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Cognitive Treatment of Illness Perceptions in Patients With Chronic Low Back Pain: A Randomized Controlled Trial

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Background. Illness perceptions have been shown to predict patient activities. Therefore, studies of the effectiveness of a targeted illness-perception intervention on chronic nonspecific low back pain (CLBP) are needed.

Objective. The purpose of this study was to compare the effectiveness of treatment of illness perceptions against a waiting list for patients with CLBP.

Design. This was a prospectively registered randomized controlled trial with an assessor blinded for group allocation.

Setting. The study was conducted in an outpatient rehabilitation clinic.

Participants. The participants were 156 patients (18–70 years of age) with CLBP (>3 months).

Intervention. Patients were randomly assigned to either a treatment group or to a waiting list (control) group. Trained physical therapists and occupational therapists delivered 10 to 14 one-hour treatment sessions according to the treatment protocol.

Measurements. The primary outcome measure was change in patient-relevant physical activities (Patient-Specific Complaints questionnaire). The secondary outcome measures were changes in illness perceptions (Illness Perceptions Questionnaire) and generic physical activity level (Quebec Back Pain Disability Scale). Measurements were taken at baseline (0 weeks) and after treatment (18 weeks).

Results. A baseline-adjusted analysis of covariance showed that there were statistically significant differences between intervention and control groups at 18 weeks for the change in patient-relevant physical activities. This was a clinically relevant change (19.1 mm) for the intervention group. Statistically significant differences were found for the majority of illness perception scales. There were no significant differences in generic physical activity levels.

Limitations. Longer-term effectiveness was not studied.

Conclusions. This first trial evaluating cognitive treatment of illness perceptions concerning CLBP showed statistically significant and clinically relevant improvements in patient-relevant physical activities at 18 weeks.
Cognized as a target for treatment,5–9 and Illness perceptions are well recognized to maladaptive behavior3 (ie, activity adaptive illness perceptions can lead these findings, showing that maladaptive illness perceptions can lead to maladaptive behavior3 (ie, activity limitations).

Illness perceptions are well recognized as a target for treatment,5–9 and illness perception interventions have shown promising results for patients with acute10–13 and chronic4,14 conditions. There are, however, no CLBP rehabilitation interventions that focus predominantly on illness perceptions as defined in the SRM. Therefore, we developed and tested an intervention applying the SRM for CLBP: cognitive treatment of illness perceptions (CTIP).15 Cognitive treatment of illness perceptions is distinct from other rehabilitation interventions that have changing cognitions as one of their aims: (1) because the cognitions are well defined and theorized (ie, illness perceptions and SRM) and (2) because the illness perceptions are the main target for change and not one among many targets of treatment. In addition, CTIP is an innovative treatment as it applies a health psychology theory (ie, SRM) to physical therapy and occupational therapy.

The SRM is central to CTIP. In the SRM, it is assumed that an individual first forms a representation of the illness and subsequently adopts behaviors to cope with the illness.16–18 The SRM distinguishes several dimensions of illness perceptions: (1) identity, (2) cause, (3) time line and time line cyclical, (4) consequences, (5) personal control and treatment control, (6) coherence, and (7) emotional response. A questionnaire (Illness Perceptions Questionnaire–Revised [IPQ-R]19,20) is available to measure the dimensions. The dimension “identity” refers to the symptoms experienced (eg, pain, fatigue). The dimension “cause” reflects the individual’s ideas about the cause of the illness (eg, “We have weak backs in our family”). The dimension “time line” reflects the patient’s ideas about how long the illness will last and whether it will be a temporary or a persistent problem (eg, “I will have increasingly more back problems for the rest of my life”). The dimension “consequences” refers to the individual’s ideas regarding the possible impact of the illness on his or her life (eg, “I’ll end up in a wheelchair, and I’ll lose my job”). The dimension “personal control and treatment control” includes the patient’s ideas about whether or not the illness can be controlled by the patient or by treatment (eg, “The only thing I can do to help my back problem is to lie down.” “Treatment won’t help; I’ve tried so many things and nothing has worked”). The dimension “coherence” reflects the individual’s ideas about understanding the illness (eg, “My back problem is a mystery to me”). The dimension “emotional response” reflects the patient’s feeling in reaction to the illness (eg, “The back problem makes me angry”).21

We investigated whether patient-relevant activity limitations in patients with CLBP can be reduced by adjusting maladaptive illness perceptions by applying CTIP. Cognitive treatment of illness perceptions starts by exploring the patient’s own ideas about CLBP, based on SRM illness perception dimensions. The primary aim of this study was to test the hypothesis that CTIP is more effective than a waiting list (WTL) in reducing patient-relevant activity limitations. In addition, we investigated which of the maladaptive illness perceptions were influenced by CTIP. This article reports the findings of the primary analysis from the trial.

Materials and Method
Setting and Participants
Between December 2004 and May 2008, patients with CLBP were invited to participate in the study, prior to their first consultation in our outpatient rehabilitation center. Patients were invited by letter (including written information and a screening questionnaire).

Eligibility criteria were: age 18 to 70 years; nonspecific low back pain with or without radiation to the legs for at least 3 months; current episode of back pain lasting less than 5 years; presence of activity limitations (Roland-Morris Disability Questionnaire [RMDQ] score >3)22; no previous multidisciplinary treatment for CLBP; no involvement in litigation concerning CLBP; absence of serious psychological or psychiatric problems; no substance abuse interfering with treatment; not being pregnant; being able to fill in questionnaires without help; and providing written informed consent. Eligibility criteria were checked: (1) on paper, from the completed screening questionnaires; and (2) in person, for patients meeting the criteria, by physiatrists and psychologists from the multidisciplinary team.
Randomization and Interventions

Randomization. After baseline assessment, patients who met the eligibility criteria were randomized to either a CTIP group or a WTL (control) group. Randomization followed a predetermined computer-generated block-randomization schedule (block size 12), and opaque sealed and numbered envelopes were prepared by an independent fellow researcher before recruitment started. An independent randomization officer organized randomization and treatment or WTL. Thus, the researchers and independent assessors were blinded for both group allocation and the randomization schedule.

To improve statistical power for a future study of predictors of the effect of CTIP, an unequal distribution (2:1) of patients over the 2 groups was chosen. To ensure equal treatment expectations for both groups, patients were informed that all study participants would eventually receive the same treatment but that the timing would be different. Participants in the WTL group received CTIP after 18 weeks. Participants and therapists could not be blinded for treatment allocation, but the therapists were blinded for the timing of CTIP.

Interventions. The CTIP consisted of 10 to 14 one-hour individual treatment sessions and was provided weekly to each participant of the CTIP group by a single experienced physical therapist or occupational therapist according to the treatment protocol.

The first phase of treatment was the mapping of existing illness perceptions. For mapping, the answers to the IPQR19,20 were used as a starting point, and, with help of a Socratic style of dialogue,24,25 participants were stimulated to elaborate on their thoughts about their low back pain in relation to their limitations in activity. The aim here was to get an overview of the patient’s illness perceptions. An example of an illness perception that came up was: “I need to rest in bed in order to allow the pain to fade away.”

The second phase was aimed at challenging maladaptive illness perceptions. Those illness perceptions that most limited physical activity and, according to the therapist’s biomedical knowledge, were maladaptive were questioned with the aim of creating doubt about these illness perceptions. In continuing the above-mentioned example, this phase of treatment might have been done by questioning the patient’s perception that resting in bed would decrease the pain.

In the third phase, alternative illness perceptions were formulated. Socratic dialogue was used here to change maladaptive illness perceptions into alternative perceptions conducive to increasing physical activity. This phase ended when both the participant and the therapist felt that plausible and intelligible alternative perceptions had been found. An alternative illness perception, for example, may have been “Doing light jobs is a suitable replacement for bed rest, as it allows the body to recuperate and it distracts my attention away from the pain.”

In the fourth phase, alternative perceptions were tested and were strengthened by confirming their utility in daily practice. In continuation of the aforementioned example, in this phase the participant practiced the use of light jobs instead of bed rest. For further details on CTIP, see Siemonsma et al.15 The intervention was considered to be incomplete if fewer than 5 treatment sessions were attended. This number reflects the minimum number of treatments needed to map the illness perceptions (2 sessions), to challenge maladaptive illness perceptions (2 sessions), and to formulate alternative illness perceptions (1 session).

The 4 physical therapists and 3 occupational therapists delivered CTIP according to the protocol and were experienced in treating patients with chronic pain in a multidisciplinary rehabilitation setting. Before the trial started, the therapists received extensive training in CTIP, consisting of an explanation of the treatment rationale and structure, the protocol, and skills training. Three refresher courses were provided each year throughout the study period. The protocol required that the therapists discuss the progress of each patient at least twice with an experienced, supervising psychologist. The protocol and supervision were provided to ensure purity of the intervention and to optimize and maintain adherence to the protocol over time.

Participants assigned to the WTL group received no treatment and were reassessed at 18 weeks. Patients in both groups were asked not to participate in any other diagnostic or therapeutic CLBP procedures during the study period. To estimate the amount and the comparability of co-interventions between the groups, co-interventions were monitored in a cost diary. In the diary, both health care costs and other costs related to the back problem were recorded for 2 consecutive weeks. Participants were asked to report the number of their back pain-related visits to their general practitioner, medical specialist, physical therapist, or alternative medicine practitioner and any pain medication taken for their back problem.
Outcome Measures and Follow-up

The primary outcome measure was the Patient-Specific Complaints (PSC) questionnaire (Appendix).27,28 This measurement tool allowed for personal relevance and circumstances to be taken into consideration and was a logical consequence of using the SRM as the main treatment theory, as the SRM focuses on the individual’s thoughts and aims.17,29 The PSC was administered according to the procedure described by Beurskens et al.27 Administration of the PSC is a 3-step process: (1) prioritizing a list of 36 daily activities that are difficult for the patient to perform and important to improve upon in the ensuing 3 months, (2) listing the top 3 prioritized activities in patient-relevant terms, and (3) indicating on a visual analog scale (VAS) (0=no difficulty, 100=impossible) how difficult it was to perform each activity in the previous week. These activities were finalized in a second meeting (just before starting treatment), thereby giving the participants extra time to prioritize their most important activities. The score on each participant’s most important activity was used as the primary outcome. Lower scores indicate better performance (range=0–100). The PSC is valid, reliable, and sensitive to change.30 The PSC has considerable similarities to the Patient-Specific Functional Scale (PSFS),31 which is well known in the United States. Several acronyms are used for the PSC, with PSK30 being its original Dutch acronym; other acronyms include MC32,33 and PSFL.23

Secondary outcome measures were the IPQ-R19,20 and the Quebec Back Pain Disability Scale (QBPDS).54 The IPQ-R was included to examine, and measure changes in, illness perceptions. It was designed specifically to measure the dimensions of the SRM: (1) identity, (2) cause, (3) time line and time line cyclical, (4) consequences, (5) personal control and treatment control, (6) coherence, and (7) emotional response.19 The dimensions “identity” and “cause” cannot be summed and, therefore, were not used in this study. The score ranges differ for the dimensions, with higher scores indicating, for instance, longer duration (range=1–30), a more cyclical nature (range=4–20), more consequences (range 6–30), more personal control (range=6–30), more treatment control (range=5–25), lower coherence (range=5–25), and more emotional reactions (range=6–30). Scales are not summarized into a total score. The reliability and validity of the Illness Perceptions Questionnaire (IPQ) scales have been demonstrated in different populations with chronic illness.20 Further information about the IPQ is available at the IPQ website.35

The QBPDS54 was added to the study design to facilitate comparison with other studies and might facilitate the inclusion of the trial in future reviews and meta-analyses.36 The QBPDS measures 20 physical activities, with lower sum scores indicating better physical functioning (range=0–100). This measurement instrument is a reliable and valid outcome measure in the field of research on CLBP.57 The QBPDS is among the most reliable scales measuring physical disability and has sufficient scale width to reliably detect improvement or worsening in most people.38 Therefore, we chose the QBPDS over, for example, the Roland-Morris Disability Questionnaire.59 No changes were expected to be found on this generic physical activities scale at 18 weeks because the activities measured with the QBPDS might not match closely with the narrower patient-specific activity-based treatment aims. Summing the scores of 20 physical activities, therefore, might dilute the treatment effect.

The outcome measurements on the PSC, IPQ-R subscales, and QBPDS were obtained at baseline and at 18 weeks follow-up. At baseline, we also collected data on: (1) demographic variables: age, sex, marital status, native language, level of education, and work status and (2) clinical variables: time since first onset of complaints, activity limitations (RDQ, range=0–24),22,39 with lower scores indicating less limitations; current pain measured on a 100-mm VAS (range=0–100), with lower scores indicating less pain; symptoms of anxiety and depression (Hospital Anxiety and Depression Scale [HADS], range=0–24),40 with lower scores indicating fewer symptoms; overall complaints (Symptom Check List 90 [SCL-90], range=90–450),41,42 with lower scores indicating fewer complaints; fear of injury/movement (Tampa Scale of Kinesiophobia [TSK], range=17–68),43,44 with lower scores indicating less kinesiophobia; and number of co-interventions (cost diary).26 These data were collected to characterize the study population and to facilitate comparison with other studies.

Statistical Analyses

A decrease of 18 to 24 mm on the PSC was determined as being a clinically relevant change in patients with low back pain.50 The sample size was calculated with a minimum change of 18 mm, a 2-sided α of .05, a 1 − β of .90, and a standard deviation of 26.01. This standard deviation was calculated from available PSC data from patients with CLBP in our center that were similar to those included in the study. The sample size calculation resulted in a total of 135 participants. Descriptive statistics of baseline variables (ie, demographic variables and clinical variables) were calculated to characterize and compare the 2 study groups. For dichotomous or
categorical variables, frequencies with corresponding percentages were computed. For continuous variables, means with standard deviations were calculated for normally distributed variables. Medians with 25th to 75th percentile scores were computed for non-normally distributed variables. The level of education was categorized into “low” (primary education), “intermediate” (secondary education), or “high” (higher education, including university). To test differences between the 2 study groups on the baseline variables, statistical analyses were performed: phi coefficient for dichotomous variables, chi-square statistic for categorical variables, independent-samples t test for normally distributed continuous variables, and Mann-Whitney U test for non-normally distributed continuous variables. For both groups, PSC change scores were calculated (follow-up minus baseline) to determine whether the changes were clinically relevant. Odds ratios (ORs) were computed to estimate the chance of obtaining a clinically relevant change in the CTIP group compared with the WTL group.

The primary hypothesis, whether CTIP was more effective in reducing patient-relevant activity limitations compared with the WTL, was tested by performing a so-called baseline-adjusted analysis of covariance, as recommended by Twisk. Despite randomization, differences in baseline values between groups may occur on the outcome measures. When ignored, such differences in baseline value may distort the actual effect of group (CTIP versus WTL) on the change in outcome measure from baseline to follow-up. This phenomenon is called “regression to the mean.” To correct for this phenomenon, a linear regression analysis was applied where the outcome value of the follow-up PSC was used as the dependent variable in the linear regression and the baseline PSC value was included as a covariate, hence the name baseline-adjusted analysis of covariance. Group (CTIP versus WTL) was the independent variable. This analysis was called the “crude analysis.”

Next, the analysis was corrected for the influence of several variables by including them in the analysis as covariates. The covariates age, sex, and level of education were included on theoretical grounds. To be able to generalize the findings to a larger population, the results should be independent from age and sex of the patients; therefore, these variables were corrected for. Level of education (low, intermediate, or high) was included as a covariate because the skills needed for undergoing CTIP could be associated with a higher level of education. To test the categorical level of education, 2 dummy variables were created, with low education as the reference category. In addition to the covariates age, sex, and educational level, covariates were included on statistical grounds; namely, when a significant difference between the 2 groups was found on a baseline characteristic, this variable also was included as a covariate. Interactions of clinical variables (RDQ, VAS pain, HADS, SCL, and TSK) with the group variable were analyzed in order to check whether clinical variables were potential effect modifiers. Non-significant \((P>.05)\) interaction terms were removed from the model, and significant \((P<.05)\) interactions were analyzed within strata. This analysis was called the “adjusted analysis.”

To study the effect of group on changes in the secondary outcome measures IPQ-R and QBPDS, identical analyses were performed as for the PSC. The baseline-adjusted analysis of covariance was performed separately on the different IPQ-R scales and the QBPDS. The crude analysis again consisted of a baseline-adjusted analysis of covariance with the baseline scores of the IPQ-R scales or the QBPDS included as a covariate, the follow-up scores as the dependent variable, and group as the independent variable. For the adjusted analysis, covariates identical to those used for the primary outcome measure were included. Assumptions for linear regression analysis were checked for all analyses. No violations were detected.

To estimate the effectiveness of the treatment, the number needed to treat (NNT) was computed. The NNT was computed by subtracting the proportion benefiting from the WTL from the proportion benefiting from the CTIP and then taking the inverse. Based on the study by Beurksens et al. we used a clinically relevant change of at least \(-18\) mm on the PSC to define a beneficial outcome. All analyses were performed with SPSS statistical software 16.0 (SPSS Inc, Chicago, Illinois) and carried out according to the intention-to-treat principle. No imputation of missing data was performed.

Role of Funding Sources
The Medical Ethics Committee of Slotervaart Hospital, Amsterdam, the Netherlands, approved the study protocol (number 0541). The trial was registered (ISRCTN Register identifier: ISRCTN35108886), and the results were reported according to the Consolidated Standards of Reporting Trials (CONSORT statement). The Netherlands Organization for Health Research and Development (ZonMw) supported Dr Siemonsma (grant no. 014-32-041). The authors have no conflicts of interest.

Results
Three hundred fifty-two patients received a written invitation to participate in the study. Of those patients, 28 refused participation.
prior to the first appointment, 4 patients preferred to (remain to) be treated elsewhere, and 116 patients did not meet the eligibility criteria. The 2 criteria most frequently not met were: ability to fill in the questionnaires without help (65 patients) and the current episode of low back pain lasting less than 5 years (21 patients). The remaining 204 out of 352 patients were medically examined, psychologically screened, and received verbal explanation of the study. A total of 156 out of 204 patients met all criteria, gave written informed consent to participate in the study, completed baseline measurements, and were randomized. The recruitment process in our study resulted in inclusion of 48% (156/352 patients) and 76% (156/204) of paper-screened patients.

Of the 156 randomized patients, 104 of whom underwent treatment, 19 received fewer than 5 treatments and were registered as “incomplete treatment,” as shown in Figure 1. In total, 12 patients were not assessed at 18 weeks follow-up. Reasons for withdrawal from the study or from the treatment also are shown in Figure 1. Withdrawal from treatment was 18% (19/104).

**Baseline Characteristics**

Baseline characteristics (Tab. 1) and co-interventions (Tab. 2) were similar between the 2 groups for all except one variable. A significant difference was observed for education, where the CTIP group had fewer participants with a high level of education. This variable was used *a priori* as a covariate in our analyses. Thus, the covariates to be included in the analyses of the primary and secondary outcomes remained the following: age, sex, and level of education. Although the selection criterion was current episode of back pain lasting less than 5 years, the time since first onset back pain could be longer than 5 years. The absolute number of co-interventions reported in Table 2 was generally 1 or 2 visits. No adverse effects of treatment were reported.

**Primary Outcome**

Figure 2 shows pretreatment and posttreatment scores of the primary outcome measure (ie, PSC). The top 3 prioritized activities were: sports, standing for a long duration, and walking outside. Table 3 shows estimates of the independent variable group and the covariates for PSC resulting from the baseline-adjusted covariance analysis. Due to missing values on the primary outcome measure, analysis was done on 93 patients in the CTIP group and 46 patients in the WTL group. A signif-
ificant group effect was found in both the crude analysis ($P=.018$) and the adjusted analysis ($P=.010$). This finding implies that, on average, CTIP resulted in a higher reduction in PSC scores than WTL (Tab. 4). No significant effects were found for the covariates, except for the contrast of high versus low level of education. There was no indication for effect modification, as none of the interactions was significant ($P>.05$). Cognitive treatment of illness perceptions resulted in a clinically relevant PSFL change score of $-19.1$ (95% confidence interval [CI] $=-24.3$ to $-13.9$) compared with $-5.2$ (95% CI $=-14.7$ to 4.2) for the WTL group (details not shown). In the CTIP group, 46 (49%) of the 93 participants showed a clinically relevant change compared with 12 (26%) of the 46 participants in the WTL group. This resulted in an OR of 2.77 (95% CI $=1.28$ to $6.01$) and an NNT of 4, which implies that out of every 4 patients, at least 1 would have a beneficial effect of CTIP.

### Secondary Outcomes

Table 4 shows the means and 95% CI of the IPQ-R scales and the QBPDs for both groups at each time point. Baseline-adjusted covariance crude and adjusted analyses for the IPQ-R scales and the QBPDs were performed identically to the PSC analyses (details not shown). The $P$ values corresponding to the independent variable group (CTIP versus WTL) are shown in Table 4. Significantly different changes were found for baseline to follow-up measurements between the WTL and CTIP groups for 4 IPQ-R scales: time line cyclical, consequences, personal control, and coherence (Tab. 4). Regression analysis in the CTIP group ($n=93$) revealed that the change scores of these 4 IPQ-R scales explained 14.4% of the variance of the PSC change score. Of the scales, only personal control and consequences contributed significantly to the model ($P=.023$ and $P=.006$, respectively). No significant differences were found for the QBPDs (results not shown).

### Summary of Key Findings

Cognitive treatment of illness perceptions significantly improved patient-relevant activity (PSC) in the CLBP group at 18 weeks compared with the WTL group, which was in accordance with our primary hypothesis. The changes in patient-relevant activity also were clinically relevant, indicating that CTIP is a relevant treatment for clinical practice. The NNT of 4 indicates that 4

### Table 1.
Summary of Baseline Characteristics$^a$

<table>
<thead>
<tr>
<th>Variable</th>
<th>CTIP Group (n=104)</th>
<th>WTL Group (n=52)</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (y)$^b$</td>
<td>45.6 (12.9)</td>
<td>47.1 (11.1)</td>
<td>.468$^e$</td>
</tr>
<tr>
<td>Sex, female, n (%)$^*$</td>
<td>56 (53.8)</td>
<td>31 (59.6)</td>
<td>.494$^a$</td>
</tr>
<tr>
<td>Marital status, n (%)</td>
<td></td>
<td></td>
<td>.149$^b$</td>
</tr>
<tr>
<td>Living together</td>
<td>55 (52.9)</td>
<td>36 (69.2)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>18 (17.3)</td>
<td>6 (11.5)</td>
<td></td>
</tr>
<tr>
<td>Living alone</td>
<td>26 (25.0)</td>
<td>10 (19.2)</td>
<td></td>
</tr>
<tr>
<td>Living with parents</td>
<td>5 (4.8)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Native language, Dutch, n (%)</td>
<td></td>
<td>.175$^c$</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>94 (90.4)</td>
<td>41 (80.4)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>8 (7.7)</td>
<td>9 (17.6)</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2 (1.9)</td>
<td>1 (2.0)</td>
<td></td>
</tr>
<tr>
<td>Education, n (%)$^*$</td>
<td></td>
<td>.043$^g$</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>39 (37.5)</td>
<td>16 (31.4)</td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>47 (45.2)</td>
<td>17 (33.3)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>18 (17.3)</td>
<td>18 (35.3)</td>
<td></td>
</tr>
<tr>
<td>Work status, n (%)</td>
<td></td>
<td>.499$^f$</td>
<td></td>
</tr>
<tr>
<td>Working</td>
<td>38 (41.8)</td>
<td>22 (47.8)</td>
<td></td>
</tr>
<tr>
<td>Disability pension</td>
<td>19 (20.0)</td>
<td>7 (15.2)</td>
<td>.492$^f$</td>
</tr>
<tr>
<td><strong>Clinical variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time since first onset of back pain (mo)$^c$</td>
<td>60 (27.8–141)</td>
<td>72 (40.5–192.5)</td>
<td>.238$^g$</td>
</tr>
<tr>
<td>Activity limitations (RDQ)$^c$</td>
<td>12.2 (4.2)</td>
<td>12.7 (4.7)</td>
<td>.545$^f$</td>
</tr>
<tr>
<td>Current pain (VAS)$^c$</td>
<td>55.7 (21.6)</td>
<td>55.8 (20.8)</td>
<td>.976$^f$</td>
</tr>
<tr>
<td>Anxiety (HADS)$^c$</td>
<td>5.5 (3–9)</td>
<td>5.0 (3–8.75)</td>
<td>.889$^f$</td>
</tr>
<tr>
<td>Depression (HADS)$^c$</td>
<td>5.0 (2.25–7)</td>
<td>4.0 (2–6)</td>
<td>.200$^f$</td>
</tr>
<tr>
<td>Overall complaints (SCL-90)$^c$</td>
<td>132.5 (118–150.8)</td>
<td>126.0 (111–146)</td>
<td>.187$^f$</td>
</tr>
<tr>
<td>Fear of movement (TSK-R)$^c$</td>
<td>29.1 (6.1)</td>
<td>28.3 (6.5)</td>
<td>.416$^f$</td>
</tr>
</tbody>
</table>

$^a$ CTIP=cognitive treatment of illness perceptions, WTL=waiting list, RDQ=Roland Disability Questionnaire, VAS=visual analog scale, HADS=Hospital Anxiety and Depression Scale, SCL-90=Symptom Check List 90, TSK-R=Tampa Scale for Kinesiophobia–Revised. Asterisk indicates variables used as covariates in the adjusted analyses.

$^b$ Values presented are means (SD).

$^c$ Values presented are medians with 25th–75th percentiles, as skewness exceeded 1 or 1.

$^d$ Independent-samples t test.

$^e$ Phi coefficient.

$^f$ Chi-square statistic.

$^g$ Mann-Whitney U test.
patients have to be treated for 1 to achieve a clinically relevant improvement in physical activities in comparison with the WTL group. Considering our second aim, statistically significant differences were found for 4 illness perception dimensions (time line cyclical, consequences, personal control, and coherence), indicating that changes in illness perceptions differed between the WTL and CTIP groups. These changes were related to changes in patient-relevant activities and explained 14.4% of the variance, which seems to support CTIP’s working mechanism. No significant differences were found for generic physical activities (QBPDS), which is in line with our expectations and might reflect the strong focus of CTIP on patient-relevant physical activities.

Discussion

Study Population

The patient characteristics and recruitment rates in this trial of a relatively chronic and fairly disabled population of patients with back pain were comparable to those of other trials in rehabilitation settings. The number of co-interventions was comparable to that in other studies, and the percentages of patients visiting professionals for their back problem were small. Our results are likely to generalize to other patients with CLBP referred for rehabilitation in the Netherlands. The statistically significant and clinically relevant changes found in this study are very encouraging, as no effort was made to specifically select the best candidates for CTIP (eg, patients with maladaptive illness perceptions).

Interventions

To our knowledge, this is the first intervention study specifically targeting illness perceptions in people with CLBP. Illness perception-based interventions are an emerging field, which has mostly focused on more acute diseases. Positive results have been found for individual interventions on myocardial infarction and cancer pain and for a population-based intervention on acute back pain.

Cognitive treatment of illness perceptions was well accepted by the patients, with only 18% of them withdrawing from treatment. This percentage was lower than the 33% reported by Leeuw et al and the 23% reported by Smeets et al. This withdrawal from treatment reflects normal clinical procedures in which patient agreement is not reached with every patient over treatment goals. Because an intention-to-treat analysis was performed, an overestimation of effects was avoided by including all patients in the analyses regardless of completeness of the treatment.

In comparison with other cognitive treatments for CLBP, CTIP isless intensive (10–14 hours of treatment) and has a more specific target for change (focusing on changing illness perceptions rather than changing a wide range of perceptions and behaviors). Future studies may focus not only on replication of the results and longer-term effectiveness of CTIP, but also on optimizing the treatment and its delivery (eg, optimal content, mode of delivery, length and dose of treatment).

The use of a WTL group as the control group was a suitable choice for this study, the first study of the effectiveness of CTIP, because it allowed...
us to quantify rather than to assume the changes or lack of changes involved in natural recovery. Contrary to our expectations, the WTL group slightly increased in physical activity level. Patients’ expectations about receiving treatment, regression to the mean, or chance might explain the changes in the WTL group. The use of a WTL group also is a limitation because no comparison can be made with an active control (eg, a usual care group). This limitation is important in interpreting the current effects of CTIP, which might be overestimated because the WTL group received no treatment and the patients in this group were asked not to participate in therapeutic procedures. In future studies, these issues could be addressed by using different types of active control groups. Such studies could help to estimate the effect of CTIP in comparison with usual care and to differentiate specific effects of CTIP from nonspecific effects, thereby addressing the limitations of the current study.

### Outcome Measures

The changes in patient-relevant activity, measured with the PSC, were assessed using the Patient-Specific Conditions questionnaire (PSC). The PSC is a self-report measure that assesses the impact of illness on daily activities. The PSC consists of 44 items that are rated on a scale from 0 (no impact) to 10 (extreme impact). The PSC is a well-validated measure that has been used in a variety of settings to assess the impact of illness on daily activities.

### Table 3

Results of the Crude (Baseline PSC Score) and Adjusted (Age, Sex, and Educational Level) Covariance Analyses of the Primary Outcome Measure (PSC)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Crude Analysis</th>
<th>Adjusted Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β (SE)</td>
<td>95% CI</td>
</tr>
<tr>
<td>Constant</td>
<td>35.89 (8.09)</td>
<td>19.89 to 51.88</td>
</tr>
<tr>
<td>Baseline PSC score</td>
<td>0.42 (0.10)</td>
<td>0.21 to 0.62</td>
</tr>
<tr>
<td>Group</td>
<td>−10.79 (4.51)</td>
<td>−19.72 to −1.87</td>
</tr>
<tr>
<td>Other covariates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>−0.02 (0.18)</td>
<td>−0.33 to 0.37</td>
</tr>
<tr>
<td>Sex</td>
<td>4.22 (4.27)</td>
<td>−4.22 to 12.67</td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate vs low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High vs low</td>
<td>−6.69 (5.06)</td>
<td>−16.70 to 3.32</td>
</tr>
<tr>
<td></td>
<td>−11.33 (5.82)</td>
<td>−22.85 to 0.19</td>
</tr>
</tbody>
</table>

*PSC = Patient-Specific Conditions questionnaire, SE = standard error, 95% CI = 95% confidence interval.

### Table 4

Baseline and Follow-up Scores and Group Effects Resulting From Crude and Adjusted Covariance Analyses of the Secondary Outcome Measures (IPQ and QBPDS)

<table>
<thead>
<tr>
<th>Variable</th>
<th>CTIP Group (n=104)</th>
<th>WTL Group (n=52)</th>
<th>Group Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Follow-up&lt;sup&gt;b&lt;/sup&gt;</td>
<td>n</td>
</tr>
<tr>
<td>IPQ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time line</td>
<td>23.6 (22.9 to 24.3)</td>
<td>23.9 (23.1 to 24.6)</td>
<td>96</td>
</tr>
<tr>
<td>Time line cyclical</td>
<td>13.6 (12.9 to 14.4)</td>
<td>14.1 (13.4 to 14.7)</td>
<td>97</td>
</tr>
<tr>
<td>Consequences</td>
<td>19.0 (18.3 to 19.8)</td>
<td>17.7 (16.7 to 18.7)</td>
<td>96</td>
</tr>
<tr>
<td>Personal control</td>
<td>19.1 (18.3 to 20.0)</td>
<td>21.1 (20.2 to 21.8)</td>
<td>96</td>
</tr>
<tr>
<td>Treatment control</td>
<td>17.1 (16.6 to 17.6)</td>
<td>15.9 (15.2 to 16.7)</td>
<td>97</td>
</tr>
<tr>
<td>Coherence</td>
<td>14.3 (13.4 to 15.2)</td>
<td>11.7 (10.8 to 12.5)</td>
<td>96</td>
</tr>
<tr>
<td>Emotional response</td>
<td>16.9 (16.0 to 17.8)</td>
<td>15.5 (14.5 to 16.4)</td>
<td>96</td>
</tr>
<tr>
<td>QBPDS</td>
<td>40.4 (37.6 to 43.1)</td>
<td>36.9 (33.8 to 40.0)</td>
<td>96</td>
</tr>
</tbody>
</table>

*IPQ = Illness Perception Questionnaire, QBPDS = Quebec Back Pain Disability Scale, CTIP = cognitive treatment of illness perceptions, WTL = waiting list.

<sup>b</sup> Values represent mean scores (95% confidence interval).
were statistically significant and clinically relevant as defined in our study. The PSC was shown to be highly responsive to change in patients who reported reductions in back pain symptoms. However, unlike more generic measures, the PSC was unable to detect deterioration in patients with mild to moderate disability (RDQ scores = 4.8–6.1). Therefore, in the interpretation of the positive results on the PSC, the possibility of measurement bias should not be ruled out. Clinically relevant changes were found in 46 of the 93 patients in the CTIP group compared to 12 of the 46 patients in the WTL group (OR = 2.77 and NNT of 4). The best method to define and determine a clinically relevant change, however, is under debate. Fundamental statistical issues currently cloud the precise estimation of clinically relevant changes in general. Therefore, some caution in the interpretation of our results is warranted. Despite these measurement and statistical issues, we judge the first results of CTIP on the PSC as being very positive.

The activities measured with the PSC are those that are most important to the individual patient. These activities might differ in how physically demanding they are; for example, it might be most important for one person to be able to walk but for another to play tennis. Therefore, the change scores reflect the treatment’s impact on relevant activities in the patient’s life and should not be interpreted as indicators of overall physical function. In contrast, generic low back measures, such as the QBPDS, aim to objectify changes in general disability and present the patient with a fixed list of activities, some of which may not be relevant to the individual. The PSC was more suited to the treatment aims of CTIP than the QBPDS. Therefore, the non-statistically significant changes in QBPDS scores at 18 weeks follow-up are in line with our expectations.

The statistically significant changes found on the majority of the IPQ-R scales seem to support CTIP’s working mechanism (ie, that CTIP resulted in changes in illness perceptions). The changes on the IPQ-R scales were shown to be related to those on the PSC (ie, the changes explained 14.4% of the variance). The IPQ-R scales “consequences” and “personal control” were found to significantly contribute to this model. Little information is available to interpret our results. However, the results seem to be in line with findings of Foster et al, who found the scales “consequences” and “personal control” (among other scales) to be predictive of disability scores (RDQ) at 6 months in a mixed population consulting their general practitioner about their low back pain. Although our results seem to be in support of CTIP’s working mechanism, other studies are needed to further examine and understand such relationships.

Related Research
The current study is part of a number of theory-driven studies on CTIP. Previous articles have reported the theory-driven development of CTIP and the role of theory in the study design. A parallel study demonstrated patient-related characteristics predictive of CTIP treatment effect. In that study, possession of rational problem-solving skills was shown to predict CTIP effect. Forthcoming studies have examined, at a content level, CTIP versus graded activity and gradual exposure (Siemonsma et al, unpublished research), as well as fidelity to the treatment protocol. Preliminary results show that fidelity to the structure of the protocol was very satisfactory (67%–100%). Fidelity to the treatment content was less satisfactory (44%–56%).

Conclusion
This study, the first study of a cognitive intervention focusing on illness perceptions in patients with CLBP, showed statistically significant and clinically relevant improvements in patient-relevant physical activities and significant changes in illness perceptions for at least 18 weeks. Notwithstanding some methodological limitations of this study, the results are very encouraging. These results add to the increasing awareness that illness perceptions are a factor well worth examining in patients with CLBP. Illness perceptions are recognized as an important predictor of outcome. We showed that targeted treatment resulted in both an increase in physical activity and changes in illness perceptions. Cognitive treatment of illness perceptions is a relatively short treatment for CLBP that is well focused and, therefore, a clinically important addition to the available treatment for CLBP. Further studies are needed to estimate the effectiveness in comparison with active control groups and to determine for whom and under what circumstances CTIP can best be implemented in clinical practice. Longer-term results on the effectiveness of CTIP, as well as comparative intervention studies, also are needed.

All authors provided concept/idea/research design, writing, and consultation (including review of manuscript before submission). Dr Siemonsma, Dr Roorda, and Dr Vollebregt provided data collection. Dr Siemonsma, Dr Stuve, Dr Roorda, Dr Walker, Dr Lankhorst, and Dr Lettinga provided data analysis. Dr Siemonsma, Dr Roorda, Dr Vollebregt, Dr Walker, Dr Lankhorst, and Dr Vollebregt provided project management. Dr Siemonsma, Dr Lankhorst, and Dr Lettinga provided fund procurement. Dr Roorda, Dr Vollebregt, Dr Walker, Dr Lankhorst, and Dr Lettinga provided institutional liaisons. Dr Roorda and Dr Vollebregt provided study participants.

The Medical Ethics Committee of Slotervaart Hospital, Amsterdam, the Netherlands, approved the study protocol (number 0541).
The results of this study were presented at IASP August 29—September 2, 2010, and at EULAR, June 10–14, 2009, Copenhagen, Denmark.

The Netherlands Organization for Health Research and Development (ZonMW) supported Dr Siemonsma (grant no. 014-32-041).

The trial was registered with ISRCTN Register (identifier: ISRCTN35108886).


References


34. The Illness Perceptions Questionnaire website. Available at: http://www.ubc.ca/ipq/.


Cognitive Treatment of Illness Perceptions in Chronic Low Back Pain


Call For Papers:
Innovative Technologies for Rehabilitation and Health Promotion: What Is the Evidence?

As new technologies enter the market or the research development track, physical therapists increasingly are in positions to either guide or lead the development team, working with engineers to modify existing technologies or develop new technologies to enable rehabilitation, prevent decline, and maintain healthy living. Remarkable breakthroughs have occurred in rehabilitation robotics, brain-computer interface (BCI), virtual reality–based therapies, wearable sensors and monitors (eg, smart homes, garments), and interactive media applications for rehabilitation and health. But there are still significant gaps in knowledge about how to best use these technologies to reduce disability broadly.

PTJ invites original contributions to a special issue to be released during the first half of 2014. Innovative Technologies for Rehabilitation and Health Promotion will capture the latest research, perspectives, and scholarship. We seek to aggregate and disseminate high-quality, cutting-edge research on such topics as:

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- What new interventions and technological developments have preliminary evidence of efficacy in improving participation in people with disability?
- How can technology be used to prolong a healthy, active lifestyle?
- Can new technology be used to detect impending decline in function in the home and community?
- Will the developments in BCI become noninvasive and appropriate for more people?
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Guest Co-Editors
Carolee J. Winston, PhD, PT, FAPTA
Phil Requejo, PhD
University of Southern California-Los Angeles
Appendix.
Patient-Specific Complaints Questionnaire

Instructions
Your back problems influence your daily activities and movements. Most troublesome are those activities that are difficult for you to avoid. The consequences of back problems are different for everyone. Each person wants to improve certain activities and movements through treatment. Below there are a number of activities and movements that might be difficult for you to perform because of your back problems. Try to recognize the activities and movements that you were troubled by during the past week because of your back problems. Color or mark the dot for this activity in the list below. You may add activities or movements that are important for you and are not in the list.

We ask you to mark those problems that YOU FIND VERY IMPORTANT and that YOU WOULD LIKE TO CHANGE MOST in the NEXT MONTHS.

List of activities

- Lie in bed
- Turn in bed
- Get out of bed
- Get out of a chair
- Sit down on a chair
- Sit for a long time
- Get in or out of a car
- Ride in a car or bus
- Cycle
- Stand
- Stand for a long time
- Stand for a long time while bending over
- Stand slightly while bending over (eg, at a sink)
- Stoop down with rotated back
- Light work in and around the house
- Heavy work in and around the house
- Walk inside the house
- Walk outside
- Run
- Climb stairs
- Carry an object
- Pick up something from the ground
- Lift
- Pick up something from the floor
- Go out
- Sexual activities
- Perform job
- Perform hobbies
- Perform housekeeping activities
- Play sports
- Travel
- Other activities:

Select the 3 most important activities (troublesome to perform and important to improve upon). Prioritize them below:

1. ....................................................................................................................................................................................
2. ....................................................................................................................................................................................
3. ....................................................................................................................................................................................

(Continued)
### Example of how to fill in

**Problem: walking**

If you place the line on the left, it means that, for you, walking is not much of an effort.

| No problem at all | Impossible |

If you place the line on the right, it means that, for you, walking is a great effort.

| No problem at all | Impossible |

**Date of filling in:**

|........................................................................................................................................................................|

**Problem 1**

How difficult was it to perform this activity during the past week?

| No problem at all | Impossible |

**Problem 2**

How difficult was it to perform this activity during the past week?

| No problem at all | Impossible |

**Problem 3**

How difficult was it to perform this activity during the past week?

| No problem at all | Impossible |

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Cognitive Treatment of Illness Perceptions in Patients With Chronic Low Back Pain: A Randomized Controlled Trial
Petra C. Siemonsma, Ilse Stuive, Leo D. Roorda, Joke A. Vollebregt, Marion F. Walker, Gustaaf J. Lankhorst and Ant T. Lettinga
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