

## The effect of multidisciplinary rehabilitation treatment on spouses of patients with non-specific chronic pain

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### Abstract

**Background:** Research has revealed the influence of spouses on the complaints of patients with non-specific chronic pain, and vice versa. The effect of multidisciplinary rehabilitation treatment (MRT) on patients' spouses has not been studied yet. **Methods:** Prospective cohort study. Patients with chronic pain admitted to an outpatient rehabilitation treatment and their spouses filled out questionnaires at pre-treatment (T0), start of treatment (T1), end of treatment (T2), and three months after treatment (T3). Primary outcome measure was psychological distress of the spouses (SCL-90-R). Secondary outcome measures were life satisfaction (Lisat-9), health-related quality of life (RAND-36), catastrophizing (PCS), self-efficacy (DGSES) and strain (CSI) of spouses. **Results:** The analysis included 39 couples. Mean scores (SD) of the spouses on the SCL-90-R at T0–T3 were 112 (SD 21), 119 (SD 27), 114 (SD 33) and 107 (SD 17), respectively (differences non-significant). The PCS scores of the spouses and their mean scores on the social domain of the RAND-36 improved significantly, as did the score for the physical domain of the RAND-36 before treatment and the DGSES score after treatment. No differences were found in the spouses' scores on the CSI and most Lisat-9 or other domains of the RAND-36. The patients benefited from the treatment, with significant changes in scores on the SCL-90-R and most domains of the RAND-36. **Conclusions:** Spouses had favourable changes in their scores on social life and catastrophizing tendency. Our study also confirms that patients with non-specific chronic pain benefit from MRT.

**Keywords:** chronic pain musculoskeletal pain, multidisciplinary rehabilitation, spouses

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### **I Introduction**

People with chronic musculoskeletal pain (CMP) have lower life satisfaction and quality of life<sup>1</sup> compared to people without chronic pain, and are more likely to suffer from psychological distress than persons in the general population. It is known that the spouses of patients with CMP influence the patients. Research indicates that solicitous behaviour<sup>2,3,4</sup> as well as punitive behaviour<sup>5</sup> by spouses cause more pain and disability in patients, and can even have a negative impact on their use of medication<sup>7</sup>. More recently it became clear that the influence also works the other way round: spouses of patients with chronic pain also experience consequences. They have higher levels of distress<sup>7,8</sup>, fear and depression<sup>9,10,11,12</sup> and have lower scores on instruments measuring marital satisfaction<sup>8</sup>. Previous research has demonstrated that the level of pain and limitations perceived by the patient, as well as their spouses' estimation of those levels, correlate with the consequences experienced by the spouses<sup>8,9</sup>. These consequences are also influenced by their level of catastrophizing and their perceived sense of helplessness<sup>9</sup>.

Various programmes for the treatment of chronic pain have been developed. Studies<sup>13</sup> have shown that multidisciplinary rehabilitation treatment (MRT) of patients with CMP is effective in reducing the consequences of the CMP for the patients. To our knowledge, no research has been performed to explore the effect of MRT programmes on the spouses of patients with

chronic pain. The aim of our study was to examine whether a multidisciplinary rehabilitation programme had a positive effect on the wellbeing of the spouses as well.

### **2 Methods**

#### *2.1 Design*

Prospective cohort study.

#### *2.2 Participants*

Patients with chronic musculoskeletal pain who had been admitted to outpatient rehabilitation treatment between November 2013 and May 2015 and their spouses were invited to participate in the study. Participants were recruited from five rehabilitation treatment sites of the Revalidatie Friesland rehabilitation centre and from the Centre for Rehabilitation of the University Medical Center Groningen at Beatrixoord, Haren, The Netherlands.

The inclusion criteria for participation in the present study were: patient having non-specific musculoskeletal pain lasting longer than 3 months, being aged over 18 years and having been admitted to an outpatient rehabilitation treatment; the relationship between patient and spouses had to have existed for at least 1 year, and have involved them living together for at least the past 6 months.

Exclusion criteria were insufficient knowledge of the Dutch language, co-morbidity with severe negative consequences for physical functioning and

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current major psychiatric disorder (active psychosis, severe depression, addiction, etc.) of either patient or spouse.

A power calculation was performed for the primary outcome measure, the SCL-90-R. With an effect size of 0.50, a power of 0.80 and alpha of 0.05, 69 couples were required for the desired power. Estimating a loss to follow-up of approximately 10%, we assumed we needed 75 couples.

### *2.3 Treatment*

Patients received usual care, which was based on cognitive behavioural concepts<sup>13</sup>. Programme goals depended on the patient's characteristics, complaints and aims. Patients' aims generally included reduction of activity limitations, participation problems and, if relevant, psychological distress. The most commonly used treatment modalities were teaching ergonomic principles, graded activity, and behavioural therapy. Treatment was mostly provided on three days a week for one to four hours a day, for three months. Depending on the local programme and the specific problems of the patients, the spouses were involved in the treatment to a greater or lesser extent.

### *2.4 Measurements*

#### *2.4.1 Participants' characteristics*

The following characteristics of both patients and spouses were assessed, by means of a self-constructed questionnaire and by investigating the medical files from the first consultation: sex, age, duration of the relationship; duration, location and intensity of the patients' pain (measured by

the Numeric Rating Scale (NRS) range 0-10); and whether or not the spouses experienced pain themselves. If the latter was the case, the duration and intensity of their pain were assessed with the NRS as well.

#### *2.4.2 Outcome measures*

Primary outcome measure was psychological distress, measured with the *Symptom Checklist-90-R* (SCL-90-R)<sup>14</sup>. Psychological distress was chosen as the primary outcome measure because increased levels of distress among spouses of patients with chronic pain were found<sup>7,8,11</sup>. It was suggested<sup>11</sup> that this could be favourably influenced by treating the patients. In the SCL-90-R, subjects are instructed to rate 90 distress symptoms on a 5-point Likert scale ranging from 'not at all' (1) to 'extremely' (5). The total score (90-450) of the SCL-90-R ('psychoneuroticism') represents a global measure of distress over the last week. A higher score corresponds with more distress.

Secondary outcome measures were the various domains of life satisfaction, health-related quality of life and strain perceived by the spouses, measured with the Life Satisfaction Questionnaire (Lisat-9)<sup>15</sup>, RAND-36 item Health Survey (RAND-36)<sup>16,17</sup> and the Caregiver Strain Index (CSI)<sup>18</sup>, respectively.

*Lisat-9* includes one question about general life satisfaction and 8 questions about domain-specific life satisfaction, such as 'vocational situation' (including housekeeping), 'partner relationship' and 'family life'. All nine questions are scored

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on 6-point Likert scales (1=very dissatisfied, 6=very satisfied).

The *RAND-36* consists of 36 questions, and measures 8 dimensions: physical functioning, social functioning, physical role restriction, emotional role restriction, mental health, vitality, pain and general. The total score ranges between 0 and 100, with a higher score indicating a better state of health or functioning or less pain. Since we used the NRS for measuring pain, we did not use the 'pain' domain of the *RAND-36* in the analysis.

The *CSI* consists of 13 yes/no questions and measures possible problems relating to caring for a significant other. The higher the score, the higher the strain on the caregiver. This questionnaire was only filled out by the spouses.

### *2.4.3 Other measures*

These measures were assessed to examine factors which might explain changes in outcome variables.

- The *Dutch General Self Efficacy Scale (DGSES)*<sup>19</sup> consists of 10 questions measuring self-efficacy. Each question is scored on a 4-point Likert scale, ranging from absolutely incorrect (1) to absolutely correct (4). A higher score means a higher degree of self-efficacy.
- The *Pain Catastrophizing Scale (PCS)*<sup>20</sup> measures the degree of catastrophic thoughts about pain. The respondent indicates to which degree a particular

statement applies to him or her, ranging from not at all (0) to always (4). Summation of the scores on the 13 questions gives a total score for the degree of catastrophizing<sup>21</sup>.

- Involvement of the spouse: the intensity of contact between spouses and team members and the spouses' perceived involvement with the treatment was measured by a self-constructed questionnaire.

### *2.5 Study procedure*

Measurements took place at four moments: at inclusion in the study (T0), at the start of the rehabilitation treatment (T1), at the end of the rehabilitation treatment (T2) and 3 months after the treatment (T3). If the time between inclusion and the start of the treatment was shorter than 2 weeks, T0 was skipped. If a patient and/or spouse did not fill out the questionnaire, a reminder was sent by e-mail or post. If they still did not return the questionnaire, the patients or spouses were contacted by phone.

In addition, a short self-constructed questionnaire with questions about the treatment characteristics was sent to the spouse each month between T1 and T2. If the spouse did not return the e-mail or letter, an e-mail reminder was sent or the spouse was contacted by phone.

### *2.6 Ethics*

Patients and spouses both gave written informed consent. In view of the nature of the study the Medical Ethics Committee of the UMCG decided that no approval was needed.

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### *2.7 Statistical analysis*

Descriptive statistics were used to analyse the characteristics of the study sample.

Differences between patients' and spouses' scores at the four moments of assessment were analysed using Generalized Linear Mixed Models (in SPSS, version 22) taking into account the correlated data. If data were not normally or Poisson distributed, or in case of a Poisson distribution including a zero, the data were transformed. It became clear during the analyses that not all data could be transformed to a normal or Poisson distribution, and the Wilcoxon Signed Ranks Test was used for these data. Missing values for the SCL-90, CSI, DGSES and PCS and RAND-36 item scores were replaced by the mean value of the respondent's other item scores (in the RAND-36 for items of that particular domain) except if there were too many missing data (more than 7, 4, 4, 5 and 1-5, respectively (depending on the domain).

A p-value <0.05, two-tailed, was considered significant for all analyses. No Bonferroni correction was applied, because of the explorative nature of our study.

### **3 Results**

#### *3.1 Participants*

The final sample size was reached at the time when the researcher (MIMV) had to terminate the inclusion of participants because of restrictions on the study period. One hundred and twelve couples were asked to participate. After exclusion of 57 couples, 55 couples were included in the study. The most common reasons for exclusion were that couples could not be reached by phone (15), were not willing to participate (9), or did not meet inclusion criteria (12). The latter also included patients who in the end did not start the treatment. After 16 more couples had been excluded because the spouses only filled out one questionnaire during the whole study, 39 couples were included in the final analysis. Of these 39 couples, 27 started at T0, while 12 started at T1 because treatment started within 2 weeks after inclusion. Unfortunately, not all couples filled out all questionnaires, see Table 2. The inclusion period proved too short to enable us to include the intended 75 couples.

Characteristics of the patients and spouses are listed in Table 1.

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	Spouses	Patients
Gender (male/female)	26/13	13/26
Age in years, (SD)	47 (12)	45 (11)
Type of pain 1/2/3/4/5 <sup>a</sup> (%)	-	3/26/41/15/15
Number of spouses with chronic pain	8	-
Duration of pain in years (SD)	12 (9.1) <sup>b</sup>	6.4 (9.3)
Duration of relationship in years (SD)		20 (11)
Duration of living together in years (SD)		17 (11)

Table 1: Baseline characteristics of participants (n=39)

<sup>a</sup> 1: generalized, 2: neck/shoulder/arm, 3: back, 4: extremities, 5: not specified;

<sup>b</sup> of those spouses having chronic pain.

SD=standard deviation

### 3.2 Treatment

Mean duration of the rehabilitation treatment was 16 (SD 4.1) weeks, range 6-24 weeks (1<sup>st</sup> quartile 13, 3<sup>rd</sup> quartile 17.5).

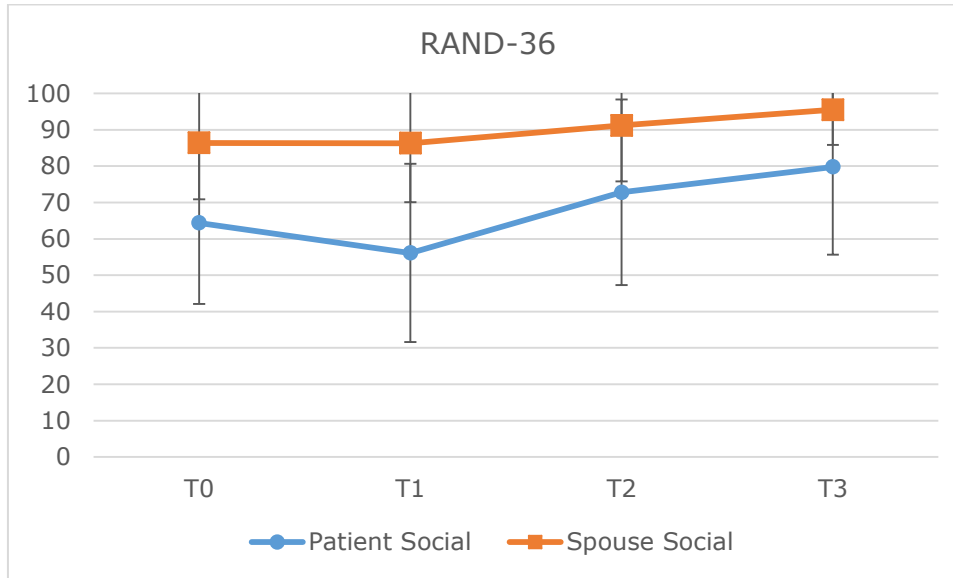
### 3.3 Spouses

The results of the spouses are given in Tables 2a and 3a. No change was found in scores on the SCL-90-R, CSI, or Lisat-9, except for ‘financial situation’ between T0 and T1 (p=0.035) and ‘life as a whole’ between T0 and T2 (p=0.025). The PCS scores decreased significantly during treatment (p<0.05). The effect lasted until the three-months follow-up. Of the various

domains of the RAND-36, only the social functioning domain improved significantly between T0 and T2 (p=0.017), T0 and T3, and T1 and T3 (all p<0.001), T1-2 and T1 and T3 (both p<0.01) (Figure 1). The changes in the physical functioning domain of the RAND-36 and the LISAT-9 financial situation domain between T0 and T1 just reached significance (p=0.046 and 0.035, respectively). On the Lisat-9, the scores for ‘life as a whole’ decreased somewhat between T0 and T1 (not significant) and T0 and T2 (p=0.025). The DGSES scores increased significantly between T2 and T3 (p=0.021).

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Figure 1: changes in scores on the social domain of the RAND-36 between inclusion in the study (T0), start of the rehabilitation treatment (T1), end of the rehabilitation treatment (T2) and 3 months after the treatment (T3).



Of the 39 spouses, 8 had chronic pain themselves at inclusion, with a mean duration of 12 years (range 2-32, SD 9.1) and a mean NRS of 4.4 (SD 1.2). Of these 8 spouses, one no longer had chronic pain during and after the treatment of their partner, i.e. the patient. Of the other 7 spouses, 5 still had pain at the end of treatment, with a mean NRS of 5.2 (SD 1.7), while 2 did not fill out the questionnaires at that point. At the three-months' follow-up, 3 spouses still had chronic pain, with a mean NRS of 3.5 (SD 0.5), while 2 were lost to follow-up.

### 3.4 Patients

The results for the patients are given in Tables 2b and 3b. The patients improved significantly ( $p < 0.001$ ) in terms of SCL-90-R scores, an improvement lasting at least until the three-months' follow-up. The same

was found for the PCS, and the physical functioning, social functioning, physical role restriction, mental functioning and vitality domains of the RAND-36.

The DGSES also increased significantly during treatment. Significant changes occurred in the Lisat-9 for the domains of 'life as a whole' (T1-T2), leisure situation (T0-T2 and T1-T2), vocational situation (T1-T3, T2-T3), sex life (T0-T2), partner relationship (T1-T2) and contact with friends (T1-T2)

No statistically significant change in pain was observed between any of the measurements.

### 3.5 Spouses' involvement

On average spouses and patients talked about the treatment 2.8 (SD 2.0, quartiles 1.5-3.1) times a week. The spouses had

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contact with one or more members of the rehabilitation team 0-1.9 (mean 0.3, SD 0.41, quartiles 0-0.41) times a week. The spouses were usually invited once during the treatment period to attend the treatments and

a consultation with the physician. Their scores for satisfaction with their involvement in the treatment was 7.6 (1.89, quartiles 7-9) out of 10.



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Table 2: Questionnaire scores of the spouses and patients.

**2a Spouses**

	Questionnaire (score range)	T0 (SD;n)	T1 (SD;n)	T2 (SD;n)	T3 (SD;n)
psychological distress	SCL-90 (90-450)	112 (20.8; 23)	119 (27.3; 29)	114 (32.7; 27)	107 (17.4; 21)
strain on spouse's quality of life	CSI (0-13)	3.9 (2.9; 25)	4.5 (2.9; 37)	3.6 (2.7; 31)	3.6 (2.4; 22)
	RAND-36 (0-100)	n=23	n=30	n=27	n=22
	physical functioning	93.7 ( 9.7)	88.4 (22.3;31)	90.0 (14.1)	96.1 (6.3)
	social functioning	86.4 (15.5)	86.3 (16.2)	91.2 (15.4)	95.5 (9.7)
	physical role restriction	91.3 (22.1)	84.2 (33.1)	88.0 (28.1)	94.3 (17.1)
	emotional role restriction	92.4 (22.8;22)	90.0 (27.9)	91.4 (23.7)	97.0 (14.2)
	mental functioning	80.5 (13.6)	75.6 (16.0)	80.9 (15.2)	83.8 (9.4)
	vitality	68.0 (18.4)	65.5 (17.0)	71.1 (16.0)	69.6 (15.2)
	general health	73.0 (18.9)	70.7 (23.0)	75.9 (18.2)	79.3 (13.2)
catastrophizing	PCS (0-52)	5.6 (6.2; 21)	8.3 (6.8; 27)	4.2 (6.9; 27)	6.4 (7.7; 20)
self-efficacy	DGSES (10-40)	33.6 (3.7; 23)	33.2 (3.6; 28)	32.2 (4.2; 25)	34.5 (4.1; 19)
life satisfaction	Lisat-9 (1-6)	n=23	n=20	n=27	n=21
	general	5.0 (0.9)	4.8 (0.8)	4.8 (0.9)	5.0 (0.9)
	self-care ability	5.9 (0.3)	5.7 (0.5)	5.7 (0.5)	5.9 (0.4)
	leisure situation	4.8 (1.0)	4.7 (0.8)	4.9 (0.8)	4.7 (0.7)
	employment situation	4.6 (1.2)	4.4 (1.4)	4.8 (1.1)	5.1 (0.6)
	financial situation	4.7 (1.2)	4.2 (1.2)	4.5 (1.4)	4.4 (1.2)
	sex life	4.6 (0.7)	4.2 (1.3; 19)	4.3 (1.2)	4.3 (1.3)
	relationship with partner	5.5 (0.6)	5.3 (0.7)	5.4 (0.7)	5.1 (0.9)
	family life	5.3 (0.9)	5.1 (0.5)	5.2 (0.8)	5.0 (0.9)
	contacts with friends and acquaintances	4.9 (0.8; 22)	4.8 (0.7)	4.8 (0.7)	5.0 (0.9)

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**2b Patients**

	Questionnaire (score range)	T0 (SD;n)	T1 (SD;n)	T2 (SD;n)	T3 (SD;n)
psychological distress	SCL-90 (90-450)	150 (41.6; 26)	154 (47.9; 35)	135 (39.0; 29)	127 (41.3; 21)
pain in last week	NRS (0-10)	6.4 (1.7;25)	6.4 (1.4)	5.5 (2.4)	5.1 (2.4)
quality of life	RAND-36 (0-100)	n=26	n=35	n=29	n=21
	physical functioning	47.1 (20.6)	48.4 (19.7)	63.6 (18.1)	66.7 (22.7)
	social functioning	64.4 (22.3)	56.1 (24.5)	72.8 (25.5)	79.8 (24.2)
	physical role restriction	6.7 (13.3)	7.1 (23.9)	32.8 (34.8)	40.5 (39.1)
	emotional role restriction	51.3 (44.5)	56.2 (44.1)	66.7 (47.1)	81.0 (37.4)
	mental functioning	65.9 (17.4)	66.1 (19.2)	72.3 (17.3)	77.5 (16.5)
	vitality	41.7 (15.4)	40.9 (15.0)	60.0 (17.2)	58.8 (22.0)
	general health	51.0 (19.1)	50.7 (20.8)	56.0 (15.1)	58.3 (20.5)
catastrophizing	PCS (0-52)	15.9 (8.9;25)	17.8 (10.7;34)	13.4 (11.5;29)	8.2 (9.8;20)
self-efficacy	DGSES (10-40)	31.6 (4.0;26)	31.4 (3.8;34)	32.9 (4.2;28)	33.7 (4.5;19)
life satisfaction	Lisat-9 (1-6)	n=25	n=34	n=29	n=19
	general	4.2 (1.2)	4.2 (1.3)	4.5 (1.1)	4.5 (1.6)
	self-care ability	4.4 (1.0)	4.5 (1.1)	4.8 (1.1)	5.0 (1.0)
	leisure situation	3.6 (1.2)	3.8 (1.2)	4.3 (1.2)	4.4 (1.3)
	employment situation	3.2 (1.4)	3.0 (1.4)	3.3 (1.4;28)	3.7 (1.4)
	financial situation	4.4 (1.2)	4.2 (1.4)	4.4 (1.2)	4.0 (1.5)
	sex life	4.0 (0.9)	4.0 (1.5)	4.2 (1.5)	4.0 (1.3)
	relationship with partner	5.3 (0.7)	5.2 (1.0)	5.3 (1.1)	4.8 (1.3)
	family life	5.2 (0.7)	5.0 (1.1)	5.1 (1.1)	4.8 (1.3)
	contacts with friends and acquaintances	4.7 (0.9)	4.4 (1.3)	4.8 (1.0)	4.7 (1.3)

SCL-90 = Symptom Checklist-90-Revised; CSI = Caregiver Strain Index; NRS = numeric rating scale; RAND-36 = RAND-36 item Health Survey ; PCS = Pain Catastrophizing Scale; DGSES = Dutch General Self Efficacy Scale; Lisat-9 = Life Satisfaction Questionnaire; SD = standard deviation; n = number.

T0: at inclusion in the study, T1: at the start of the rehabilitation treatment, T2: at the end of the rehabilitation treatment, T3: 3 months after the treatment.

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Table 3: Overview of statistical significance for the different questionnaires.

<b>3a Spouses</b>						
Generalized Linear Mixed Models						
	T0-T1	T0-T2	T0-T3	T1-T2	T1-T3	T2-T3
SCL-90	NS	NS	NS	NS	NS	NS
CSI	NS	NS	NS	NS	NS	NS
PCS	NS	<0.001	0.014	<0.001	0.002	NS
RAND-36						
- physical functioning	0.046	NS	NS	NS	NS	NS
- social functioning	NS	0.017	<0.001	NS	<0.001	NS
- general health	NS	NS	NS	NS	NS	NS
- mental functioning	NS	NS	NS	NS	NS	NS
- vitality	NS	NS	NS	NS	NS	NS
DGSES	NS	NS	NS	NS	NS	0.021
Wilcoxon Signed Ranks Test						
	T0-T1	T0-T2	T0-T3	T1-T2	T1-T3	T2-T3
RAND-36						
- physical role restriction	NS	NS	NS	NS	NS	NS
- emotional role restriction	NS	NS	NS	NS	NS	NS
Lisat-9						
- 'life as a whole'	NS	0.025	NS	NS	NS	NS
- self-care ability	NS	NS	NS	NS	NS	NS
- leisure situation	NS	NS	NS	NS	NS	NS
- employment situation	NS	NS	NS	NS	NS	NS
- financial situation	0.035	NS	NS	NS	NS	NS
- Sex life	NS	NS	NS	NS	NS	NS
- relationship with partner	NS	NS	NS	NS	NS	NS
- family life	NS	NS	NS	NS	NS	NS
- contacts with friends and acquaintances	NS	NS	NS	NS	NS	NS

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### 3b Patients

Generalized Linear Mixed Models						
	T0-T1	T0-T2	T0-T3	T1-T2	T1-T3	T2-T3
SCL-90	NS	<0.001	<0.001	<0.001	<0.001	NS
PCS	NS	<0.001	<0.001	<0.001	<0.001	NS
NRS for pain	NS	NS	NS	NS	NS	NS
RAND-36						
- physical functioning	NS	<0.001	<0.001	<0.001	<0.001	NS
- social functioning	0.007	<0.001	<0.001	<0.001	<0.001	NS
- general health	NS	NS	0.009	NS	0.036	NS
- mental functioning	NS	0.018	<0.001	0.013	<0.001	NS
- vitality	NS	<0.001	<0.001	<0.001	<0.001	NS
DGSES	NS	<0.01	0.015	0.018	0.026	NS
Wilcoxon Signed Ranks Test						
	T0-T1	T0-T2	T0-T3	T1-T2	T1-T3	T2-T3
RAND-36						
- physical role restriction	NS	0.009	0.009	<0.001	0.015	0.046
- emotional role restriction	NS	NS	NS	NS	NS	NS
Lisat-9						
- 'life as a whole'	NS	NS	NS	0.048	NS	NS
- self-care ability	NS	NS	NS	NS	NS	NS
- leisure situation	NS	0.013	NS	0.008	NS	NS
- employment situation	NS	NS	NS	NS	0.008	0.012
- financial situation	NS	NS	NS	NS	NS	NS
- sex life	NS	0.007	NS	NS	NS	NS
- relationship with partner	NS	NS	NS	0.034	NS	NS
- family life	NS	NS	NS	NS	NS	NS
- contacts with friends and acquaintances	NS	NS	NS	0.049	NS	NS

SCL-90 = Symptom Checklist-90-Revised; CSI = Caregiver Strain Index; PCS = Pain Catastrophizing Scale; NRS = numeric rating scale; RAND-36 = RAND-36 item Health Survey ; DGSES = Dutch General Self Efficacy Scale; Lisat-9 = Life Satisfaction Questionnaire; SD = standard deviation; n = number. NS = non-significant,  $p \geq 0.05$   
 T0: at inclusion in the study, T1: at the start of the rehabilitation treatment, T2: at the end of the rehabilitation treatment, T3: 3 months after the treatment.

### 4 Discussion

Like the patients themselves, the spouses also benefited from the patients' multidisciplinary rehabilitation treatment, as their social functioning improved, while their catastrophizing tendency decreased, as was shown by a significant improvement regarding the social domain of the RAND-36

and the PCS. No improvement was found in the primary outcome measure of spouses' psychological distress. Since the scores for the social domain of the RAND-36 and the PCS were stable in the pre-treatment period, i.e. between T0 and T1, the effects are most likely due to the treatment. The score on the physical functioning domain of the RAND-36 decreased after the inclusion of the

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patients, but increased again (though not significantly) during and after treatment. The 'life as a whole' domain of the Lisat-9 decreased significantly between inclusion and the end of the treatment, and the score on the DGSES improved after the treatment. Since no other LISAT-9 or DGSES scores seem to have changed during treatment, these results are difficult to explain. Probably a larger study size would have resulted in more significant changes being found (type 2 error).

As expected, the patients showed improvement in their scores on the SCL-90-R, PCS, DGSES, most domains of the RAND-36 and Lisat-9. All improvements also lasted till the three-month's follow-up. Contrary to all these improvements, no change in the score for the pain was detected.

The improvement in the social domain perceived by the spouses might be explained by improvements in the patient's functioning: as patients felt better and improved their functioning (as can be seen for example from their improvement regarding the social functioning and physical and emotional role restriction domains), they might be engaging in more social activities with their spouses. Another explanation might be that a reduction in catastrophizing made the spouses less anxious to undertake social activities with their spouses, i.e. the patients. The third explanation might be that this finding is a type I error.

While the change in the social domain of the RAND-36 for spouses was statistically

significant, we wondered whether this change was also clinically relevant. No values for minimal clinically important change (MCIC) for the RAND-36 could be found in the literature, so we looked for known MCICs for the SF-36. Samsa et al.<sup>22</sup> mentioned a change of 3-5 points as the MCIC, which is comparable to the 3 points change that Ali et al.<sup>23</sup> reported for patients suffering from psoriasis. Glassman et al.<sup>24</sup> suggested a change of 6.2 on the physical component score to be clinically relevant in a group of patients undergoing lumbar spine surgery. Using these MCICs, we consider the change in the score for social functioning among the spouses (from 86.3 to 95.5 at the start and 3 month after the treatment, respectively) to be clinically significant. However, in view of the favourable score at the start of the treatment, i.e. 86.3, the clinical meaning of the improvement is questionable. Nevertheless, the fact that the spouses might also benefit from the treatment of the patients is a new finding, even though they might think they did not suffer very much in the original situation.

The patient group we studied is similar to the populations in other studies in terms of age, gender and the duration of the pain period. The patients' scores at baseline and their improvement were similar to those reported in the literature<sup>25,26,27</sup>. Although there have been several studies of the effect of chronic pain on the spouses using questionnaires, the questionnaires they used were different from the ones we used in this study, precluding a direct comparison between the scores from the different studies. However, it may be

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noted that the scores for social functioning and catastrophizing for the spouses at baseline were already good and not comparable with the low scores of the patients. Even so, the spouses' scores still improved further.

Although the spouses were satisfied with their involvement in the treatment (mean score of 7.6 out of 10), being in contact with one or more members of the rehabilitation team an average of once during the whole treatment cannot be regarded as very intensive. The effect of MRT on the spouses, and perhaps also on the patients, might be more positive if the involvement of the spouses was more intensive. This could be done by inviting the spouses to be present more often during the patients' therapy sessions or by organizing special meetings for the spouses. This might be especially valuable for spouses suffering from chronic pain themselves, since they will likely experience similar effects from the chronic pain as the patients. In view of the small sample size, and the even smaller sample size for spouses suffering from chronic pain themselves, our study could not test this hypothesis. Future studies could focus on this topic.

### *Limitations of the study*

The main weakness of the study was the ultimately small sample size and the missing data. The loss to follow-up was 30%. The intended number of couples as calculated in the power analysis, i.e. 69, was not reached. Therefore, selection bias and type 2 errors cannot be excluded.

An explanation for the high percentage of loss to follow-up and for the missing data might be the large number of questions asked each time. Another explanation might be the overlap with other questionnaires which the participants had to fill out at the start of treatment. Although we explained this to the participants at inclusion, some still felt confused by the fact that they had to fill out questionnaires twice. Participants were encouraged as much as possible (by phone, post and e-mail) to fill out all questionnaires and send them back. Despite this encouragement, questionnaires were often filled out only fragmentarily. We tried to solve this problem as much as possible by using a multilevel analysis, namely generalized linear mixed models, where the dataset became a person-period dataset<sup>28</sup>, and all available data was used.

Another weakness is that this study was a prospective cohort study, rather than a randomized controlled trial (RCT), which weakens the outcome.

### **5 Conclusion**

Our study confirmed that patients with non-specific chronic pain benefit from the MRT with respect to multiple domains. The spouses might experience a benefit to their social life, as shown by the significant increase in their scores on the social domain of the RAND-36. There also seems to be a decrease in catastrophizing by the spouses. No other benefit for spouses was found in this study.

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