



**UHASSELT**

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## Faculteit Geneeskunde en Levenswetenschappen

master in de revalidatiewetenschappen en de  
kinesitherapie

### **Masterthesis**

***Is perceived injustice present in persons with chronic shoulder pain which are surgically or non-surgically treated, and is it related to other emotional and cognitive variables?***

### **Ines Willekens**

Scriptie ingediend tot het behalen van de graad van master in de revalidatiewetenschappen en de kinesitherapie, afstudeerrichting revalidatiewetenschappen en kinesitherapie bij musculoskeletale aandoeningen

### **PROMOTOR :**

Prof. dr. Annick TIMMERMANS

### **COPROMOTOR :**

dr. Liesbet DE BAETS



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## Research context

This master thesis is a cross-sectional study situated in the domain of musculoskeletal rehabilitation, more specifically in the rehabilitation of shoulder patients. It is part of a post-doctoral study, led by Liesbet De Baets. It is also a follow-up of a last year's literature study. The study has been conducted by one student in Physiotherapy and Rehabilitation Sciences at the University of Hasselt mainly by distributing questionnaires to patients of different physiotherapists in Limburg and surroundings. In order to obtain more data, the student also visited an orthopedic surgeon several times to recruit more patients.

Shoulder complaints are among the top 3 of musculoskeletal pain complaints in Western Europe (Picavet & Schouten, 2003). In the Netherlands, a prevalence of 6.9% to 48% is described (Feleus et al., 2008; Luime et al., 2004; Kooijman, Swinkels, van Dijk, de Bakker, & Veenhof, 2013). There is not much known about the prevalence of the psychological factors that are related to shoulder pain and disability outcomes in patients with chronic shoulder pain.

The primary aim of this study is to investigate the prevalence of different psychological factors in chronic shoulder pain patients. Secondly, it will be investigated whether there is a relationship between perceived injustice (PI) and pain, between PI and depression, between PI and fear of movement and between PI and pain catastrophizing. These prevalences and relationships mentioned above will furthermore be investigated separately in chronic shoulder pain patients treated surgically and treated conservatively.

The research question was developed by the student under the approval of the co-promotor. Under supervision of the co-promotor the student recruited patients with regard to the inclusion criteria. The necessary data to answer the research questions, were completed by the patients. The input of data was done by the student herself. The data analysis and the writing process was the responsibility of the student supervised by the co-promotor.

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## 1. Abstract

**Background** From perceived injustice (PI), pain catastrophizing, fear of movement and depression, it is known that they negatively influence outcome in persons with chronic musculoskeletal pain. However, in chronic shoulder pain (CSP) patients, the prevalence of these psychological factors and the relation between PI and these psychological variables in persons treated surgically and in a conservative manner, is unknown.

**Objectives** To investigate the prevalence of PI, fear of movement, pain catastrophizing and depression in CSP patients, and to examine the relationship between perceived injustice (PI) on the one hand and pain, depression, fear of movement and pain catastrophizing on the other hand. The prevalence and their associations will also be investigated in CSP patients who received surgery (CSP-S) and in CSP patients who did not receive surgery (CSP-NS).

**Design** A cross-sectional study

**Methods** Data from 41 individuals with CSP (mean  $\pm$  SD age,  $55.4 \pm 13.71$  years, 39% male) were examined. Eleven patients were classified in the surgery group (CSP-S) and 25 patients were classified in the non-surgery group (CSP-NS). Questionnaires were used to assess pain, feelings of perceived injustice, depression, fear of movement, and pain catastrophizing. Spearman rho correlations were used to determine the relations.

**Results** The prevalence of the different variables were higher in the CSP-S group than in the CSP-NS group. Perceived injustice and the different variables were all positively significant correlated, except for PI and VAS in both groups and PI and depression in the CSP-S group. The highest relations between PI and the different variables were found in the CSP-S group.

**Conclusions** Patients with chronic shoulder pain treated with surgery are more susceptible to negative psychological variables than patients treated conservatively.

**Key words** Chronic Shoulder Pain, perceived injustice, pain catastrophizing, kinesiophobia, depression, prevalence



## 2. Introduction

Shoulder complaints are a common issue among the Western population (Karel et al., 2017; Kuijpers et al., 2006; Picavet & Schouten, 2003; van der Windt et al., 1996). As an omnipresent phenomenon, the shoulder is only surpassed by the lower back and neck (George, Dover, & Fillingim, 2007; Picavet & Schouten, 2003; Urwin et al., 1998). In the Netherlands, a prevalence of shoulder complaints of 6.9% to 48% is known (Feleus et al., 2008; Kooijman, Swinkels, van Dijk, de Bakker, & Veenhof, 2013; Luime et al., 2004). The prevalence tends to increase with older age (Greving et al., 2012) and in psychologically stressed populations (McBeth & Jones, 2007). Even though it is a common problem, a reference to the physiotherapist happens in only 13-14% of the cases (Kooijman, Swinkels, van Dijk, de Bakker, & Veenhof, 2013).

In these shoulder patients, pain is the most common symptom (Chatterjee, Middy, & Barman, 2008; Garzedin, Matos, Daltro, Barros, & Guimaraes, 2008; Sindhu et al., 2012). This leads to a disabling condition which might rapidly progress to chronic pain (Croft, Pope, & Silman, 1996; George, Dover, & Fillingim, 2007; Gill, Shanahan, Taylor, Buchbinder, & Hill, 2013; MacFarlane, Hunt, & Silman, 1998; Pope, Croft, Pritchard, Macfarlane, & Silman, 1996; van der Windt et al., 1996) when it is not treated appropriately. Chronic shoulder pain has a prevalence of 7% to 34% in the general population (Bjelle, 1989; Chard, Hazleman R., Hazleman B.L., King, & Reiss, 1991; Luime et al., 2004; Roh, Noh, Oh, Baek, & Gong, 2012). Research shows that only 50% of the shoulder patients recover completely after 6 months (Croft, Pope, & Silman, 1996; George, Dover, & Fillingim, 2007; Reilingh, Kuijpers, Tanja-Hafterkamp, & van der Windt, 2008; van der Windt et al., 1996; Winters, Sobel, Groenier, Arendzen, & Meyboom-de Jong, 1997), increasing only to 60% at 1 year (van der Windt et al., 1996). In these chronic shoulder pain populations, a higher pain intensity, a more gradual onset of shoulder pain and more pain catastrophizing are reported in comparison to acute or sub-acute shoulder pain patients (Reilingh, Kuijpers, Tanja-Hafterkamp, & van der Windt, 2008), which may cause a mismanage of the pain experience and create a vicious cycle of negative pain perceptions (Martinez-Calderon et al., 2018; Vlaeyen & Linton, 2000).

Nowadays there is more attention in the Musculoskeletal (MSK) pathology for the role of perceived injustice in maintaining the pain complaint and extending the recovery period in different musculoskeletal pathologies (Scott, Trost, Milioto, & Sullivan, 2013; Sullivan (2008, 2009)). Perceived injustice is defined as the degree to which individuals perceive their life as being characterized by feelings or perceptions of injustice (Sullivan et al., 2008). Research indicated that patients with chronic pain perceive their situation with a sense of injustice (Carriere, Martel, Kao, Sullivan, & Darnall, 2017). Especially when pain remains present after having orthopedic surgery for their pain problem (Szeverenyi et al., 2018), feelings of injustice have been described. These feelings of injustice have furthermore been linked to higher depressive symptoms (Scott & Sullivan, 2012), lower chance of returning to work, greater pain severity, higher post-traumatic stress symptoms, and more disability and heightened pain behavior (Sullivan, Yakobov, Scott, & Tait, 2014). Next to that, one might assume that there may be an association between perceived injustice and other emotions and cognitions, like fear of pain or pain catastrophizing, from which it is also known that they can maintain a pain complaint. A relation between these factors was found in one study in chronic musculoskeletal pain patients, where feelings of injustice significantly correlated with catastrophic thinking, kinesiophobia and depression (Sullivan et al., 2008). Part of these results was confirmed by a second study which reported a significant correlation between perceived injustice and pain catastrophizing (Scott & Sullivan, 2012) in patients with persistent musculoskeletal pain.

In chronic shoulder pain patients, it is however not known to what extent these emotions and cognitions and their association with perceived injustice are present. Knowledge about the presence of these factors and their relationship might be of interest to better understand why shoulder pain can become chronic. Therefore, the primary objective of the present study was to investigate the prevalence of different psychological factors in chronic shoulder pain patients. Secondly, this study aimed to examine whether there is a relationship between perceived injustice (PI) and pain, between PI and depression, between PI and fear of movement and between PI and pain catastrophizing.

As the type of received treatment might influence prevalence and strength of these relationships, a distinction will be made between patients who underwent surgery and those who did not.

## 3. Methods

### 3.1 Research design

This study has a cross-sectional design.

### 3.2 Participants

#### 3.2.1 Patient Recruitment

Between February and May 2018, patients with shoulder pain were recruited via physiotherapists and a shoulder orthopedist.

#### 3.2.2 Inclusion criteria

The participants of the study had to have Dutch as mother tongue, since the questionnaires were formulated in Dutch. The subjects had to be  $\geq 18$  years and should have chronic ( $\geq 3$  months) musculoskeletal shoulder pain for which they consulted a healthcare professional. Their mean VAS score over the last week had to be  $\geq 3$ .

#### 3.2.3 Exclusion criteria

Patients were excluded when they experienced other co-morbidities, such as cancer, serious neurological or rheumatic diseases.

#### 3.2.4 Informed consent and ethical approval

Prior to study enrollment, all participants signed an informed consent form.

Ethical approval was obtained from the Medical Ethics Committee (CME) of the University of Hasselt.

### 3.3 Procedure

Participants were invited to complete several questionnaires about demographic data, pain intensity, pain catastrophizing, depression, fear of movement/re-injury and perceived injustice. Patients willing to participate were handed the questionnaires by their physiotherapist, or by the research assistant of the orthopedist. Patients independently filled in the questionnaires, and gave them back to the physiotherapist/research assistant when they were filled in. After collection of the questionnaires, the data was entered in excel.

#### 3.3.1 Questionnaires

##### ***Patient Characteristics***

The age, gender, length and weight, marital status and educational level was questioned. Furthermore, the duration of their shoulder complaint and whether they received surgery for their shoulder complaint, was questioned. This made it possible to classify the chronic shoulder pain (CSP) patients in two separate groups: a surgically treated group (CSP-S group) and a conservatively treated group (CSP-NS).

##### ***Pain intensity (VAS)***

The visual analog scale for pain (VAS) with scores from (0) 'no pain' to (10) 'the worst imaginable pain' was used to score pain intensity. A study on patients with CSP defined a VAS score between 1 and 5 as 'non-severe' and a VAS score between 6 and 10 as 'severe' (Badcock, Lewis, Hay, McCarney, & Croft, 2002). Patients were asked to score their average pain over the past week.

##### ***Hospital Anxiety and Depression Scale (HADS)***

Zigmond and Snaith (1983) developed the HADS, which is a 14-item scale to determine the levels of anxiety and depression a person is experiencing (Zigmond & Snaith, 1983). The HADS is divided into two subscales, with seven items that investigate symptoms of anxiety (HADS-A) and the other seven investigate depression symptoms (HADS-D) (Bjelland, Dahl, Haug, & Neckelmann, 2002). The items are rated on a 4-point Likert-type scale. Each item is scored from zero to three. A total score from zero to 21 can be obtained for each subscale. Higher scores indicate higher levels of depression or anxiety. It is one of the best

questionnaires for checking depression and anxiety in patients with pain disorders (Rodero et al., 2012; Zigmond & Snaith, 1983). The HADS-D has an adequate internal consistency with a Cronbach alpha value of 0.84 (Pallant & Bailey, 2005). A study on chronic shoulder patients defined cases of depression as follow: a score of < 8 means a 'non-case', 8-10 means a 'probable case' and a score > 10 means a 'definite case' of depression (Badcock, Lewis, Hay, McCarney, & Croft, 2002). For this study, the scores on the HADS-A were not of interest.

### ***IEQ-(Dutch)***

The Injustice Experience Questionnaire (IEQ) is a questionnaire that is used to assess perceptions of injustice (Sullivan et al., 2008). It consists of a 12-item questionnaire that addresses the degree to which individuals perceive their life as being characterized by feelings or perceptions of injustice (Sullivan et al., 2008). The IEQ uses a 5-point scale with endpoints (0) 'not at all' and (4) 'all the time'. The total IEQ score ranges from zero to 48. Higher scores indicate more perceived injustice. A cut-off score of  $\geq 20$  was used to indicate clinical elevated levels of perceived injustice (Ioannou et al., 2017; Scott, Trost, Milioto, & Sullivan, 2013).

### ***Pain Catastrophizing scale***

The Pain Catastrophizing Scale (PCS) is a 13-item instrument that gives a total score between zero and 52. The 13 items scored, are on a 5-point scale with the endpoints (0) 'not at all' and (4) 'all the time'. It is a questionnaire that assesses the catastrophizing cognitions of people by asking them to reflect on thoughts or feelings associated with current painful experiences (Sullivan, Bishop, & Pivik, 1995). There are three subscale scores assessing rumination, magnification and helplessness (Sullivan et al., 2001). A total PCS score of 30 represents a clinically relevant level of catastrophizing (Ioannou et al., 2017). Research shows that the PCS has a good construct validity, internal consistency, reliability and concurrent validity (Osman et al., 2000; Sullivan, Bishop, & Pivik, 1995).



### ***Tampa Scale for Kinesiophobia (TSK)***

The Tampa Scale for Kinesiophobia (TSK) is a 17-item questionnaire measuring fear of movement or (re)injury (Miller, Kori, & Todd, 1991). The items are scored on a 4-point Likert scale, ranging from 'strongly disagree' (score =1) to 'strongly agree' (score =4). A total score is calculated after inversion of the individual scores of items 4, 8, 12 and 16. The total score ranges between 17 and 68. A high score on the TSK indicates a high degree of Kinesiophobia (Pool et al., 2009). A cut-off score was developed by Vlaeyen (1995), where a score above 37 is considered as a high score (high responders), while scores  $\leq 37$  are considered as low scores (Low responders) (Vlaeyen, Kole-Snijders, Boeren, & van EEK, 1995b). The TSK is a valid and reliable instrument in patients with chronic low back pain (Lundberg, Styf, & Carlsson, 2004). The TSK is a reliable questionnaire with an internal consistency ranging from  $\alpha = 0.68$  to  $0.81$  (Vlaeyen, Kole-Snijders, Rotteveel, Ruesink, & Heuts, 1995a; Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995b; Crombez, Vlaeyen, Heuts, & Lysens, 1999).

### 3.4 Statistical analysis

Data were analyzed using JMP Pro, version 13.

The normality of the distribution for all data was examined using the Shapiro-Wilk test. Because not all the data met the criteria for normality, the statistical analysis was carried out using nonparametric tests.

A Spearman Rho non-parametric correlation test was used to determine the relationship between perceived injustice and the different variables in the whole group of chronic shoulder pain patients. Afterwards, correlations were calculated a second time in each group (CSP-S, CSP-NS) separately. Table 1 shows the used rules for the interpretation of the size of the correlation coefficients.

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**Table 1**

*Standard rules for interpreting the size of a correlation coefficient (adapted from Hinkle, Wiersma, & Jurs, 2003)*

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Size of Correlation	Interpretation
.00 to .30 (.00 to -.30)	Negligible correlation
.30 to .50 (-.30 to -.50)	Low positive (negative) correlation
.50 to .70 (-.50 to -.70)	Moderate positive (negative) correlation
.70 to .90 (-.70 to -.90)	High positive (negative) correlation
.90 to 1.00 (-.90 to -1.00)	Very High positive (negative) correlation

---



## 4. Results

### 4.1 Characteristics of the participants

A total of 61 participants were recruited between February and May 2018. Forty-one patients (16 men, 25 women) met the inclusion criteria for chronic shoulder pain (CSP) which meant that the pain was lasting longer than three months. The mean duration of pain was 17.71 months. The mean intensity of pain was  $4.61 \pm 1.64$ . Eleven patients with CSP underwent surgery (CSP-S) and 25 patients didn't receive surgery (CSP-NS) (Figure 1). The mean age of the CSP sample was 55.4 years (standard deviation (SD) = 13.71) with a range of 18-85 years. Sixty-six percent (27/41) of the participants were married and 75.61% (31/41) had a support system (either married or living together). Higher studies (high school or university) were completed by 39.02% (16/41) of the patients. Table 2 gives an overview of the demographic characteristics of the patients and their mean scores on the questionnaires.

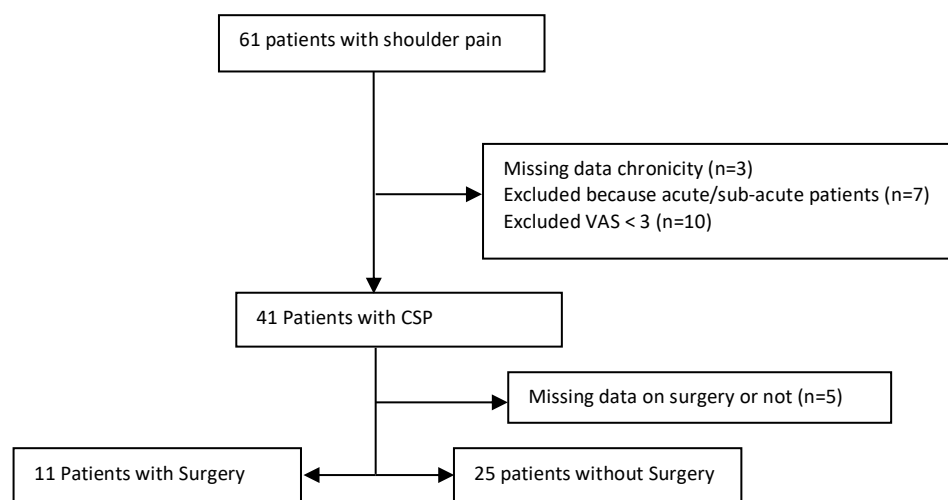


Figure 1. Participant flow diagram

**Table 2***Patients demographic characteristics and questionnaires*

	CSP-S (N=11)	CSP-NS (N=25)	CSP (N=41)
<i>Sociodemographic data</i>			
Age (yr)	60.18 ± 14.01	53.4 ± 14.05	55.4 ± 13.71
Sex (females, %)	81.82(9/11)	60 (15/25)	60.98 (25/41)
Education (higher studies, %)	27.27 (3/11)	52 (13/25)	39.02 (16/41)
Marital status (Married, %)	36.36 (4/11)	72 (18/25)	65.85 (27/41)
(Living together, %)	18.18 (2/11)	8 (2/25)	9.76 (4/41)
(Support, %)	54.54	80	75.61
<i>Questionnaires (Mean ±SD)</i>			
Shoulder pain (0-10)	4.45 ± 1.97	4.32 ± 1.22	4.61 ± 1.64
HADS-D (0-21)	5.64 ± 4.11	3.92 ± 2.97	4.46 ± 3.54
IEQ-dutch (0-48)	14.64 ± 11.07	9.44 ± 7.51	11.02 ± 8.4
PCS (0-52)	19.27 ± 12.72	14.56 ± 6.6	14.18 ± 8.5
TSK (17-68)	43.27 ± 8.27	35.72 ± 6.02	38.05 ± 7.16

CSP: Chronic Shoulder Patients; S: Surgery; NS: No Surgery; Support: having someone to lean on (% married + % living together); HADS-D: Hospital Anxiety and Depression Scale-Depression; IEQ-dutch: Dutch version of the Injustice Experience Questionnaire; PCS: Pain Catastrophizing Scale; TSK: Tampa Scale of Kinesiophobia

#### 4.2 Prevalence of pain intensity and the different psychological variables in Chronic shoulder pain patients (surgically treated or not).

Prevalence is the number of people in a sample with the characteristic divided by the total number of people in that sample (<https://www.nimh.nih.gov>). Table 3 gives a summary of the prevalence of the different variables in our studied sample.

**Table 3**

*Prevalence of pain intensity and the different psychological variables in chronic shoulder pain patients, treated with surgery or not*

	CSP (%)	CSP-S (%)	CSP-NS (%)
<b>VAS</b>			
<i>Non-severe (1-5)</i>	78.05	81.82	88
<i>Severe (6-10)</i>	21.95	18.18	12
<b>HADS-D</b>			
<i>Non-case (&lt;8)</i>	82.93	64	88
<i>Probable case (8-10)</i>	9.8	27	8
<i>Definite case (&gt;10)</i>	7.32	9.1	4
<b>IEQ</b>			
IEQ > 20	17.1	36.36	12
<b>TSK</b>			
TSK > 37	53.66	72.73	44
<b>PCS</b>			
PCS > 30	7.32	27	0

CSP: Chronic Shoulder Pain; S: Surgery; NS: no-Surgery; VAS: Visual Analog Scale; HADS-D: Hospital Anxiety and Depression Scale – Depression; IEQ: Injustice Experience Questionnaire; TSK: Tampa Scale for Kinesiophobia; PCS: Pain Catastrophizing Scale

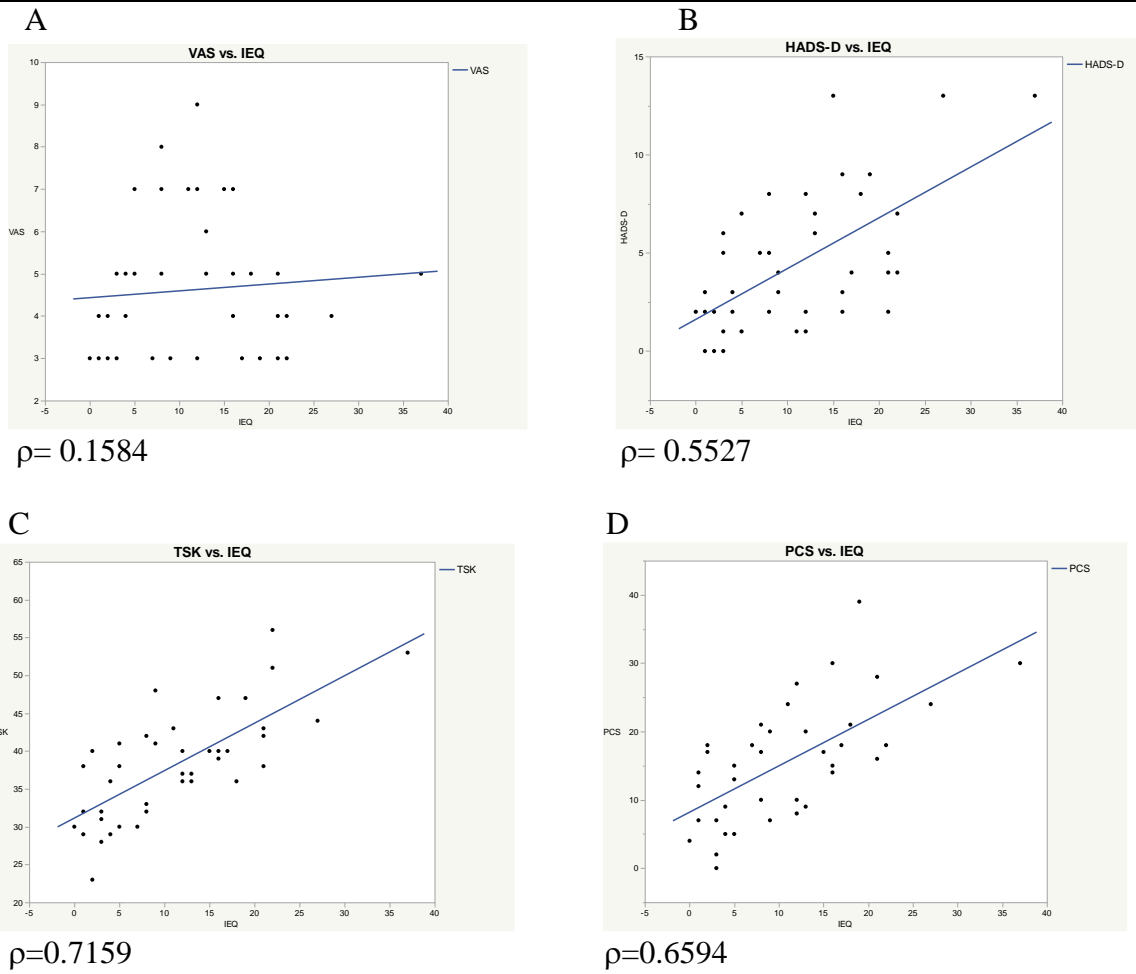
### 4.3 Relation between perceived injustice and the different variables in Chronic Shoulder Pain patients

Spearman Rho Correlation coefficients of different variables with perceived injustice in CSP patients are presented in figure 2. For an interpretation of the correlation coefficient, see table 1. All the parameters showed a positive significant correlation with perceived injustice. Only VAS and IEQ were not significantly correlated (table 4). The highest relation was found between perceived injustice and fear of movement ( $\rho=0.72$ ,  $p>,0001$ ), which indicated that higher scores for perceived injustice are related to higher fear of movement. There was also a moderate significant correlation between PI and depression and between PI and pain catastrophizing.

**Table 4**  
*Correlations (Spearman's rho) between Perceived Injustice and different parameters in CSP Patients*

Different parameters	Perceived Injustice	
	Rho ( $\rho$ )	P value
VAS	0.16	0.3227
HADS-D	0.55	0.0002*
TSK	0.72	<,0001*
PCS	0.66	<,0001*

CSP: Chronic Shoulder Pain; rho: Spearman rho; IEQ: Injustice Experience Questionnaire; VAS: Visual Analog Scale; HADS-D: Hospital Anxiety and Depression Scale-Depression; TSK: Tampa Scale of Kinesiophobia; PCS: Pain Catastrophizing Scale; \*: A significant correlation



*Figure 2.* Association between the IEQ and different Parameters in CSP patients

- A Spearman Rho Correlation between IEQ and VAS
- B Spearman Rho Correlation between IEQ and HADS-D
- C Spearman Rho Correlation between IEQ and TSK
- D Spearman Rho Correlation between IEQ and PCS

IEQ: Injustice Experience Questionnaire; VAS: Visual Analog Scale; HADS-D: Hospital Anxiety and Depression Scale – Depression; TSK: Tampa Scale for Kinesiophobia; PCS: Pain Catastrophizing Scale; CSP: Chronic Shoulder Pain;  $\rho$ = rho, Spearman rho correlation coefficient



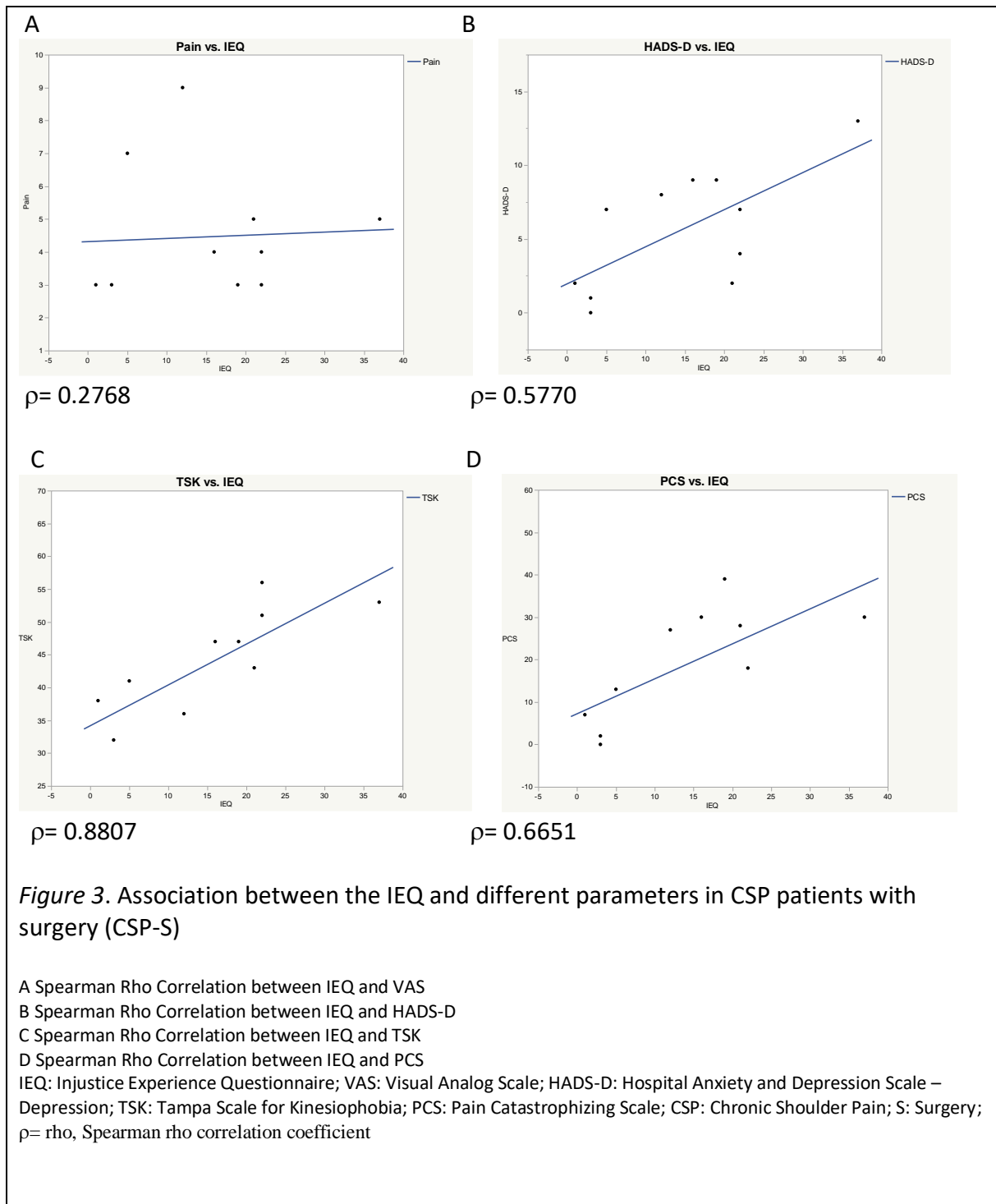
#### 4.4 Relation between Perceived Injustice and the different variables in Chronic Shoulder Pain Patients with or without surgery

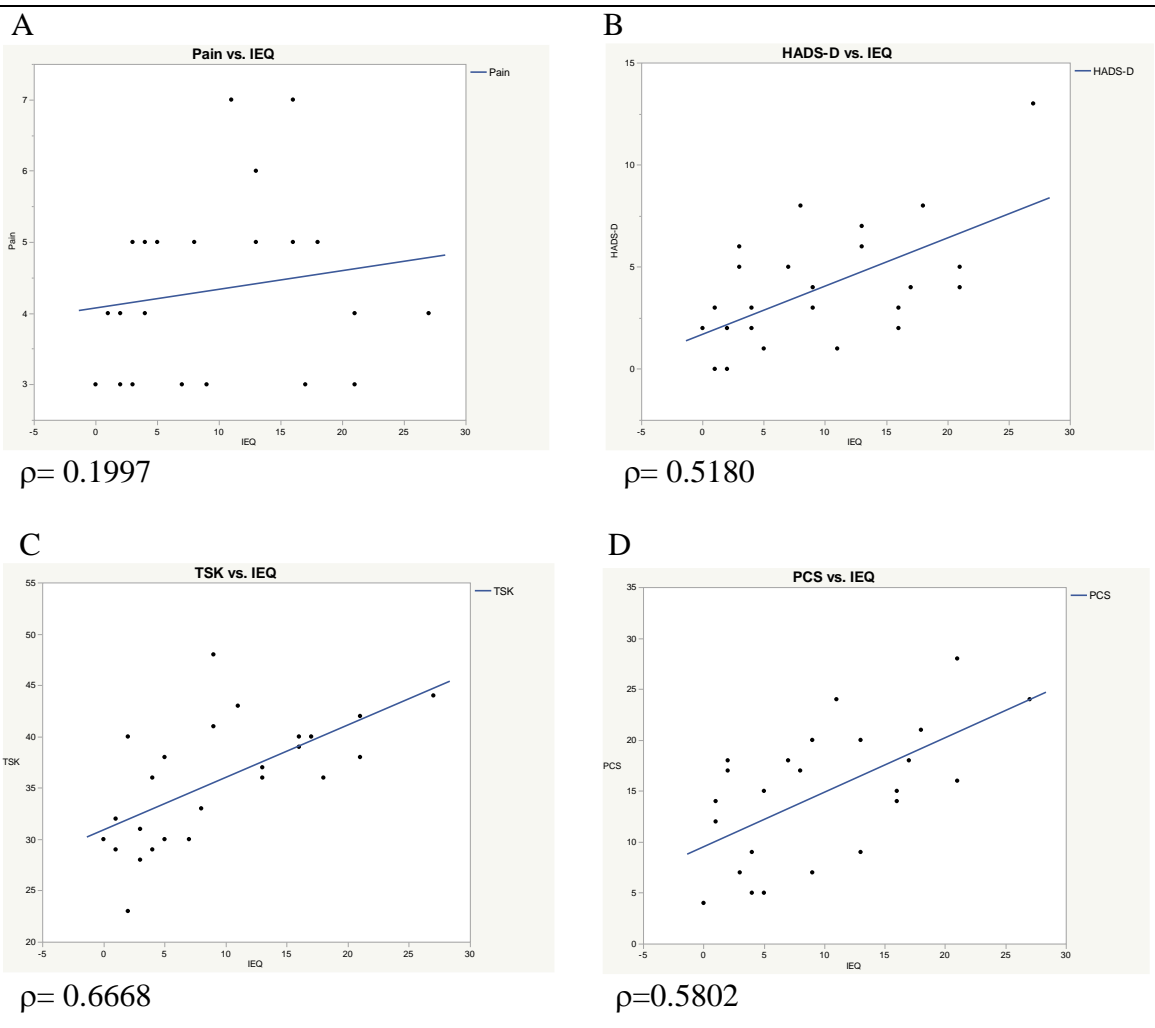
In both groups, correlations between PI and pain catastrophizing and between PI and fear of movement were significant (Table 5). Furthermore, higher Spearman rho correlation values between perceived injustice and all these parameters were found in the CSP-S group compared to the CSP-NS group. Only in the CSP-NS group, PI was significantly correlated with depression. In none of the groups, pain intensity was significantly correlated with PI (see table 5). Higher scores for perceived injustice, were associated with higher scores on the TSK and the PCS in the CSP-S group (figure 3). In the CSP-NS group, higher scores for perceived injustice, were related to higher scores of depression, fear of movement and catastrophizing thoughts (figure 4).

**Table 5**  
*Relation between Perceived Injustice and different parameters in patients with CSP with/without surgery*

Different parameters	Perceived Injustice			
	CSP-S		CSP-NS	
	Rho	P value	Rho	P value
VAS	0.28	0.4100	0.20	0.3386
HADS-D	0.58	0.0631	0.52	0.0080*
TSK	0.88	0.0003*	0.67	0.0003*
PCS	0.67	0.0255*	0.58	0.0024*

CSP: Chronic Shoulder pain; S: Surgery; NS: No Surgery; rho: Spearman Rho; IEQ: Injustice Experience Questionnaire; VAS: Visual Analog Scale; HADS-D: Hospital Anxiety and Depression Scale-Depression; TSK: Tampa Scale of Kinesiophobia; PCS: Pain Catastrophizing Scale; \*: a significant correlation





**Figure 4.** Associations between the IEQ and different parameters in CSP patients without surgery (CSP-NS)

A Spearman Rho Correlation between IEQ and VAS  
 B Spearman Rho Correlation between IEQ and HADS-D  
 C Spearman Rho Correlation between IEQ and TSK  
 D Spearman Rho Correlation between IEQ and PCS  
 IEQ: Injustice Experience Questionnaire; VAS: Visual Analog Scale; HADS-D: Hospital Anxiety and Depression Scale – Depression; TSK: Tampa Scale for Kinesiophobia; PCS: Pain Catastrophizing Scale; CSP: Chronic Shoulder Pain; NS: No Surgery;  $\rho$ = rho, Spearman rho correlation coefficient

## 5. Discussion

The first purpose of the study was to examine the prevalence of pain intensity and different psychological variables in a group of chronic shoulder pain patients who were surgically or non-surgically treated. The reason why we investigated this, was to see whether we should treat these patients differently compared to the current standards of therapy, which are purely focusing on the affected tissue itself. If indeed emotions and cognitions play a role, they have to be better acknowledged and taken into account during the rehabilitation of this chronic pain problem.

In this study we found more patients (18.18%) in the CSP-S group classified with 'severe pain' compared to patients in the CSP-NS group (12%). These results are different compared to another study on patients with chronic shoulder pain, where they identified 31% of the patients with 'severe pain' (Badcock, Lewis, Hay, McCarney, & Croft, 2002). The explanation for this apparent discrepancy between the pain intensity results, could be the difference in number of patients between the two studies and the subdivision that was made for surgery in this study. Related to depression, the results in the present study for CSP-NS patients were similar to the findings in other chronic shoulder pain patients (Badcock, Lewis, Hay, McCarney, & Croft, 2002), where eight percent of the patients were identified as 'cases', ten percent as 'probable cases' and 82% as 'non-cases'. The results of the CSP-S group were somewhat different compared to the results mentioned above. More patients (36%) were classified as 'probable or definite cases'. Moreover, another study in chronic shoulder patients classified patients in different categories of depression: 77.7% of the patients were classified as 'normal case' (0 to 7), 9.2% as 'mild case' (8 to 10), 12.3% as 'moderate case' (11-15) and 0.8% as 'severe case' (16 to 21) (Cho et al., 2013). These findings are similar to the findings in this study for the CSP-NS group, but different compared to the results obtained by the patients in the CSP-S group, where more patients (27.27%) were categorized in the 'mild case' group and less patients (63.64%) in the 'normal case' group. These results indicate that CSP patients who underwent surgery are more likely to be classified as a 'possible' or 'definite case' of depression.

When we looked at the prevalence of perceived injustice, there were no studies for chronic shoulder pain patients. So we had to look for other patient groups. In a population with traumatic injuries, 36.7% met the cut-off value of  $\geq 20$  for perceived injustice (Iannou et al., 2017), this is similar to the patients in the CSP with surgery group (36.36%) but higher compared to the CSP-NS group (12%) in the current study. This could mean that patients who received surgery, perceive their situation with more feelings of injustice, compared to patients who did not undergo surgery. The possible explanation could be that these patients who already underwent invasive treatment, such as surgery, had higher expectations regarding their rehabilitation process and blame their therapists or doctors for their continuing pain. With this persistent pain in mind, fear of movement was found in 72.73% of the patients in the CSP-S group. This means that most of the patients in the surgery group had fear of movement even after being treated for their condition. This result is much higher compared to a study in patients with back pain after lumbar disc herniation, who reported a value of 45% (36/80) for kinesiophobia (Svensson, Lundberg, Ostgard, & Wendt, 2011), but lower, compared to a study in patients with chronic neck pain, where 80.2% obtained a TSK score  $> 37$  (Demirbüken et al., 2016). Although the vast majority of studies use a threshold of 37 to classify their patients as being kinesiophobic, one research group, however, defined their cut-off score as  $\geq 40$  in patients with MSK pain (Perrot et al., 2018), based on the results in a previous study in patients with chronic low back pain (Vlaeyen et al., 1999). It has to be noted that comparison with other studies in shoulder pain, was not possible because they used the Shortened version of the Tampa Scale of Kinesiophobia (TSK-11) (Clausen et al., 2017; Lentz, Barabas, Day, & Bishop, 2009), which was not used in the present sample.

The next prevalence we investigated was pain catastrophizing, where 27% of the patients in the CSP-S group and none of the patients in the CSP-NS group, met the cut-off above 30. This finding shows that more patients who underwent surgery catastrophize about their painful condition. Other studies used another PCS cut-off score ( $PCS \geq 21$ ) to classify patients as a 'high pain catastrophizing patient' (Park et al., 2016). The reason for this, is that the cut-off score varies according to the type of pain condition or study purpose (Park et al., 2016; Scott, Wideman, & Sullivan, 2014). Research has shown that PCS is a risk factor for problematic recovery after injury (Scott, Wideman, & Sullivan, 2014).

Taken all the above mentioned results into account, research emphasizes the importance of identifying these psychological prognostic factors to distinguish between patients who are likely to respond well to physiotherapy and those who are more likely to develop chronic shoulder pain (Chester et al., 2013; Karel et al., 2017). These findings highlight an important missing piece of the treatment puzzle in patients with chronic shoulder pain. In the future, this information could assist physiotherapists to identify patients that would benefit from extra guidance by a psychologist, or possibly other multidisciplinary healthcare professionals (Dinant, Buntinx, & Butler, 2007; Karel et al., 2017; Kuijpers, van der Windt, van der Heijden, & Bouter, 2004).

The second aim of the study was to investigate the relation between the IEQ and different variables in chronic shoulder pain patients who were surgically or non-surgically treated. The results showed significant correlations between the IEQ and measures of depression, fear of movement and pain catastrophizing in the CSP-NS group. In the CSP-S group, only fear of movement and catastrophizing correlated significantly with the IEQ scores. All the associations were positive between the parameters. This means that an increase in the IEQ, was accompanied with an increase in the above mentioned significant variables. These results are similar to a study in chronic musculoskeletal pain patients, where a significant positive relation was found between IEQ and PCS ( $r=.75$ ,  $P<.01$ ) and between IEQ and TSK ( $r=.58$ ,  $P<.01$ ) (Sullivan et al., 2008) and to a study in patients with traumatic injuries, where a correlation of 0.66 was found between the IEQ and the PCS and a correlation of 0.55 was found between the IEQ and the TSK (Ioannou et al., 2017). The only difference between these studies and the one studied here, is the distinction between patients treated surgically or not. Given that perceived injustice was significantly associated with fear of movement and pain catastrophizing in both the CSP-S and CSP-NS group and with depression in the CSP-NS group, it is important to address these psychological variables during treatment. Evidence support the use of adjunct psychosocial interventions to decrease postoperative pain and to improve the quality of care in orthopedic surgery (Szeverneyi et al., 2018).

Finally, we noticed in the demographic data, that more patients treated with surgery, were not married or not living together (lower % support), than patients in the CSP-NS group. The percentage of patients with higher scores on perceived injustice, pain catastrophizing and fear of movement was also higher in this CSP-S group. So an important question for further research could be if the level of support plays an important role in the maintenance of higher psychological variables. Next to that it had to be noted, that only thirty-nine percent of the chronic shoulder patients completed higher education. A question we could ask ourselves is whether it is important to have a certain cognitive level, to fill in the questionnaires.

### Strengths and limitations

This study on chronic shoulder patients was able to reproduce the results obtained in the study on chronic MSK pain patients by Sullivan et al. 2008, more specifically the associations between the IEQ and TSK and IEQ and PCS. In addition, we also made a subdivision between patients who were surgically or non-surgically treated. In this study we used a cross-sectional design, with the advantage that it is less time consuming than longitudinal research. A disadvantage of this type of research is that the data could only be analyzed at one point in time. This made it impossible to draw conclusions about the progression of the different psychological variables and their associations. A follow-up and repeated measures to determine changes over time, can only be done by longitudinal research and this is not possible with cross-sectional research. There was also a lot of missing data on the chronicity (acute, sub-acute, chronic) of the shoulder complaints (n=3) and on the treatment method (surgery, conservative) (n=5) in the current study. The disadvantages using questionnaires, are that different definitions can be used to describe the same problem or condition, that a combination of questionnaires need to be used to get a broader view of the psychological status of the patient and that these questionnaires are frequently an adaptation or modification of low back pain scales (Wiiitavaara, Björklund, Brulin, & Djupsjöbacka, 2009). This makes interpretation and comparison of results often difficult for shoulder patients.

## Future recommendations

Future studies should include more chronic shoulder pain patients in both surgery groups. It would also be interesting to investigate the relationship between perceived injustice and the different psychological variables during different follow-up periods to examine if the relations change over time. Also it might be useful to investigate how these psychological factors and perceived injustice can be practically implemented in a rehabilitation context. As evidence support the use of relaxation therapy to improve postsurgical pain and anxiety, patient education to decrease postoperative pain and cognitive or behavioral therapies to improve the recovery process after surgery (Szeverenyi et al., 2018). So it might be useful to introduce these psychological tools and trainings into the orthopedic shoulder rehabilitation settings. Future longitudinal studies should also focus on the question if these psychological variables are the cause of surgery or that they are the result of it. Next to that, it would be interesting to statistically compare the results of the two groups (CSP-S and CSP-NS) in future research. And finally, it may be worthwhile to implement the shorter version of the Tampa Scale for Kinesiophobia (TSK-11). This will make it easier to compare the scores between different studies.





## 6. Conclusion

In conclusion, this study analyzed the prevalence of pain intensity and different psychological variables and their associations with perceived injustice in chronic shoulder pain patients who were surgically or non-surgically treated. Our results suggest that the prevalence for most of the psychological variables and their association with perceived injustice were higher in chronic shoulder pain patients treated with surgery (CSP-S group), compared to patients in the CSP-NS group. This could be expected because people who received surgery after chronic shoulder pain, might not understand why their pain is not disappearing. They become more aware of their body and the situation they are in. Their negative feelings of depression, pain catastrophizing thoughts, feelings of injustice and fear of movement are more prevalent than in non-surgical chronic pain patients. They expected to be cured after the operation, but when that did not happen and the shoulder pain remained, these negative feelings became more present.



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**VOORTGANGSFOMULIER WETENSCHAPPELIJKE STAGE DEEL 2**

DATUM	INHOUD OVERLEG	HANDTEKENINGEN
September 2017	- Metingen shouderpatiënten bij Dokter Dierickx	Promotor: Copromotor: Student(e): Student(e):
Oktober 2017	- Onderzoeksvraag bepalen aan de hand van artikels - Kijken en beslissen welke vragenlijsten gebruikt zullen worden voor het onderzoek	Promotor: Copromotor: Student(e): Student(e):
Februari 2018	- Maken van de vragenlijsten: printen, inbinden	Promotor: Copromotor: Student(e): Student(e):
Maart - April 2018	- Verdelen van de vragenlijsten over verschillende kinesitherapie praktijken en raadplegingen meevolgen bij de orthopedische dokter om extra data te kunnen verwerven	Promotor: Copromotor: Student(e): Student(e):
April 2018	- Data ingeven	Promotor: Copromotor: Student(e): Student(e):
Mei 2018	- Statische analyse van de data in JMP	Promotor: Copromotor: Student(e): Student(e):
		Promotor: Copromotor: Student(e): Student(e):
		Promotor: Copromotor: Student(e): Student(e):
		Promotor: Copromotor: Student(e): Student(e):
		Promotor: Copromotor: Student(e): Student(e):