Which Pain Coping Strategies and Cognitions Are Associated with Outcomes of a Cognitive Behavioral Intervention for Neuropathic Pain after Spinal Cord Injury?

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Background: Chronic neuropathic pain is one of the most difficult problems to manage after spinal cord injury (SCI). Pain coping and pain cognitions are known to be associated with the patient's experience of neuropathic pain, but they have not been studied in the context of a cognitive behavioral treatment program for coping with neuropathic pain after SCI. **Objective:** To explore associations of pain coping strategies and cognitions with pain intensity and pain-related disability and changes in pain coping strategies and cognitions with changes in pain intensity and pain-related disability. **Methods:** Forty-seven persons who participated in the CONECIS (COping with NEuropathic SCI pain) trial completed questionnaires before the intervention (baseline) and 3 months after of the intervention (follow-up). **Results:** Compared to baseline, participants showed more favorable scores on 2 pain coping scales (Pain Transformation and Worrying), the subtotal score Active Coping, and 3 pain cognitions scales (Catastrophizing, Optimism, and Reliance on Health Care) at follow-up. Baseline Reliance on Health Care was associated with change in pain intensity and pain-related disability. Change in Catastrophizing and change in Restriction cognitions were associated with change in pain-related disability. **Conclusions:** Our findings suggest that modifying pain coping strategies and cognitions by a cognitive behavioral intervention for chronic neuropathic pain after SCI may have some beneficial effects on pain intensity and pain-related disability. Further research should show how dysfunctional pain coping strategies and cognitions can be most effectively modified. **Key words:** chronic pain, cognitive behavioral therapy, pain intensity, pain-related disability, psychological

Pain is a significant problem for many persons with spinal cord injury (SCI). About 65% to 85% of them report the presence of pain,^{1,2} and around a third of them experience severe pain.¹ Chronic neuropathic SCI pain (CNSCIP) at the level of the injury is present in 41% of all persons at 5 years after SCI, and 34% of them have CNSCIP below the level of injury.¹ Pain contributes to poorer rehabilitation outcomes and reduced quality of life,³ and it is one of the most difficult problems to manage, even in the presence of other problems that interfere with daily life.⁴ The long-term prognosis for pain resolution following SCI is poor.^{1,3} Many persons affected report that SCI pain persists or even worsens over time.⁵

Although biomedical changes associated with the disability itself may play a primary role in the presence and severity of pain, psychosocial factors, such as attitudes and cognitions, coping behavior, and the social environment play a major role in the perceived intensity and impact of pain in many persons with physical disabilities and chronic pain.⁶⁻¹⁰ Psychosocial factors may perpetuate chronic pain¹¹ and predict pain and functioning in persons with physical disabilities.⁹ Several studies identified pain cognitions such as catastrophizing^{7,12-15} and pain coping strategies such as passive coping^{7,14} as predictors of increased pain

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intensity and pain-related disability. Interventions to modify dysfunctional pain cognitions and pain coping strategies therefore hold promise for persons with CNSCIP.^{7,16} In particular, cognitive behavior therapy (CBT) has been used for a variety of chronic pain problems and is expected to change patient cognitions and coping strategies.¹⁷

Studies to investigate the effect of CBT-based treatment programs for persons with chronic SCI pain have been rare,^{18,19} especially among persons with CNSCIP.²⁰ Although these studies showed some promising results, in terms of changes in pain intensity and life satisfaction,²⁰ anxiety,^{18,19,20} and depression,^{18,20} they failed to prove the effectiveness of CBT as compared to placebo or usual care.

Changes in pain coping strategies and cognitions were not examined,²⁰ or associations with changes in the outcome measures were not studied.^{18,19} Kennedy and colleagues¹⁸ found no changes in coping strategies compared to controls, whereas Nicholson Perry and colleagues¹⁹ found a significant improvement in pain catastrophizing in the treatment group but no differences with the usual care group.

In any case, persons vary in their response to CBT, and little is known about patient characteristics that predict or moderate the effects of CBT on patient outcomes following SCI.^{17,21} A better understanding of how baseline pain coping strategies and cognitions, and changes in such strategies and cognitions, are associated with treatment outcomes could help direct limited resources to those persons most likely to benefit, match patients with the most appropriate treatments, and tailor interventions to patient characteristics.¹⁷

Recently, Heutink and colleagues^{22,23} reported the design and results of the CONECSI (Coping with NEuropathic Spinal cord Injury pain) trial, the first randomized controlled trial (RCT) on the effectiveness of a multidisciplinary CBT program for coping with CNSCIP compared with a waiting list control group. No significant intervention effects on the primary outcomes pain intensity and pain-related disability were found. There was a trend ($P = .059$) toward an effect of the intervention on pain-related disability immediately after the intervention, and the intervention group showed

a significant decrease in pain intensity and pain-related disability that was not found in the control group. Significant treatment effects were found on the secondary outcomes anxiety and participation in activities.²³

The current study utilized data from the CONECSI trial to explore associations between baseline pain coping strategies and pain cognitions on the one hand and pain intensity and pain-related disability on the other, and to study the hypothesis that changes in pain coping strategies and pain cognitions are associated with outcome variables after CBT intervention. The specific aims were to explore changes in pain coping strategies and cognitions during the CBT intervention and to explore (a) associations between baseline pain coping strategies and cognitions and baseline pain and pain-related disability, (b) associations between baseline pain coping strategies and cognitions and the changes in pain and pain-related disability during the RCT, and (c) associations between changes in pain coping strategies and cognitions and changes in pain intensity and pain-related disability during the RCT. We hypothesized that more catastrophizing,^{7,12-15} less active coping, and more passive coping^{7,14} at baseline would be associated with higher pain intensity and pain-related disability at baseline and greater changes in pain intensity and pain-related disability. Further it was hypothesized that favorable changes in pain coping strategies and pain cognitions would be associated with favorable changes in pain intensity and pain-related disability.

Methods

Study design

In the unblinded CONECSI trial, participants were randomly allocated to the intervention group or to the waiting list control group²² within 4 participating rehabilitation centers in different parts of The Netherlands. The control group was invited for the same intervention after waiting for 6 months. Both groups were tested before the intervention (baseline) and 3 months after the end of the intervention (follow-up). For the purpose of this study, the data of both groups

were merged, leaving a single group with pre- and postintervention tests.

The Medical Ethics Committees of the University Medical Center Utrecht and the participating rehabilitation centers approved the study protocol. Written informed consent was obtained from each participant.

Participants and procedure

An extensive description of the study protocol has been published elsewhere.²² Persons with SCI who had been treated at 1 of the 4 rehabilitation centers, were at least 18 years old, and had been discharged from first SCI rehabilitation at least 1 year previously were invited to participate. Other inclusion criteria were the following: the main pain type was neuropathic pain, the neuropathic pain had persisted for at least 6 months, and the neuropathic pain intensity score in the previous week was at least 40 on the 0 to 100 scale of the Chronic Pain Grade (CPG) questionnaire.²⁴ Exclusion criteria were the following: SCI was caused by metastatic tumor, previous CBT was received for coping with pain after SCI, inability to function in a group due to psychopathology, and insufficient command of Dutch. Data were complete for 61 persons, but 14 of them were excluded from the current analyses because they had dropped out before the start of the intervention, so that no change in pain coping strategies or pain cognitions was to be expected. Of these 14, 4 persons could not participate because of health problems not related to the intervention, and 10 persons withdrew for practical reasons (eg, they could not get a day a week off from work to follow the course). The analyses in the current study were limited to the 47 participants who did participate in the CBT program.

Intervention

The CBT program comprises educational, cognitive, and behavioral elements targeted at coping with CNSCI and consists of 10 three-hour sessions over a 10-week period and a follow-up session 3 weeks after the 10th session. Participants received a course book containing

information on all sessions, as well as reading texts and homework assignments. The trainers received a manual and the same course book as the participants. Two theoretical models were used in the program to focus on coping and cognitions: the BioPsychoSocial (BPS) model²⁵ and the Activating event-Belief-Consequence (ABC) model.²⁶ The BPS model was used to focus on the influence of psychosocial factors on the experience of pain; to clarify the relationship between biological, psychological, and social factors and pain; and to clarify the importance of maintaining a balance between capacity and load. The ABC model was used for cognitive restructuring. These 2 models were explained in educational sessions and in guided group discussions using fictitious cases. The models were also applied in sports workshops and homework assignments. The content of the program is described in more detail in **Appendix 1**.

Measures

Pain type

Before inclusion, participants were asked to indicate their pain types (musculoskeletal pain; visceral pain; spasm pain; neuropathic pain below, above, or at injury level; pain from syringomyelia; and non-SCI-related pain). The questionnaire contained descriptions of the different types of pain with examples to help participants indicate their type. The questions of the DN4²⁷ were used to check for the presence of neuropathic pain. The DN4 questionnaire is a validated instrument with a specificity for detecting neuropathic pain of 82.9% and a sensitivity of 89.9%.²⁷ If there was any doubt about the presence of neuropathic pain, the physiatrist was asked for information. Participants were also asked to indicate for how long they had had neuropathic pain.

Pain intensity and pain-related disability

Pain intensity and pain-related disability were measured with the CPG questionnaire.²⁴ Participants rated their pain intensity on a 0 to 10 numeric rating scale (NRS) for average pain, worst pain, and current pain (pain intensity

score) and rated the degree of pain interference with daily activities, work/household activities, and recreational/social activities (pain-related disability score). The internal consistency of the pain intensity score and the pain-related disability score in an SCI population is excellent (Cronbach's α of 0.95 and 0.94, respectively).⁷ In the present study, the CPG was adapted to ask about neuropathic pain in the previous week instead of the previous 6 months. The CPG scores at inclusion and at baseline were combined, and the mean score was used as the baseline score.

Pain coping

The Pain Coping Inventory (PCI) consists of 33 items measuring cognitive and behavioral pain coping strategies. Items are rated on a 4-point Likert scale ranging from 1 (*rarely or never*) to 4 (*very often*) in terms of the frequency with which strategies are applied when dealing with pain. Two subtotal scores can be computed: Active Coping and Passive Coping. The Active Pain Coping subtotal score consists of the scales for Pain Transformation (eg, I pretend the pain is not there), Distraction (eg, I look for distraction by focusing on reading, music, a television program, etc), and Reducing Demands (eg, I continue my activities, but at a slower pace). The Passive Pain Coping subtotal score consists of the scales for Retreating (eg, I retreat to a quiet setting), Worrying (eg, I think the pain will get worse), and Resting (eg, I will stop my activities). All scales are reliable,²⁸ and the internal consistency for the 6 scales ranges from 0.62 to 0.79.²⁹

Pain cognitions

The Pain Cognition List-2003 (PCL) consists of 39 items. Each item presents a specific pain cognition statement, for example, "My thoughts are always concentrated on the pain." Items are rated on a 5-point Likert scale ranging from 1 (*totally disagree*) to 5 (*totally agree*).³⁰ The questionnaire consists of 5 subscales: Catastrophizing (eg, I think I was stuck by fate), Restrictions (eg, I think the pain is a warning that I should slow down), Optimism (eg, I think I have learned to deal with the pain),

Internal Control (eg, I know a way to reduce my pain a little), and Reliance on Health Care (eg, I have firm confidence in medical science). The scales vary in length (from 4 to 16 items) and internal consistency (Cronbach's α of 0.64 to 0.88 with an average of 0.75), and correlations between subscales range from 0.00 to 0.45. The validity of these subscales is supported by the meaningful pattern of correlations with other relevant constructs.³¹ The stability of the PCL is satisfactory with Pearson correlation coefficients across a time interval of 2 weeks ranging from 0.51 (Reliance on Health Care) to 0.73 (Catastrophizing), with an average of 0.64.³¹

Statistical analyses

Descriptive statistics were computed, using mean (SD) and when appropriate median (interquartile range [IQR]). Nonparametric statistics were used for the further analyses, because of the relatively small sample size. Wilcoxon signed-rank tests were performed to analyze changes between baseline and follow-up. Spearman correlation coefficients were used to study the 3 hypotheses (a) associations between baseline PCI and PCL scores and baseline scores of pain intensity and pain-related disability, (b) associations between baseline PCI and PCL scores and change scores (pre-post difference) for pain intensity and pain-related disability, and (c) associations between change scores (pre-post difference) for the PCI and PCL scores and change scores (pre-post difference) for pain intensity and pain-related disability. In view of the small sample size, no multivariate linear regression analyses were performed. Data analysis was performed using SPSS 16.0. Significance level was set at a *P* value less than .05. No correction for multiple testing was performed, because of the exploratory nature of these analyses.

Results

Participant characteristics

More men than women participated in this study, and the majority had a traumatic injury, an incomplete paraplegia, and were living with

Table 1. Baseline characteristics

Characteristics	n	%
Gender		
Male	31	66.0
Female	16	34.0
Marital status		
Married/living with a spouse	38	80.9
Living alone	9	19.1
Education		
Low ^a	15	31.9
Intermediate ^b	19	40.4
High ^c	13	27.7
Cause of injury		
Traumatic	36	76.6
Nontraumatic	11	23.4
Lesion level		
Paraplegia	31	65.9
Tetraplegia	16	34.1
Lesion completeness		
Motor incomplete	28	59.6
Motor complete	19	40.4
Pain types		
Musculoskeletal	21	44.7
Visceral	11	23.4
Neuropathic above	5	10.6
Neuropathic at level	23	48.9
Neuropathic below	40	85.1
Spasm	11	23.4
Syringomyelia	5	10.6
Other	2	4.3

^aIncomplete primary education, primary school, junior secondary technical education.

^bGeneral secondary education (lower level), vocational secondary education.

^cGeneral secondary education (higher level), higher vocational secondary education (bachelor), master.

a spouse (**Table 1**). The mean (SD) age of the 47 participants at the start of the study was 58.0 (11.8) years. The median time between the onset of SCI and inclusion was 7.3 years (range, 1.4-23.7), and the median duration of CNSCIP at inclusion was 6.2 years (range, 1.3-23.7). The mean (SD) number of self-reported pain types was 2.5 (1.4). The median (IQR) pain intensity scores and the pain-related disability scores on the CPG were 70 (58.3-76.7) and 50 (23.3-63.3) at baseline, and 70 (56.7-80.0; $P = .104$) and 40 (16.7-66.7; $P = .088$) at 3 months follow-up, respectively. None of the

demographic or injury-related variables were significantly associated with the baseline scores or with the changes in pain intensity or pain-related disability.

Changes in pain coping strategies and cognitions

Favorable changes in pain coping strategies and pain cognitions between baseline and follow-up were found for 6 out of 13 scales: the Pain Transformation subscale (increase), the Active Coping subtotal score (which includes Pain Transformation) (increase), the Worrying subscale (decrease), and the subscales for Catastrophizing (decrease), Optimism (increase), and Reliance on Health Care (decrease) (**Table 2**).

Baseline pain coping strategies and cognitions and pain outcomes

At baseline, higher scores on 3 of the coping subscales (Retreating, Worrying, and Resting), on the subtotal score for Passive Coping, and on the cognition subscale for Catastrophizing were associated with higher baseline pain intensity. Higher baseline scores on the coping subscales for Retreating and Resting, the subtotal score for Passive Coping, and the cognition subscales for Catastrophizing and Restrictions were associated with higher baseline pain-related disability (**Table 3**).

Baseline pain coping strategies and cognitions and changes in pain outcomes

Only a higher baseline score for Reliance on Health Care was associated with a larger decrease in pain intensity and pain-related disability between baseline and follow-up (**Table 3**).

Changes in pain coping strategies and cognitions and changes in pain outcomes

No significant correlations were found between changes in coping strategies and cognitions and changes in pain intensity. Favorable changes in the cognition subscales for Catastrophizing and Restrictions were significantly correlated with favorable changes in pain-related disability (**Table 4**).

Table 2. Median coping and cognition scores and comparison of pre- and postintervention coping and cognition scores (N = 47)

Coping and cognition scales	Pre Median (IQR)	Post Median (IQR)	Pre-Post P value
Pain Coping			
Active Coping	25.0 (22.0-27.0)	26.0 (23.0-29.0)	.044*
Pain Transformation	7.0 (6.0-9.0)	8.0 (6.0-10.0)	.038*
Distraction	11.0 (9.0-12.0)	11.0 (9.0-13.0)	.084
Reducing Demands	6.0 (5.0-7.0)	7.0 (5.0-8.0)	.491
Passive Coping ^a	40.0 (35.0-49.0)	40.0 (34.0-50.0)	.182
Retreating	12.0 (10.0-16.0)	13.0 (10.0-16.0)	.660
Worrying ^a	17.0 (14.0-22.0)	17.0 (14.0-21.0)	.045*
Resting ^a	11.0 (9.0-14.0)	11.0 (9.0-13.0)	.265
Pain cognitions			
Catastrophizing ^a	43.0 (32.0-52.0)	37.0 (29.0-48.0)	.003**
Restrictions ^a	23.0 (17.0-27.0)	20.0 (18.0-25.0)	.237
Optimism	26.0 (23.0-29.0)	27.0 (25.0-30.0)	.015*
Internal Control	15.0 (13.0-16.0)	14.0 (12.0-18.0)	.342
Reliance on Health Care ^a	12.0 (11.0-15.0)	12.0 (10.0-13.0)	.002**

Note: IQR = interquartile range.

^aDecrease in score indicates change in a favorable direction.

*Statistically significant at the .05 level (2-tailed).

**Statistically significant at the .01 level (2-tailed).

Table 3. Spearman correlations between baseline coping and cognitions and pain intensity and pain-related disability

Baseline coping and cognition scales	Pain intensity		Pain-related disability	
	Baseline ^a	Change ^b	Baseline ^a	Change ^b
Pain coping				
Active Coping	.02	.12	.01	.14
Pain Transformation	.01	-.03	.21	-.02
Distraction	-.03	.09	-.03	.14
Reducing Demands	-.01	.13	-.09	-.03
Passive Coping ^c	.48***	-.08	.50***	.18
Retreating	.35*	.03	.44**	.20
Worrying ^c	.35*	-.19	.29	.03
Resting ^c	.38**	.01	.40**	.08
Pain cognitions				
Catastrophizing ^c	.44**	-.19	.35*	.04
Restrictions ^c	.09	-.07	.34*	.11
Optimism	-.11	.24	-.28	.27
Internal Control	-.06	.21	-.06	.14
Reliance on Health Care ^c	.00	.40**	-.08	.35*

^aBaseline is preintervention.

^bChange is the difference between baseline and follow-up scores.

^cDecrease in score indicates change in a favorable direction.

*Association is significant at the .05 level (2-tailed).

**Association is significant at the .01 level (2-tailed).

***Association is significant at the .001 level (2-tailed).

Table 4. Spearman correlations between change in coping and cognitions and pain intensity and pain-related disability

Change in coping and cognition scales ^a	Change in pain intensity ^a	Change in pain-related disability ^a
Pain coping		
Active Coping	-.26	.02
Pain Transformation	-.20	.10
Distraction	-.24	.02
Reducing Demands	.15	.15
Passive Coping ^b	-.06	.29
Retreating	.02	.13
Worrying ^b	.02	.28
Resting ^b	-.15	.19
Pain cognitions		
Catastrophizing ^b	.24	.39**
Restrictions ^b	.18	.31*
Optimism	-.25	-.04
Internal Control	-.10	-.17
Reliance on Health Care ^b	.04	-.01

^aChange is the difference between baseline and follow-up scores.^bDecrease in score indicates change in a favorable direction.

*Association is significant at the .05 level (2-tailed).

**Association is significant at the .01 level (2-tailed).

Discussion

This study explored the associations between pain coping strategies and cognitions on the one hand and pain intensity and pain-related disability on the other hand, all measured in the context of a multidisciplinary CBT program for CNSCIP. We found baseline pain coping strategies and pain cognitions to be associated with baseline pain intensity and pain-related disability. Only the baseline cognition Reliance on Health Care was associated with changes in pain intensity and pain-related disability. Changes in the cognitions Catastrophizing and Restrictions were associated with changes in pain-related disability. Hence, participants with a high degree of Reliance on Health Care and showing changes in Catastrophizing and Restrictions may have benefited most from the intervention.

Little is known about the way pain intensity and pain-related disability change after completion of multidisciplinary pain programs and what factors are associated with these changes.²¹ In contrast with other studies of CBT in the field of SCI

pain, which reported change in catastrophizing cognitions only,^{18,19} we found favorable changes in 2 out of 6 coping strategies (an increase in Pain Transformation and a decrease in Worrying), as well as in 1 out of 2 coping subtotal scores (an increase in Active Coping), and 3 out of 6 pain cognitions (a decrease in Catastrophizing, an increase in Optimism, and a decrease in Reliance on Health Care). Although intensive CBT (more than 100 contact hours) has been proposed for chronic back pain patients,³² our results suggest that pain coping strategies and cognitions in persons with CNSCIP may already change during a relatively brief CBT intervention and might be associated with (changes in) pain intensity and pain-related disability. However, other aspects of this intervention may have contributed to its outcomes, for example, advice about lifestyle and sports workshops. Changes in pain coping strategies and cognitions may also have been prompted by contacts with other persons with CNSCIP, for example, contact with peers with more pain may have caused a change of perspective.

Pain cognitions

Only the baseline score for Reliance on Health Care was associated with change in the outcome measures. This is an unexpected result, as persons who rely very much on health care have hope for pain relief but expect others to deliver the necessary effort. Their cognitions are characterized by an external locus of control, with denial of their share in the process and a focus on health care providers for help.³¹ External control is usually considered negative, being associated with higher pain-related disability and poorer health and well-being.⁷ Raichle and colleagues¹⁵ also found that beliefs that medications are suitable for treating chronic pain, that a medical cure for one's pain exists, and that others should offer assistance in response to pain behaviors (solicitude) were negatively related to functioning. However, it is possible that participants with higher scores for Reliance on Health Care had more positive expectations of the intervention, and it has been shown that positive expectations of participants are related to favorable outcomes.³³⁻³⁵ It would be interesting to assess participants' pre-existing expectations of the

intervention in future studies to test directly the effects achieved through expectancy mechanisms.

Correlations were found between baseline Catastrophizing and baseline pain intensity and baseline pain-related disability. This is in agreement with cross-sectional studies among persons with SCI and persistent pain, showing strong associations between catastrophizing and pain severity,^{7,12,13,36,37} physical functioning,^{12,14,15,36-38} and psychological functioning.^{7,12,14,15,36-38}

A decrease in catastrophizing was not associated with a decrease in pain intensity, but was associated with a decrease in pain-related disability. One longitudinal study in an SCI sample by Hanley and colleagues³⁹ found changes in catastrophizing over 6 months to be significantly associated with changes in pain-related disability. In a systematic review of chronic pain in persons with physical disabilities, Jensen and colleagues⁹ found a moderate association of catastrophizing with pain severity but stronger associations with physical functioning. These results concur with ours. It is possible that participants in the present study who improved in terms of catastrophizing did not perceive less pain, but learned from the intervention to become more active despite their CNSCIP.

We found the cognition subscale for Restrictions at baseline to be associated with baseline pain-related disability, and we found changes in Restrictions to be associated with changes in pain-related disability. Persons with a high score on the cognition subscale for Restrictions avoid physical activity and experience little control over their situation.³¹ A study by Raichle and colleagues¹⁵ also found control (belief in one's own control over pain) to be significantly associated with physical and psychological functioning.

Pain coping

We found baseline scores for passive coping, but not those for active coping, to be associated with baseline pain intensity and pain-related disability. Other studies have found passive coping responses (like resting, guarding) to be associated with physical functioning.^{14,15,21} Cross-sectional SCI studies found that, in addition to passive coping, the following coping strategies

were associated with more favorable outcomes: acceptance (eg, acceptance of disability, acceptance of SCI),^{37,38,40} reinterpreting pain sensations, coping self-statements, ignoring pain sensations,¹² task persistence,^{14,15} and relaxation and exercise.³⁹ Pain coping subscale scores at baseline in our study were not associated with changes in pain severity or pain-related disability during the intervention. Although some changes in coping scores during the intervention were found, these changes were not associated with change in either pain severity or pain-related disability. The reason for this is unclear and warrants further investigation.

Limitations

Due to the relatively small number of participants in this study, only correlations of at least 0.30 were statistically significant, and no multivariate statistics could be used. Twenty out of 91 correlations were significant. Although this is more than can be expected by chance alone (5/100), some of these might be attributed to chance. The results of this study should therefore be considered exploratory and require further confirmation. Nevertheless, this study has provided useful data, because little is known about change in coping strategies and cognitions in response to CBT for CNSCIP. The analyses were conducted without a control group, so do not permit causal inference. There is therefore a need for further research using larger samples with a control group to study the effectiveness of CBT-based interventions and to investigate changes in pain cognitions and pain coping strategies in relation to the treatment effects of CBT in this population.

Another limitation of this study is the self-report nature of the neuropathic pain, completeness, and level of injury variables. However, all persons were known to the physiatrist, and if there was any doubt about the presence of neuropathic pain or the injury characteristics, the physiatrist was asked for further information.

Although the instruments used in the present study were valid and commonly used in The Netherlands, other studies on SCI pain used different instruments to determine pain coping strategies and cognitions, which affects the comparability with other studies.

Clinical implications

Changes in pain coping strategies and pain cognitions in a favorable direction between baseline and follow-up were found for 6 out of 13 scales, suggesting that CBT of relatively limited intensity and duration might be useful to change pain cognitions and coping responses in persons with CNSCIP. Reliance on health care was associated with a decrease in pain intensity and pain-related disability, suggesting that this pain cognition might predict the effectiveness of CBT for CNSCIP. The results of this study suggest that CBT programs should aim at decreasing the cognitions of catastrophizing, restrictions, and reliance on health care and decreasing passive coping to maximize the effectiveness of this type of intervention.

Conclusion

This explorative study has provided new information on the effects of a CBT program on pain coping strategies and pain cognitions in persons with CNSCIP. Our results suggest that pain coping strategies and cognitions may change

during a brief CBT intervention, which could have some beneficial effect on pain intensity and pain-related disability in persons with CNSCIP.

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APPENDIX 1

Main Contents of the 11 Sessions of the Program

Sessions	Main contents
Session 1	Information on BPS model Information on SCI and CNSCIP Goal setting
Session 2 Buddies	Information on ABC model (ABC) Information by physiatrist specialized in SCI rehabilitation
Session 3	Expansion of ABC model (ABCDE) Information by physiatrist specialized in chronic pain rehabilitation Information on movement and pain
Session 4	Sports workshop Evaluation of sports workshop with ABC model
Session 5	Information on assertiveness and communication about pain Information by role model Introduction to relaxation exercises Evaluation of goals
Session 6	Information on pain, mood, and stress Workshop on relaxation exercises Evaluation of workshop on relaxation exercises
Session 7	Sports workshop Evaluation of sports workshop with BPS model and ABC model
Session 8 Buddies	Information on social aspects and partner, family, and friends Workshop on relaxation exercises Evaluation of workshop on relaxation exercises
Session 9	Sports workshop Evaluation of sports workshop with ABC model Workshop on relaxation exercises Evaluation of workshop on relaxation exercises
Session 10	Summary and recapitulation of intervention contents Evaluation of goals Application in everyday life
Session 11	Summary of intervention contents Evaluation of intervention

Note: ABC = Activating event-Belief-Consequence; BPS = BioPsychoSocial; CNSCIP = chronic neuropathic spinal cord injury pain; SCI = spinal cord injury.