only a few studies have investigated the predictive value of treatment outcome expectations for treatment of neck pain[16 49]. Corresponding with our study, these studies showed that treatment outcome expectancy has greater predictive value than credibility.
The predictive value of locus of control on treatment outcome is variably reported in the literature. Some studies found a significant relationship between this variable and treatment outcome[50-55]. However, this was neither confirmed by our study nor by another study[56]. In our study, the scores of the subscales of the MHLC were not categorized into high and low scores as suggested by others[54,57]. This may partly explain the differences in results. Although in the literature fear avoidance beliefs are frequently reported to predict treatment outcome[29-31,58,59], this has not been confirmed by our study. Possibly because our population did not only include patients with chronic neck pain, which is the patient category in which the fear avoidance beliefs model is based[60].There were no interaction effects between the intervention and psychosocial variables.

Limitations

Some aspects of this study may somewhat hamper generalizability of the results. The participants in the study agreed to volunteer in a RCT. Characteristics and outcome expectancy of these patients may differ from those that did not agree to participate. Indeed we observed, compared to other studies[61], that patients in our study had relatively high treatment expectancy (22 out of 27 with relatively small standard deviation). Furthermore, the results of this study have to be interpreted in light of the specific interventions employed in this study. The predictive value of treatment outcome expectancy may be different for other interventions (and possibly for other musculoskeletal complaints).
There is a debate on when treatment outcome expectancy should be measured. It can be measured 'naïve' before the start of the intervention, or after the first treatment session when the rationale is explained to the patient. It can also be measured after the intervention to evaluate whether outcome expectancy has been met. It is unknown to what extent the different measurement moments have an impact on outcome in neck pain patients. However, research in patients with low back pain in primary care shows that outcome expectancies do not change over time in the majority of patients during the first 3 months of their treatment[62].
There were no significant interactions between the psychosocial variables and the interventions on any of the outcome measures or measurement moments. The only exception was credibility at 7 weeks on the outcome functioning, with greater predictive value of credibility for manual therapy in comparison with physical therapy. The reason for this difference in predictive value may be that the rationale of manual therapy, as explained to the patient, is aimed at optimizing (arthrogenic) function. Consequently, the patient could hypothetically be focused on this aspect of treatment outcome.
The response expectancy theory states that a person's expectations will affect their experiences and can therefore probably explain why treatment credibility, as highly related to expectancy, is a predictive variable specifically for the outcome functioning in patients treated with MTU. After 26 weeks this attention extinguishes, so credibility is no longer a predictive variable for MTU then.

Practical implications and suggestions for further research

Our finding that patient's treatment outcome expectancy is a predictor of outcomes is in line with the biopsychosocial model used for explaining treatment effects. Psychological processes, health perceptions and the relationship of these factors with clinical variables may be important for treatment decision making of therapeutic options in individual patients. It has been demonstrated in experiments with healthy subjects that expectancy is modifiable and can be used as potential non-specific/placebo component of an intervention[24,25 19]. On the basis of our results it is of interest to investigate this potential modifiability in clinical practice and its influence on outcome success.
In this study a cut-off point for success/no success for the subscale treatment outcome expectancy of the CEQ for the outcomes perceived recovery and functioning was found at 22.5 points. Patients with a score of 22 point or less on the CEQ subscale outcome expectancy have a greater chance of worse outcomes. In that case the practitioner could consider a specific attention on patients' outcome expectancy.
In future studies on the predictive value of psychosocial aspects in addition to clinical symptoms, a broader set of patient characteristics should be taken into account (e.g. referral or self-referral, patient's socioeconomic status). Therapist characteristics must also be considered in analysis, in order to be clear on which parameters treatment outcome expectancy and credibility of the treatment are based on. Explaining the rationale of treatment may affect the credibility and outcome expectancy as well as, for example, the cooperation with the patient and therapists empathy. Another suggestion for future research is to query expectancy more outcome-specific (e.g. on pain or functioning) to get better predictions for these outcomes.

Conclusion

Based on our study we conclude that in patients with non-specific sub-acute and chronic neck pain treatment outcome expectancy has additional predictive value for treatment success above and beyond clinical and demographic variables.

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