Psychosocial and Cognitive Rehabilitation of Patients with Chronic Toxic Encephalopathy. A Randomised Controlled Study

Van Hout MSE, Wekking EM, Berg IJ, Deelman BG.
Submitted.
Abstract

Objective: In this randomised-controlled trial (RCT) a treatment programme focusing on the psychosocial and cognitive functioning of patients with solvent-induced chronic toxic encephalopathy (CTE) is evaluated.

Method: Treatment consisted of 16 sessions in total, divided in eight group sessions based on cognitive behavioural principles focusing on psychosocial functioning and coping with the syndrome, and eight sessions focusing on cognitive strategies to compensate for memory and attention problems. Research design was a RCT with follow-up, comparing the cumulative effect of the two interventions allocated in random order with a waiting-list control group. Outcome measures were treatment satisfaction, patient and partner ratings of psychosocial and cognitive changes, questionnaires concerning psychosocial and cognitive functioning and neuropsychological tests. To determine the effects of the treatment on the various outcome measures while controlling statistically for performance at baseline, multiple linear regression analyses were performed with scores after treatment and follow-up as outcome parameters, and baseline scores, treatment versus control condition, effort status, and litigation or financial compensation status as predictors. Besides, the reliable change index (RCI) was used to determine clinical relevance of individual improvement.

Results: Ninety-five patients started treatment, 84 patients had complete data. Satisfaction with treatment was high. Immediately after the treatment, a significant improvement in the treatment group was found on objective memory tests and a nearly significant improvement of the treatment group in target complaints related to CTE. These effects diminished at follow-up. The improvement was reflected in the ratings of patients as well as partners in the treatment groups considering psychosocial and cognitive improvement. However, no treatment effects were found on the other questionnaires. Effort status seemed to be an important predictor of cognitive complaints and performance on cognitive tests. Using a reliable change index of 1.64, 32% of the treatment group exerting sufficient effort improved on objective measures of memory functioning while none of the patients who exerted insufficient effort improved (p=.01).

Discussion: Cognitive strategy training can be relevant to patients with diagnosed CTE exerting sufficient effort on neuropsychological tests, but it might be important for patients to regularly update practiced cognitive strategies. For patients exerting insufficient effort other interventions should be designed and evaluated. In future studies it is important to use or develop questionnaires that are more responsive to individual changes in psychological and social functioning.
Introduction

Long-term occupational exposure to organic solvents may lead to neurasthenic and cognitive symptoms of impaired concentration and memory, irritability, fatigue, instability of affect and difficulties in impulse control. This syndrome is called chronic toxic encephalopathy (CTE). In 1985 a World Health Organisation (WHO) Working Group formulated criteria for the diagnostic classification of CTE [1]. In the same year, the “Workshop on neurobehavioral effects of Solvents” in Raleigh (USA) introduced slightly different criteria for CTE [2]. In both classifications CTE is divided in three categories, depending on severity and reversibility of symptoms. In the more severe categories there have to be objectified cognitive deficits, especially in attention and memory functioning.

Neuropsychological testing is the keystone in objectifying cognitive complaints associated with chronic solvent exposure. The WHO advised a core battery of neuropsychological tests for diagnosing CTE [3]. Despite these international criteria and test protocols the diagnosis of CTE is controversial. There is still uncertainty regarding the mechanisms of neurotoxicity and the differences in individual susceptibility. The differential diagnosis with mood disorders is difficult. Moreover, in cases of suspected CTE, suboptimal performance on neuropsychological testing due to insufficient effort appeared to be a substantial problem [4].

The prognosis of CTE is influenced by multiple factors such as severity of cognitive and emotional problems, personality characteristics and individual coping styles, social support systems and the socio-economic situation of the patient. In follow-up studies no consistent relationship is found between neuropsychological or neurophysiological recovery and the subjective health condition of the patient [5]. When designing a treatment procedure for these patients it seems wise to focus treatment on this interrelatedness of cognitive, psychosocial and personality factors [6].

There is little experience with (neuro)psychological treatment of patients with diagnosed CTE. In a systematic review of outcome studies we found only four evaluation studies, two of them referring to the same treatment group [7, 8, 9, 10]. These studies were uncontrolled clinical case series and yielded inconsistent results. Until now, no randomised controlled studies have appeared evaluating psychological treatment of CTE patients. However, reviewing treatment outcome studies of equally controversial syndromes characterised by a comparable symptom cluster, such as the chronic fatigue syndrome and the chronic whiplash syndrome, there was evidence that cognitive behaviour therapy (CBT) techniques focusing on changing illness attributions and on stimulating graded activity might be useful for patients with CTE [6].
Moreover, the cognitive deficits of CTE patients might probably best be addressed by cognitive rehabilitation focused on compensatory memory techniques [6, 11, 12].

In this study a newly designed psychological rehabilitation programme of 16 (2 X 8) sessions will be evaluated. The programme consisted of eight group sessions based on cognitive behavioural principles focusing on coping with the psychological and psychosocial implications of the syndrome (Psychosocial Therapy or PST), and eight sessions, partly group, partly individual, focusing on strategies to compensate for cognitive problems (Cognitive Strategy Training or CST).

The study design was a randomised controlled cross-over design in which the sequence of the therapies was alternated, and results of the two treatment groups were compared to those of a waiting list control group. Outcome measures were psychosocial as well as cognitive variables.

The aims of this study were:
1. To determine whether the treatment group as a whole showed more improvement on the outcome variables after treatment and at follow-up than the waiting list control group,
2. To investigate which individual factors may contribute to the success or lack of success of the treatment,
3. To determine whether the Cognitive Strategy Training and the Psychosocial Therapy had differential treatment effects after the first eight sessions (condition effect), and whether the order in which these treatments were given had any effects on treatment outcome (order effects),
4. To determine how many individuals improved according to a criterion of clinical relevant change (reliable change index or RCI) [13, 14].

Methods

Participants

Ninety-five patients with diagnosed CTE participated in the study. All patients had been referred by general practitioners or medical officers to one of the two locations of the Netherlands Centre of Occupational Diseases in the years of 1998 to 2003, and had completed the entire diagnostic protocol. This diagnostic protocol includes three stages [15, 16; see Figure 1]. Participants
Figure 1: Flow chart of the diagnostic process and therapy selection

1500 referrals → No N=351 → No CTE

Substantial exposure + Relevant Symptoms + Relation in time + No other obvious care

Yes N=1149

NES ≥ 2 subtests abnormal → No N=475 → No CTE

Yes N=674

Neurological investigation + exposure assessment + neuropsychological assessment

CTE N=218

Patient is male + CTE diagnosis + subjective memory complaints + standardised sum score < -1.28 on memory tests

Yes N=126 → N=31 not motivated

N=95 motivated
reached the third stage if they met the following criteria: long and/or heavy exposure to organic solvents, relevant symptoms, a relation in time between exposure and development of symptoms and signs, no obvious other cause for the disease, and abnormal scores on two or more of six subtests of the computer-based Neurobehavioral Evaluation System (NES2) [17, 18]. If other explanations for cognitive complaints were present, participants were not selected for further investigation. The third stage included a clinical neurological examination, assessment of exposure, and a comprehensive psychological evaluation. This evaluation consisted of a standardised neuropsychological test battery [16] and an extensive interview to exclude psychiatric symptomatology, such as affective disorders and premorbid learning problems. A CTE diagnosis was made if exposure was substantial, neuropsychological deficits were objectified, and alternative diagnoses were not applicable.

Participants were accepted for treatment if they met the following selection criteria: 1) a CTE diagnosis was made, 2) the patient reported subjective memory problems, and 3) memory problems were objectified on neuropsychological tests, operationalised as a standardised sum score of < 1.28 (corresponding with the tenth percentile) on the total acquisition score of the Dutch version of the California Verbal Learning Test [CVLT; 19] and the immediate recall of the stories subtest of the Rivermead Behavioural Memory Test [RBMT; 20, 21] , and 4) the patient was motivated for treatment.

### Table 1: Treatment design

<table>
<thead>
<tr>
<th>Week</th>
<th>0</th>
<th>1-8</th>
<th>9</th>
<th>17</th>
<th>18-25</th>
<th>26</th>
<th>38</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition A</td>
<td>A1</td>
<td>X1</td>
<td>A1</td>
<td>A1</td>
<td>X1</td>
<td>A1</td>
<td>A1</td>
</tr>
<tr>
<td>Condition B</td>
<td>A1</td>
<td>X1</td>
<td>A1</td>
<td>A1</td>
<td>X1</td>
<td>A1</td>
<td>A1</td>
</tr>
<tr>
<td>Condition C</td>
<td>A1</td>
<td>A1</td>
<td>A1</td>
<td>A1</td>
<td>A1</td>
<td>A1</td>
<td>A1</td>
</tr>
</tbody>
</table>

A = Assessment X = treatment A1: Pre: before treatment A2: Post 1: after completing the first series of eight sessions
A3: Follow-up 1: before the second eight sessions A4: Post 2: after completing the second series of eight sessions
A5: Follow-up 2: about 12 weeks after completing the treatment programme.

X1: Psychosocial therapy (PST) X2: Cognitive strategy training (CST)
Study design

Participants were assigned at random to one of the two treatment groups (A and B) or the control group (C) according to the following rule: after the diagnostic evaluation every patient meeting the inclusion criteria was placed on a list. From that list, three groups of 8 patients were formed, consecutively, group A, B, C, A, B, C, and so forth. An independent staff member made the group selection without knowledge of clinical and psychological data.

Every patient in the treatment groups participated in two series of eight treatment sessions: psychosocial therapy (PST) and cognitive strategy training (CST). The two treatment groups, A and B, differed in the order in which the treatments were offered. In treatment group A, participants first participated in the PST, and then in the CST. In treatment group B, this order was reversed.

The cumulative effect of the two interventions was compared to the results of the control group. The differential effects of both interventions, as compared to the control group, were assessed after the first period. Due to the likelihood of a carry-over effect the study was not analysed as a cross-over trial. Participants were evaluated five times: about two weeks before treatment (Pre), about one week after the first eight sessions (Post 1), about eight weeks later before the second series of sessions (follow-up 1), about one week after the second series of eight sessions (Post 2) and about three months after completing the treatment programme (follow-up 2). See also table 1. After completing all evaluations, the waiting list control group was offered treatment (no results available).

Treatment Procedures

1: Psychosocial Therapy (PST): this semi-structured group therapy of eight weekly two-hour sessions was psycho-educational and based on cognitive behavioural principles. Treatment focus was on recognition and acceptance of complaints, and social reintegration. The group members were seen as “experts” as to coping with CTE, and were stimulated to give feedback to each other. The therapeutic aim was to challenge inadequate cognitions regarding coping with the syndrome and to develop more active coping styles. For every group member a specific and attainable “personal goal” was formulated, and in each session the achievements as to this goal were evaluated. The therapy format was semi-structured in the sense that there was a treatment protocol for each session, but there was opportunity to go into acute problems presented by the
participants.

2: Cognitive Strategy Training (CST): this treatment of eight weekly sessions focused on the development of compensation strategies for memory problems and their use in daily life, based on evidence from studies on cognitive (memory) rehabilitation [22, 23, 24]. Patients were instructed in groups on the use of memory aids (3 two-hour group sessions), and received individual treatment in which six internal memory strategies were discussed and practiced in daily homework exercises, in relation to one of three target problems chosen by the patient (four 45 minute sessions). These strategies were: spend more attention and time to the memorandum, repeat it a few times, try to find associations, organise and link the input- and retrieval situation [22]. Possible target problems were remembering names, remembering written text, and coping with attention problems. These treatment sessions were individual because the strategies were tailored to the target chosen by the patient and had to be exercised during the sessions. The treatment ended with a plenary session summarising and evaluating treatment.

Measurements

Subject characteristics

Measures of exposure

Two measures of exposure to organic solvents were used: duration and severity. Duration of exposure was expressed in years, corrected for fulltime/part-time differences. Exposure severity, based on workplace concentration, symptoms of acute intoxication and use of personal protection equipment, was assessed by an occupational hygienist and was classified in two categories: moderate and high.

Litigation status

Current involvement in a litigation procedure, a workman’s compensations claim, a procedure for receiving a disability pension, or any other form of financial compensation procedure was registered for every participant.

Effort status was assessed by a test specifically designed for the detection of insufficient effort, the Test of Memory Malingering [TOMM; 25], and by extremely low scores on the Warrington Recognition Memory Test for Faces [RMT-F; 26] as an indicator of suboptimal effort [27]. TOMM and RMT scores were dichotomised into two categories: sufficient or insufficient effort.
recommended cut-off scores for the TOMM were used. The cut-off score of the RMT (27/28) was based on the Iverson study.

**Satisfaction and perceived changes as a result of treatment**

Treatment satisfaction was assessed (only for the treatment groups) by a short evaluation questionnaire (at Post 1, Post 2 and follow-up 2), consisting of 8 questions using a 10-point scale concerning satisfaction, usefulness of the treatment for everyday life, and experienced support and empathy by group members and therapists. Partners were asked to rate their satisfaction with the treatment by independently completing the same questionnaire, to provide an intersubjective score.

Perceived changes in psychosocial and cognitive functioning since the treatment were measured (only for the treatment groups) by a short evaluation questionnaire completed at Post 1, Post 2 and follow-up 2. This questionnaire consisted of 7 questions using a 7-point scale ranging from very much worse (1) to very much improved (7). Improvement was defined as a score of 5 (moderately improved) or higher. Questions concerned acceptation of CTE, the relationship with the partner, children, friends and acquaintances, and leisure activities. Partners were asked to rate changes in functioning of their partners by independently completing the same questionnaire.

All spontaneous qualitative remarks made by the patients in a group interview regarding changes in psychosocial and cognitive functioning at POST 1 and POST 2 were categorised and rated independently by two staff-members, who were blind to the identity of the patients. These data were gathered during the last treatment session.

**Effect Measures**

Questionnaires concerning psychosocial and cognitive functioning

Complaints related to CTE were investigated with the Target Complaint List (TCL), a Dutch adaptation of the Swedish Target Complaint Lists [28]. The TCL consists of 26 questions asking for a judgment on the frequency of complaints specifically related to CTE (min 0 (never), max 2 (often) per item) and the experienced hindrance (min 0, max 10 per item). The total score is
obtained by multiplying reported frequency and experienced hindrance of complaints. The TCL was completed by the patients themselves and by their partners.

The Neurotoxic Symptom Checklist (NSC-60) was used to evaluate complaints possibly related to CTE. The NSC-60 consists of 53 questions divided in 7 subscales designed to elicit information regarding mood and affect, absent-mindedness and memory problems, sensory and motor disturbances, chest problems, equilibrium disturbances, somatic problems, fatigue and sleep disturbances [29]. Responses are given on a 4-point scale: never – seldom – sometimes – often. These data are available for the patients only.

Patients and their partners were asked to complete 4 subscales of the Dutch version of the Sickness Impact Profile (SIP-68). Scales 3) psychic autonomy and communication (11 items), 4) social behaviour (12 items), 5) emotional stability (6 items), and 6) mobility range (10 items), were used to give an indication of health-related functional condition [30]. For all items yes-no responses are used. The SIP was supplemented with an extra scale referring to acceptation of and coping with complaints (6 items). This scale was analysed separately.

Mood symptoms were identified by the Dutch version of the Hospital Anxiety and Depression Scale (HADS), consisting of 14 questions on a 4-point scale [31, 32].

Two subscales of the Utrecht Coping List (UCL) were used to assess passive and avoidant coping styles [33]. These scales consist of 7 and 8 items, respectively. Responses are given on a 4-point scale: never – sometimes – often – very often.

Finally, the patients and their partners were asked to fill in a questionnaire of 37 questions on a 7-point scale (total score min 37, max 259) rating the frequency of everyday memory complaints [22].

Neuropsychological Tests

Memory tests: For each memory test two parallel versions were used. The tests were: the Name-Face Test (immediate and delayed recall) [24], the Stories subtest of the Rivermead Behavioural Memory Test (immediate recall) [20, 21], and the Total Acquisition Score and Delayed Recall Score of the Groningen 15-words test, a Dutch version of Rey’s auditory verbal learning test [34].

Control task: Cognitive Strategy Training should not have an effect on reaction times [35]. To differentiate the effect of cognitive strategy training from the more general effects of recovery or increased task motivation, the Colour Word Vigilance Test of the Neurobehavioural Evaluation System (NES) was administered.
Data reduction and construction of sum-scores

To reduce the large number of variables and thereby the number of statistical tests needed, and to improve reliability, scores were combined into a number of sum scores. To avoid weighting problems in the addition of test scores due to differences in score ranges between tests, we used standardised sum-scores. Standardization was based on baseline group means and standard deviations. In this way 10 psychosocial (6 subjective, 3 intersubjective) and 4 cognitive effect measures (1 subjective, 1 intersubjective, 2 objective) were obtained:

1. Psychosocial effect measures:
   a. Subjective
      i. Acceptation (extra scale SIP)
      ii. Sickness Impact sum score scale 4 - 6
      iii. Target Complaints (TCL)
      iv. Depression sum score: a combination of the HADS total score, SIP scale 5, and NSC-60 mood complaints
      v. Somatic complaints / fatigue: 5 subscales of the NSC-60 (sensory and motor disturbances, chest problems, equilibrium disturbances, somatic problems, fatigue and sleep disturbances)
      vi. Passive and avoidant coping style: 2 subscales of the Utrecht Coping List
   b. Intersubjective
      i. Acceptation (extra scale SIP)
      ii. Sickness Impact sum score scale 4 - 6
      iii. Target Complaints according to partner (TCL-P)

2. Cognitive effect measures:
   a. Subjective: memory complaint list, NSC scale absent-mindedness and memory problems, Sickness Impact Profile 3 (psychic autonomy and communication)
   b. Intersubjective: memory complaint list, Sickness Impact Profile 3 (psychic autonomy and communication), by partner
   c. Objective:
      i. Memory sum score: Name Face Test total acquisition score, Name Face Test Delayed Recall, 15 Words Test total acquisition score, 15 Words Test delayed recall score, RBMT Stories acquisition score. All parallel versions were standardised per version.
      ii. Control score: Colour Word Vigilance Test time to completion, z-score
Analysis

Research data were analysed using SPSS-12.0 for Windows. When comparing group means at baseline, one-way analysis of variance was used. Pearson correlations were used for analysing relationships between continuous variables and chi-square tests for the relations between discrete variables.

To answer the first research question (is treatment effective?), global estimates of the effect of treatment on the various outcome measures were obtained by linear regression analyses with group assignment (treatment or control) and baseline values of the outcome parameters as the independent variables. Baseline values were included because treatment outcome is highly correlated with baseline scores, and these should be corrected for first [36, 37]. As to therapy satisfaction and reported changes in psychosocial and cognitive functioning, descriptive statistics were given for the entire treatment group at Post 2 and follow-up 2.

To answer the second research question (which factors contribute to success?), a priori hypothesised potential confounders (e.g. effort and litigation status) were added to the global linear regression models. A person with insufficient effort on neuropsychological tests probably has reduced motivation to achieve therapeutic success as well. In the same way it can be hypothesised that a person involved in a litigation or financial compensation procedure connected with CTE will be less motivated to achieve therapeutic success. If these variables are not distributed evenly over intervention and control groups, this might lead to confounding.

Further regression analyses were done from a more descriptive point of view, to analyse whether other variables influenced outcome scores at Post 2. Potential relationships between outcome scores and age, education level, exposure duration and exposure severity were analysed with stepwise forward regression analyses, as were possible interactions of these scores with treatment.

As to therapy satisfaction and reported changes in psychosocial and cognitive functioning, we investigated whether treatment satisfaction was influenced by potential predictors (effort status, litigation status), by the Mann-Whitney U-test. The relations with age, educational level, exposure severity and duration, and travel distance were studied exploratively (Mann Whitney U and Spearman’s rho).

Regarding the third research question (which treatment, PST or CST, is most effective?), the following analyses were done: differences between group A (PST) and group B (CST), were analysed at Post 1 and follow-up 1. Multiple linear regression analyses were performed with Post 1 and follow-up 1 scores as continuous outcome parameters, and baseline scores,
treatment group, effort status, and litigation or financial compensation status as predictors.

To determine any order effects the same analyses were done with Post 2 and follow-up 2 scores as outcome parameters.

To determine which treatment was most effective as to therapy satisfaction and reported changes in psychosocial and cognitive functioning, differences between group A (PST), and group B (CST) were analysed at Post 1 and follow-up 1 using the Mann Whitney U-test.

Table 2. Patient characteristics (complete data group)

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong>*</td>
<td>31</td>
<td>37</td>
</tr>
<tr>
<td>Primary education and lower occupational (no diploma)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower occupational (diploma) and mid-level or higher</td>
<td>53</td>
<td>63</td>
</tr>
<tr>
<td><strong>Level of exposure</strong></td>
<td>51</td>
<td>61</td>
</tr>
<tr>
<td>Moderate</td>
<td>33</td>
<td>39</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td>42</td>
<td>50</td>
</tr>
<tr>
<td>Painters</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Spray-painters</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Printers</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Chemical/paint industry</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Upholsterers</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Work situation</strong></td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>Working</td>
<td>19</td>
<td>23</td>
</tr>
<tr>
<td>Sick-leave</td>
<td>35</td>
<td>42</td>
</tr>
<tr>
<td>Disability pension</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Retired</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Effort</strong></td>
<td>64</td>
<td>76</td>
</tr>
<tr>
<td>Sufficient effort</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Insufficient effort</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Litigation / Financial Compensation</strong></td>
<td>48</td>
<td>57</td>
</tr>
<tr>
<td>No</td>
<td>36</td>
<td>43</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total N</strong></td>
<td>84</td>
<td>100</td>
</tr>
</tbody>
</table>

* This classification system is not based on years of education, but on level of completed education.
Considering the fourth research question (how many individuals improve?), the proportion of individuals with a relevant improvement was determined according to the reliable change index [13, 14, 37]. For reasons of efficiency, these frequencies will only be presented for variables for which in the previous analyses significant effects had been reported. With a one-tailed hypothesis a RCI larger than 1.64 is unlikely to occur (p < .05) without actual change.

Results

Participants

Hundred and twenty-seven patients met the inclusion criteria and were invited for treatment. Ninety-five patients were motivated for treatment. A flow-chart of the selection process is presented in figure 1. Every patient completing treatment and measurements at Post 2 was defined as a “complete data” case. Thus defined, eleven patients (12%) dropped out of treatment and/or did not complete all assessments: 7 patients dropped out because of health or family circumstances, 3 because of motivation problems that lead to a refusal to participate any further, and 1 patient found a full-time job and was not able to attend the second part of the treatment. Two of the “complete cases” had no follow-up data. The group with complete data did not differ from the dropouts in any of the subject characteristics, nor in any of the effect measures at baseline. Patient characteristics from the complete data group are presented in table 2.

The treatment group appeared to differ significantly from the control group in age (M treatment
Results regarding question 1 (is treatment effective?)

Outcome measures

In the linear regression analyses with group assignment and baseline values as independent variables, treatment had no effect on the majority of the outcome measures at Post 2. Only for three outcome measures did treatment reach borderline significance: the memory sum score (regression coefficient = .40, 95% CI 0 – 0.80, p=.052), the target complaint list (regression coefficient = -.41, 95% CI -.84 – 0.02, p=.062), and the SIP sum score (regression coefficient = .24, 95% CI -.05 – 0.54, p=.10). This means that the treatment group had .40 SD higher memory scores at Post 2 than the controls, once baseline levels were accounted for. The treatment group had fewer complaints on the TCL than controls, but a worse score on the SIP. At follow-up 2 treatment effects were no longer present.
Treatment satisfaction and psychosocial functioning

Overall, patients were very satisfied with treatment (M = 8.5, SD = 1.0), they judged treatment as useful for everyday life (M = 7.2, SD = 1.3), and they experienced much support and empathy from their peers and therapists (M = 8.6, SD = .9). Satisfaction scores did not differ significantly between Post 2 and follow-up 2. Although the partners were also satisfied with the therapy at Post 2, their ratings were significantly lower than those of the patients (M satisfaction 7.5, p = .000; M usefulness 6.5, p = .01). The partner ratings also remained stable at follow-up 2. A substantial percentage of patients gave scores of 7 or higher (very satisfied): 37 patients (97%) for satisfaction with the treatment, 31 (80%) for usefulness to everyday life, and 37 (95%) for support and empathy from peers and therapists. For the partners these figures were 26 (70%) for satisfaction and 18 (49%) for usefulness.

Changes in psychosocial and cognitive functioning at Post 2 perceived by patients and their partners are presented in table 3. At Post 2 treated patients reported the most improvement regarding acceptation (74%), relationship with their partners (58%), and cognitive functioning (56%). Results did not differ between Post 2 and follow-up 2 for all variables.

Qualitative remarks regarding improvement

The spontaneous reactions of the patients, obtained in a group evaluation during the last group session (Post 2), were classified by raters who were blind to the identity of the patients. There were no follow-up data and no partner data obtained by interview. The evaluation at Post 2 is presented in table 4 for the treatment group as a whole.

Results regarding question 2 (which factors contribute to success?)

2A: Effect of effort and litigation on outcome

An overview of the multivariate linear regression analyses is provided in tables 5 and 6.

Psychosocial outcome measures (table 5)

Treatment was a borderline significant (p = .059) predictor of Target Complaint scores at Post 2, in the sense that the treated group showed a decrease in complaints once baseline level, effort status and litigation status were accounted for. This effect was not present at follow-up 2. For the other psychosocial outcome variables there were no significant predictors of treatment outcome at Post 2 or follow-up besides baseline level.
Table 5: Summarised results of regression analyses of psychological effect measures at POST 2 (Regression coefficient expressed as changes in z-score) A negative regression coefficient means improvement.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Regression Coefficient</th>
<th>p-values</th>
<th>95% Confidence interval</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower bound</td>
<td>Upper bound</td>
</tr>
<tr>
<td>Subjective Acceptation problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>.54</td>
<td>.000</td>
<td>.37</td>
<td>.72</td>
</tr>
<tr>
<td>Treatment vs control</td>
<td>-.10</td>
<td>.59</td>
<td>-.46</td>
<td>.26</td>
</tr>
<tr>
<td>Effort status *</td>
<td>.21</td>
<td>.30</td>
<td>-.19</td>
<td>.60</td>
</tr>
<tr>
<td>Litigation Status **</td>
<td>.30</td>
<td>.087</td>
<td>-.04</td>
<td>.64</td>
</tr>
<tr>
<td>Target Complaints</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>.38</td>
<td>.000</td>
<td>.19</td>
<td>.579</td>
</tr>
<tr>
<td>Treatment vs control</td>
<td>-.42</td>
<td>.059</td>
<td>-.87</td>
<td>.02</td>
</tr>
<tr>
<td>Effort status</td>
<td>.32</td>
<td>.17</td>
<td>-.14</td>
<td>.79</td>
</tr>
<tr>
<td>Litigation Status</td>
<td>.36</td>
<td>.086</td>
<td>-.05</td>
<td>.78</td>
</tr>
<tr>
<td>Sickness Impact Profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>.72</td>
<td>.000</td>
<td>.58</td>
<td>.86</td>
</tr>
<tr>
<td>Treatment vs control</td>
<td>.24</td>
<td>.12</td>
<td>-.06</td>
<td>.53</td>
</tr>
<tr>
<td>Effort status</td>
<td>.16</td>
<td>.32</td>
<td>-.16</td>
<td>.49</td>
</tr>
<tr>
<td>Litigation Status</td>
<td>.14</td>
<td>.07</td>
<td>-.14</td>
<td>.42</td>
</tr>
<tr>
<td>Mood Complaints</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>.82</td>
<td>.000</td>
<td>.68</td>
<td>.95</td>
</tr>
<tr>
<td>Treatment vs control</td>
<td>.03</td>
<td>.83</td>
<td>-.21</td>
<td>.26</td>
</tr>
<tr>
<td>Effort status</td>
<td>.12</td>
<td>.37</td>
<td>-.14</td>
<td>.37</td>
</tr>
<tr>
<td>Litigation Status</td>
<td>.14</td>
<td>.19</td>
<td>-.08</td>
<td>.36</td>
</tr>
<tr>
<td>Somatic Complaints</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>.80</td>
<td>.000</td>
<td>.69</td>
<td>.91</td>
</tr>
<tr>
<td>Treatment vs control</td>
<td>.03</td>
<td>.75</td>
<td>-.15</td>
<td>.21</td>
</tr>
<tr>
<td>Effort status</td>
<td>.07</td>
<td>.47</td>
<td>-.13</td>
<td>.28</td>
</tr>
<tr>
<td>Litigation Status</td>
<td>.06</td>
<td>.48</td>
<td>-.11</td>
<td>.23</td>
</tr>
<tr>
<td>Passive Coping Style</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>.74</td>
<td>.000</td>
<td>.60</td>
<td>.88</td>
</tr>
<tr>
<td>Treatment vs control</td>
<td>.20</td>
<td>.15</td>
<td>-.07</td>
<td>.46</td>
</tr>
<tr>
<td>Effort status</td>
<td>-.11</td>
<td>.47</td>
<td>-.40</td>
<td>.19</td>
</tr>
<tr>
<td>Litigation Status</td>
<td>.09</td>
<td>.48</td>
<td>-.16</td>
<td>.34</td>
</tr>
<tr>
<td>Intersubjective</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
One of the other findings was that litigation status was a borderline significant independent predictor of outcome scores for acceptation problems, the TCL and the SIP. Subjects involved in a litigation procedure had worse scores at Post 2 on these outcome measures.

Cognitive outcome measures (table 6)

Treatment (p=.02) and effort status (p=.008) were significant predictors for memory scores at Post 2. This effect, however, was not maintained at follow-up 2. For the control task no treatment effect was found, but effort status was a significant predictor of scores at Post 2 (p=.016), meaning that patients exerting insufficient effort had less improvement on Post 2. At follow-up 2 effort status was still negatively related to scores on the control task, but not significantly. However, litigation status was a significant predictor of follow-up 2 scores (p=.023).

One of the other findings was that effort status and litigation status were significant independent predictors of subjective memory ratings at Post 2, in the sense that subjects exerting insufficient effort (1) versus sufficient effort (0) ** litigation status: involvement in procedure (1) versus no involvement (0)
Table 6: Summarised results of regression analyses of cognitive effect measures at POST 2. (Regression coefficient expressed as changes in z-score) A positive regression coefficient means improvement.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Regression Coefficient</th>
<th>p values.</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower bound</td>
</tr>
<tr>
<td>Cognitive effects: subjective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>0.53</td>
<td>0.000</td>
<td>0.36</td>
</tr>
<tr>
<td>Treatment vs control</td>
<td>0.14</td>
<td>0.29</td>
<td>-0.12</td>
</tr>
<tr>
<td>Effort status *</td>
<td>0.30</td>
<td>0.51</td>
<td>-0.01</td>
</tr>
<tr>
<td>Litigation Status **</td>
<td>0.25</td>
<td>0.045</td>
<td>0.01</td>
</tr>
<tr>
<td>Cognitive effects: intersubjective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>0.81</td>
<td>0.000</td>
<td>0.65</td>
</tr>
<tr>
<td>Treatment / Control</td>
<td>-0.18</td>
<td>0.22</td>
<td>-0.48</td>
</tr>
<tr>
<td>Effort status</td>
<td>0.26</td>
<td>0.10</td>
<td>-0.05</td>
</tr>
<tr>
<td>Litigation Status</td>
<td>0.05</td>
<td>0.84</td>
<td>-0.24</td>
</tr>
<tr>
<td>Cognitive effects: objective: Memory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>1.09</td>
<td>0.000</td>
<td>0.86</td>
</tr>
<tr>
<td>Treatment / Control</td>
<td>0.458</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>Effort status</td>
<td>-0.590</td>
<td>0.008</td>
<td>-1.02</td>
</tr>
<tr>
<td>Litigation Status</td>
<td>-0.266</td>
<td>0.15</td>
<td>-0.63</td>
</tr>
<tr>
<td>Cognitive effects: objective: Control Test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline scores</td>
<td>0.82</td>
<td>0.000</td>
<td>0.65</td>
</tr>
<tr>
<td>Treatment / Control</td>
<td>-0.19</td>
<td>0.27</td>
<td>-0.53</td>
</tr>
<tr>
<td>Effort status</td>
<td>-0.54</td>
<td>0.02</td>
<td>-0.98</td>
</tr>
<tr>
<td>Litigation Status</td>
<td>-0.04</td>
<td>0.80</td>
<td>-0.37</td>
</tr>
</tbody>
</table>

* effort status: insufficient effort (1) versus sufficient effort (0) ** litigation status: involvement in procedure (1) versus no involvement (0)

insufficient effort and subjects in a litigation procedure report had more cognitive complaints at Post 2. At follow-up 2, baseline scores were the only significant predictors.

Treatment satisfaction

Overall satisfaction ratings at Post 2 were significantly lower for patients exerting insufficient effort (Mann Whitney p=.023).
Reported changes in psychosocial and cognitive functioning

Ratings at Post 2 and follow-up 2 regarding cognitive improvement were significantly lower for the patient group exerting insufficient effort, according to their own (p=.02) as well as their partners’ judgment (p=.000). Differences were not significant for the other variables.

Qualitative remarks regarding improvement

Patients exerting sufficient effort reported more improvement than patients exerting insufficient effort regarding change in general (p=.034), insight (p=.003), and communication with the partner (p=.02). For the other predictors differences were not significant.
2B Effects of age, education and exposure on outcome

Main treatment effects, and interactions between predictors and treatment are summarised in table 7. Because this chapter is focused on the effects of treatment, only main treatment effects and interactions with treatment are presented here.

Psychosocial outcome measures

For the Target Complaint List a significant interaction effect was found between treatment and age: the older the patient, the more the decrease in target complaints at Post 2 in the treatment group. For the SIP sum score an interaction effect was found between treatment and exposure duration: the longer the exposure duration, the more increase in complaints on the SIP in the treatment group. For somatic complaints an interaction between severity and treatment was found: the highly exposed group in the treatment group reported more increase in somatic complaints than the moderately exposed controls.

Finally, an interaction between education and treatment for partners’ SIP ratings was found. In the treatment group, partners of higher educated patients reported a decrease in complaints on Post 2, whereas partners of lower educated patients reported an increase in complaints.

Cognitive outcome measures

The stepwise regression analyses yielded a significant interaction effect between treatment and effort for the subjective memory ratings, in the sense that patients in the treatment groups exerting insufficient effort reported relatively more increase in memory complaints at Post 2.

For the intersubjective memory ratings an interaction effect was found for treatment and educational level: partners of patients with a higher education reported relatively more decrease in memory complaints at Post 2.

For the memory score a significant interaction between age and treatment was found: the higher the age, the greater the increase in memory scores in the treatment group.

For the Control Test a significant interaction effect between effort status and treatment was found, in the sense that scores on the control tasks were relatively worse at Post 2 for the insufficient effort group participating in the treatment.

Treatment satisfaction

The severely exposed group had significantly lower satisfaction ratings (p=.01). The other independent predictors were not significantly correlated with satisfaction scores.
Reported changes in psychosocial and cognitive functioning

Ratings of the relationship with peers (p=.01) and cognitive functioning (p=.05) were significantly more positive for the moderately exposed than for the severely exposed patient group. The other predictors were not correlated with ratings of psychosocial and cognitive change.

Results regarding question 3
3A: Comparing the two interventions at Post 1 (Condition effects)

Psychosocial outcome measures
There were no significant differences between the two interventions on the psychosocial outcome variables at Post 1 nor at follow-up 1, except for somatic complaints, with group A (having received Psychosocial Therapy) reporting more somatic complaints (p=.033). This effect was not significant at follow-up 1.

Cognitive outcome measures
Group A reported significantly more cognitive complaints than group B (having received Cognitive Therapy) at Post 1, when baseline scores were accounted for (p=.005). There were no differences between treatment groups on Post 1 and follow-up 1 as to partner ratings of cognitive functioning.
Table 9: changes in psychosocial and cognitive functioning (treatment groups only) at Post 1 and Post 2.

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th></th>
<th>Group B</th>
<th></th>
<th>difference between group A and B</th>
<th>p-values (Chi-square)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Post 1</td>
<td>Post 2</td>
<td>Post 1</td>
<td>Post 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceptation</td>
<td>13 (50)</td>
<td>21 (81)</td>
<td>14 (48)</td>
<td>21 (75)</td>
<td>.43</td>
<td>.81</td>
</tr>
<tr>
<td>Relationship partner</td>
<td>18 (72)</td>
<td>15 (61)</td>
<td>15 (52)</td>
<td>15 (54)</td>
<td>.25</td>
<td>.47</td>
</tr>
<tr>
<td>Relationship children</td>
<td>16 (64)</td>
<td>15 (61)</td>
<td>15 (48)</td>
<td>12 (48)</td>
<td>.56</td>
<td>.31</td>
</tr>
<tr>
<td>Relationship friends</td>
<td>14 (52)</td>
<td>11 (42)</td>
<td>10 (35)</td>
<td>11 (39)</td>
<td>.19</td>
<td>.82</td>
</tr>
<tr>
<td>Leisure activities</td>
<td>14 (52)</td>
<td>14 (54)</td>
<td>16 (55)</td>
<td>16 (57)</td>
<td>.80</td>
<td>.89</td>
</tr>
<tr>
<td>Cognition</td>
<td>2 (7)</td>
<td>12 (46)</td>
<td>22 (76)</td>
<td>20 (71)</td>
<td>.000</td>
<td>.06</td>
</tr>
</tbody>
</table>

Table 10: Proportions of patients with relevant change, using an RCI of 1.64

<table>
<thead>
<tr>
<th></th>
<th>Treatment group</th>
<th></th>
<th>Control group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sufficient effort</td>
<td>Insufficient effort</td>
<td>Sufficient effort</td>
<td>Insufficient effort</td>
</tr>
<tr>
<td>Memory sum score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved</td>
<td>13 (32%)</td>
<td>0 (0%)</td>
<td>3 (13%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Unchanged</td>
<td>28 (68%)</td>
<td>16 (100%)</td>
<td>20 (87%)</td>
<td>2 (50%)</td>
</tr>
<tr>
<td>Deteriorated</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>2 (50%)</td>
</tr>
<tr>
<td>Target Complaint List</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved</td>
<td>2 (5%)</td>
<td>1 (6%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Unchanged</td>
<td>30 (95%)</td>
<td>14 (88%)</td>
<td>19 (90%)</td>
<td>4 (100%)</td>
</tr>
<tr>
<td>Deteriorated</td>
<td>0 (0%)</td>
<td>1 (6%)</td>
<td>2 (10%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Treatment condition was a significant predictor of memory scores at Post 1. Group B benefited the most (p=.05). At follow-up 1 this difference was not significant. There was no group difference between group A and B for the control task at Post 1 and Follow up 1.

Treatment satisfaction

Mean scores for treatment satisfaction for patients and their partners on Post 1 and Post 2 are presented in table 8. At Post 1 group A, having received PST, was significantly more satisfied than group B, having received CST.
Reported changes in psychosocial and cognitive functioning

Results for treatment group A and B on Post 1 and Post 2 are presented in table 9. At Post 1, patients in group B, having received CST, rated themselves as significantly more improved on cognition than patients in the group A.

3B: Comparing the two interventions at Post 2: Order Effects

At Post 2 and follow-up 2, after completing the entire treatment programme, there were no significant differences between the treatment groups on any of the psychosocial and cognitive outcome measures, nor on the satisfaction scores or reported changes in psychosocial functioning. There is a nearly significant difference between group A and B regarding reported changes in cognitive functioning: patients receiving CST as the first treatment, rate themselves as more improved (see table 9). For both groups, on Post 2, the proportion of patients rating themselves as more accepting and with better cognitive functioning, has increased considerably.

Results regarding question 4: Clinical significance of changes

The proportion of individuals with a relevant improvement was determined according to a reliable change index of 1.64. In the previous analyses effort status appeared to be an important predictor of outcome, in the sense that patients exerting insufficient effort were significantly less successful in the treatment. Therefore frequencies of clinical relevant change are presented separately for the subgroups exerting sufficient and insufficient effort. Results are only presented for the two variables for which a significant treatment effect was obtained in the previous analyses.

As can be seen in table 10, 13 (32%) of the patients in the treatment group exerting sufficient effort had improved on the memory tasks at Post 2, compared to 0% of the treated patients with insufficient effort scores (p=.01). For the controls these figures were 3 (13%) and 0 (p=.085). As to the Target Complaints, only two treated patients with sufficient effort improved, and 1 treated patient exerting insufficient effort. None of the controls improved.
Discussion

The main result of this nationwide multi-centre study evaluating a psychological treatment programme for patients with CTE was that treatment had a positive, though not lasting, effect on memory functioning. Moreover, the patients were very satisfied with the treatment and reported improvement in several aspects of cognitive and psychosocial functioning, but these positive findings were not reflected on the psychosocial questionnaires. We will discuss results in more detail.

Until now, there are no randomised controlled trials evaluating psychological treatment for patients with CTE. Thus it might seem somewhat premature to expect consistent results from this new psychological treatment for these patients. On the other hand, the two treatment components have been found to be effective in earlier studies: Cognitive Strategy Training for brain injured patients [11, 12] and Cognitive Behaviour Therapy and graded exercise for patients with the chronic fatigue syndrome [6].

The psychological treatment of CTE is difficult because of the chronicity of the syndrome, the entanglement of psychological, psychosocial and cognitive problems, and the fact that CTE patients are frequently involved in litigation or financial compensation procedures and therefore might not be motivated to achieve improvements.

Regarding the first research question (effect of treatment), we found a significant difference between treated patients and controls on objective memory test performance after the treatment, in favour of the treated patients. It is important to stress that these tests were not practiced during the strategy training. The fact that treatment effects were not found on the control task where the strategies could not be applied indicates that the improvement was an effect of strategy training. Unfortunately, this treatment effect was no longer significant at follow-up 2. This is consistent with some other treatment evidence concerning memory strategy training [24]. An explanation might be that treatment was too short and that these patients need a possibility to regularly “update” their trained cognitive strategies.

Besides the objective outcomes, we found that treated patients as well as their partners were very satisfied with the treatment and with the support and empathy they experienced from their fellow-participants, and judged the treatment as useful for everyday life. Moreover, a substantial percentage of treated patients and partners reported improvement in acceptation, cognition, relations with family and peers, and leisure activities. While these findings are important, certainly for patients and therapists, they are not conclusive. One could assume that patients, and certainly their partners, are better judges of improvement in daily life than
tests and questionnaires. However, their ratings might be influenced by the investment of time and energy in the treatment. Moreover, high treatment satisfaction has been also reported by participants in quasi-treatments [12]. On the other hand one might assume that partners are less inclined to be grateful and are more critical as to the implications of the treatment for the family and for everyday life. The fact that a substantial proportion of partners in our study was fairly satisfied with treatment and rated their husband as improved as to cognitive functioning and communication, might be an indication of the usefulness of this treatment for daily life.

Positive results were not found on the questionnaires concerning cognitive and psychological complaints, sickness impact and coping style. Only on the Target Complaint List, a complaint list specifically devised for CTE-patients, we found a nearly significant positive treatment effect, but again this result did not remain at follow-up.

There are several possible explanations for this difference between satisfaction ratings and questionnaires:

First, most questionnaires investigate symptoms and not changes. It can be questioned whether somatic and cognitive symptoms related to a chronic somatic or cerebral disorder can be substantially reduced by psychological treatment [37]. On the contrary, it might well be that a patient focussing on social reintegration and physical activities experiences improvement in general, but nevertheless experiences the same or even increased complaints. The finding that group A, having received the psychosocial therapy focused on social reintegration, reported significantly more somatic complaints, is in line with this hypothesis. Second, the exchange of experiences in a group setting might lead to more recognition of symptoms associated with CTE, and group A, having received the psychosocial therapy, reported significantly more cognitive complaints after the first part of the treatment. Finally, it is not certain whether a questionnaire designed to differentiate sickness severity on one specific moment is the optimal instrument to measure responsiveness to treatment. Disease-specific measurements might be more responsive than generic instruments [38, 39]. The treatment effects found only on the Target Complaints seem to be in line with this general trend.

The second research question of this study was which individual factors might contribute to the success or lack of success of the treatment. For the cognitive outcome measures, there was a significant interaction effect between treatment and effort, especially on subjective cognitive problems and on the control test. Patients in the treatment groups exerting insufficient effort deteriorated on these measures, whereas suboptimal performing patients in the control group did not. Moreover, effort was an important independent predictor of memory scores. Litigation appeared to be a significant predictor of subjective memory problems but
there was no interaction with treatment. Effort thus seems to be a more important predictor of treatment success or failure than involvement in a litigation or financial compensation procedure.

Regarding the third research question as to which of the treatments was more effective, we can conclude that at Post 1, patients having received cognitive strategy training had better scores on the memory tests than patients in the psychosocial therapy group, and they rated their cognitive functioning as improved. On the other hand, patients in the psychosocial therapy group were more satisfied. To put it bluntly: patients feel more satisfied after PST, but benefit more from cognitive strategy training. At Post 2, both groups having received both kinds of therapy, these differences disappeared. So there was no evidence that the order in which the treatments were given had any effect on treatment outcome.

Regarding the fourth research question as to the proportion of patients with clinical relevant improvement, the difference between the sufficient and insufficient effort group was striking. In the insufficient effort group there was not a single patient with significant improvement. The proportion of 32% of patients with relevant improvement is not high, but nevertheless encouraging, in view of the absence of other treatment evidence.

Recommendations for future research and clinical practice

What are the implications of this study for research and clinical practice? Although it cannot yet be concluded that this new treatment can be advised as a practice guideline for patients with diagnosed CTE, there are several indications that it may be valuable for CTE patients, especially for those exerting sufficient effort. In future studies it is important to use or develop questionnaires that are more responsive to individual changes in psychological and social functioning. Further development of the CTE-specific Target Complaint List might be useful. In our research design we only crudely evaluated changes in everyday life, and only for the treatment group. It would be important to focus more attention on this subject in future evaluation studies, especially including more objective measures of social relations and reintegration, like family interactions and activities, (part time) return to work, and medical consumption. In this treatment, every patient formulated an individual goal. It would be very important to focus attention on an adequate measurement of these individual treatment goals in future evaluation studies, for example by goal attainment scaling techniques.
The results of this study do also have implications for the selection of patients. It can be advised to use methods to detect insufficient effort on neuropsychological tests, when selecting patients for a cognitive rehabilitation programme. Which treatment programme would be useful for patients exerting insufficient effort remains a topic for further study. It was somewhat disappointing that especially the psychosocial therapy, focusing on challenging inadequate illness cognitions and on developing more active coping styles, was not as effective as expected for subjects exerting insufficient effort. The development of adapted treatment programs focusing on inadequate illness behaviour would be very important for this group.
References


