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Faculteit Revalidatiewetenschappen

master in de revalidatiewetenschappen en de kinesitherapie

Masterthesis

The influence of musculoskeletal pain and injury on within-subject movement variability at the upper extremity: a systematic review

Sarah Den Hond

Eerste deel van het scriptie ingediend tot het behalen van de graad van master in de revalidatiewetenschappen en de kinesitherapie

PROMOTOR :
dr. Liesbet DE BAETS

COPROMOTOR :
Prof. dr. Annick TIMMERMANS
dr. Bart DINGENEN

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The influence of musculoskeletal pain and injury on within-subject movement variability at the upper extremity: a systematic review

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Research question: How does upper extremity musculoskeletal pain or injury affect within-subject movement variability during repetitive task-related movements?

- There is a trend towards greater within-subject movement variability in MSK pain or injury groups.
- The precise courses of variability, as well as its potential consequences, still remain unclear.
- There is a need for more and stronger evidence about the relationship between musculoskeletal pain or injury and movement variability.

Student: Sarah Den Hond

Supervisor: dr. Liesbet DE BAETS

Co-supervisor(s): Prof. dr. Annick TIMMERMANS, dr. Bart DINGENEN

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Context

This systematic review is part of a master's thesis and can be situated within the research domain of musculoskeletal rehabilitation. The author of this review attempts to identify the influence of musculoskeletal upper extremity pain or injury on within-subject movement variability in the upper extremity.

Research shows that movement variability differs in people having musculoskeletal pain or injury. A change in movement variability can be an adaptation strategy to stabilize joints and prevent further pain or injury (Madeleine, Mathiassen, & Arendt-Nielsen, 2008). These adaptations demonstrate short-term benefits and protect patients against potential overuse injuries (Madeleine, Lundager, Voigt, & Arendt-Nielsen, 2003; Mathiassen, Moller, & Forsman, 2003). In contrast, deviating movement variability is associated with long-term chronic consequences that contribute to the recurrence of injury and pain (Hodges & Tucker, 2011). These contradictions prove the need for more and stronger evidence about the relationship between musculoskeletal pain or injury and movement variability. It is important to expand research analyzing movement variability to broaden clinicians' knowledge about this topic and to encourage physiotherapists of its importance in rehabilitation.

This systematic review is part of a study that analyzes the link between movement behavior of the shoulder and pain-related beliefs. Next academic year, the author will perform observational research in this context. This research will take place in the movement laboratory of REVAL - Rehabilitation Research Center of Hasselt University.

General guidelines of a central format were used throughout the entire review. One student, Sarah Den Hond, wrote the systematic review under the supervision of dr. Liesbet De Baets. This student was able to prepare an appropriate research question in agreement with her supervisor. Furthermore, an existing protocol was modified, according to the student's interests, to report the research design and aim of the second part of the master's thesis (MP2).

Abstract

Background: Movement variability is defined as variations in joint movements, joint coordination and muscle activation patterns that arise between repetitions of tasks. It can be affected by several factors such as pain, fatigue, and skill level. However, the association between pain and movement variability in the upper extremity is unclear.

Methods: The databases PubMed and Web of Science were used. Studies were included if: they assessed the influence of musculoskeletal (MSK) pain/injury at the upper extremity on within-subject movement variability; the assessment of movement variability involved movement patterns, muscle activity, and moments; a standardized tool was used to measure movement variability in task-related movements; studies performed a correlation/regression analysis. Studies were excluded if: participants suffered primary pathologies other than MSK pain or injury; the study procedure was not clearly described; only healthy participants were considered.

Results: Four studies demonstrated significantly higher within-subject movement variability in participants experiencing upper extremity MSK pain or injury. Four other studies documented both increased and decreased within-subject variability. Furthermore, one study reported lower within-subject movement variability in patients with MSK pain and injury.

Discussion and conclusion: Findings suggest that within-subject movement variability differs in people experiencing upper extremity MSK pain or injury.

Research goal: The aim of this study is to summarize articles investigating how MSK pain or injury affects within-subject movement variability during repetitive task-related movements.

Research question: How does upper extremity MSK pain or injury affect within-subject movement variability during repetitive task-related movements?

Key points: Upper extremity, musculoskeletal pain, musculoskeletal injury, movement variability

1 Introduction

Musculoskeletal disorders (MSDs) can be described as a group of conditions associated with the body's musculoskeletal (MSK) system (Gatchel & Schultz, 2014). The patients' quality of life is severely affected since these disorders concern the entire MSK system including joints, muscles, tendons, and ligaments (March et al., 2014). Research indicates that after mental and behavioral problems, which account for 23.2% of the total years lived with disability, MSDs represent 21.3% of the total years lived with disability (Murray et al., 2012), making them the third most common reason to seek medical help (Gatchel & Schultz, 2014). MSDs can be work-related and are often associated with pain. Worldwide, work-related MSK pain and disability entail tremendous costs for our society (Gatchel & Schultz, 2014). Although underlying mechanisms are not fully understood, various studies demonstrate that people in pain move differently (Hodges & Tucker, 2011).

Moving differently is related to movement variability, which refers to variations that arise while performing multiple repetitions of a movement (Stergiou, Harbourne, & Cavanaugh, 2006). The intrinsic variability is natural and occurs in the most fundamental movements; it can be defined as variations in joint movements, joint coordination and muscle activation between repetitions of identical tasks (Srinivasan, Mathiassen, Samani, & Madeleine, 2015). Movement variability can be affected by several factors such as pain, fatigue, differences in working techniques, and skill level (Srinivasan & Mathiassen, 2012). The amount of motor variability differs in individuals even though performing similar tasks (Srinivasan & Mathiassen, 2012). In line with this finding, Bernstein (1967) demonstrated that, regardless of the experience or skills, repeated movements cannot be performed with an exact similar trajectory (Bernstein, 1967). The existence of chaos in movement variability is essential to guarantee health and functional movement (Stergiou & Decker, 2011). Previous research also indicates a loss of flexibility of the motor system when the accuracy demands of a task are increased (Kudoh, Hattori, Numata, & Maruyama, 1997; Soechting, 1984). Nevertheless, in changing conditions movement variability is required for the adaptations that occur in the MSK system (Riley & Turvey, 2002).

Variability in motor behavior can be assessed by different methods, of which electromyography (EMG) and analysis of three-dimensional (3D) motions are the most

important ones. EMG measures the extent and timing of muscle activity in an accurate, reliable and non-invasive way, while joint movements and coordination patterns are registered with 3D kinematics using reflective markers and cameras (Basmajian, 1985). The coefficient of variation and standard deviation are commonly used linear statistical tools to quantify the amount of movement variability (James, 2004). Furthermore, sample entropy and approximate entropy are non-linear statistical tools that are used to quantify the structure of variability (Baida, Gore, Franklyn-Miller, & Moran, 2018).

The author of this study focuses on the influence of pain on within-subject motor variability. There is a growing interest in the relationship between pain and within-subject motor variability, knowing that pain affects various aspects of task performance (Hodges & Tucker, 2011). Furthermore, Baida et al. (2018) demonstrate that more than 80% of the included pain studies showed an overall trend to greater within-subject variability of movement in patients with lower extremity injuries compared to healthy controls (Baida et al., 2018). Moreover, research shows that due to pain motor adaptations occur (Hodges & Tucker, 2011). These adaptations demonstrate short-term benefits but can have long-term chronic consequences that contribute to the recurrence of injury and pain (Hodges, 2011). Identifying the relevance of motor adaptations and finding an adequate balance in moving challenges the patients' rehabilitation (Hodges, 2011). It is important to expand research analyzing movement variability to broaden clinicians' knowledge about this topic. More background knowledge is necessary to adjust and add movement variability in treatments and focus on preventing possible negative consequences such as recurrence or relapse of injury or pain in the presence of deviating movement variability. The aim of this study is to summarize relevant articles investigating how MSK pain or injury affects within-subject movement variability during functional repetitive task-related movements.

2 Methods

2.1 Research question

The following research question is used: 'How does upper extremity MSK pain or injury affect within-subject movement variability during repetitive task-related movements?'.

Keywords: upper extremity, musculoskeletal pain, musculoskeletal injury, movement variability.

2.2 Literature search

In December 2018, one reviewer initiated the literature search by using the bibliographic electronic databases: PubMed and Web of Science. The search strategy was performed based on several keywords divided into four groups namely upper extremity, disorders, motor behavior, and movement variability. A fifth group was added involving search terms that could not be included within the electronic search. An overview of the search strategy is presented in Table 1. The search terms within each of the clusters were combined using the 'OR' Boolean operator. The 'AND' Boolean operator was used to merge four clusters, while the fifth cluster was added with Boolean operator 'NOT'. The author of this review performed a second search using PubMed in May; this search yielded 53 new published results. One out of 53 studies was read on full text but was excluded.

Table 1
Search terms

Peripheral joints	Wrist OR finger OR hand OR elbow OR epicondylitis OR Shoulder OR Subacromial OR impingement OR glenohumeral OR scapul* OR "rotator cuff" OR upper-extremit* OR upper extremit* OR upper limb* OR arm OR peripheral joint*
Disorders	Pain OR Disorder OR Impairment OR *function OR Disease OR Abnormalit* OR Complaint OR Disabil* OR Discomfort* OR Patholog* OR Problem OR Injur*
Motor behavior	Joint angle OR joint angles OR Movement control OR motor control OR coordination OR motion OR ROM OR biomechanical OR biomechanics OR kinematic OR kinematics OR joint motion OR joint excursion OR joint excursions OR stiffness OR motor behavior OR motor behaviour OR sway OR flexibility OR Velocity OR speed OR spatiotemporal OR spatial OR temporal OR acceleration OR accelerations OR jerk OR smoothness OR Electromyographic OR electromyography OR EMG OR Muscle fatigue or musclar fatigue OR Muscle activity OR muscular activity OR muscle activation OR muscular activation OR muscle function OR muscular function OR muscle functions OR myoelectric activity OR activation pattern OR activation patterns OR activity pattern OR activity patterns OR muscle timing OR muscular timing
Movement variability	Variability OR redundancy OR entrophy OR "spatial variation" OR "temporal variation" OR adaptibility OR abundance OR "motor equivalence" OR "noise"

NOT (All Fields)	Amputation* OR prosthetic* OR Stroke OR Post stroke OR Autism OR Autism Spectrum Disorders OR acute lymphoblastic leukemia OR COPD OR chronic obstructive pulmonary disease OR HIV-2 protease OR HIV OR Peripheral Artery disease OR periferal arterial disease OR Mouth disease OR Parkison* OR Parkinson's disease OR spastic* OR cerebellar ataxia OR ataxia OR cerebral palsy OR Huntington* OR multiple sclerosis OR osteogenesis imperfecta OR Pallister-Killian syndrome OR Lyme disease OR hemiplegia OR diabetes OR Type 2 diabetes OR vestibular OR social anxiety disorder OR bacterial colonization OR chronic kidney disease OR arthroplasty OR schizophrenia OR cystic fibrosis OR atherosclerosis OR Alzheimer's disease OR breast cancer OR Guillain-barre syndrome OR cardiovasculair dysfunction OR Down syndrome OR developmental coordination disorder OR chronic hypotension
# hits PubMed	1137 in December/53 new hits in May
# hits WoS	1252
BOOLEAN operators within clusters	OR
BOOLEAN operators between clusters	AND, NOT

2.3 Selection criteria

The selection criteria were formulated by the author before the search was started. Studies were included if they assessed the influence of MSK pain (high or low levels of pain) or injury (short-term injury and long-term post-injury/post-surgery) of single or multiple peripheral joint(s) at the upper extremity on within-subject variability in motor behavior. Furthermore, studies were included if the assessment of motor behavior involved movement patterns, muscle activity and muscle forces and moments. The assessment of movement patterns involves joint angle(s), range of motion, joint motion and spatiotemporal parameters. Additionally, studies were included if they used a standardized tool to measure variability in motor behavior (e.g. EMG or laboratory systems, inertial sensors or clinical measurement tools like inclinometers) in active analytical and functional task-related movements. Furthermore, studies perform a correlation analysis or regression analysis where MSK pain or injury acts as an independent variable and variability in motor behavior acts as a dependent variable. All selected studies are written in English or Dutch language. Studies were excluded if participants suffered primary pathologies other than MSK pain or injury at the upper extremity. Studies were excluded if the study procedure was not clearly described or if only healthy participants were used and if lower extremity was considered.

2.4 Quality assessment

The STROBE-checklist was used to perform a quality assessment of the nine included studies thus guaranteeing the quality of the studies.

2.5 Data extraction

One reviewer extracted relevant data answering the research question from all the included articles. The data extraction table contained information about the author and year of publication, information regarding patients characteristics, the aim of the study, methods used for measurements, key findings and conclusions. Furthermore, a qualitative synthesis of the results was achieved, due to heterogeneity.

3 Results

3.1 Results of study selection

The first search on PubMed and Web of Science took place in December 2018 and yielded 2389 results. In May 2019, the author performed a second search on PubMed, resulting in 53 additional studies. Search terms that were used and the number of hits from both electronic databases are illustrated in Table 1. All articles were merged and imported into EndNote (version X8.2) after which the author removed all duplicates, eventually resulting in 2034 articles. The remaining studies were screened for title and abstract. Furthermore, reference lists of included studies were manually screened to extract additional papers. Twenty-nine potentially relevant articles were read in full text. Of those 29 studies, 20 were excluded for the following reasons: (a) pain or disability were induced (n=3), (b) no primary MSK pain or injury at the upper extremity (n=9), (c) outcome other than MSK pain or injury at the upper extremity (n=8). All excluded studies are illustrated in Table 2. Finally, nine studies, published between 1997 and 2018, were included. Figure 1 illustrates a flow diagram of the search strategy. All nine studies were designed to investigate within-subject movement variability at the upper extremity. Six of these nine studies compared a group who experienced MSK pain or injury with a healthy and pain-free control group: one of these studies explored the influence of pain on within-subject variability in muscle activity and movement during a repetitive reaching task in participants with chronic neck-shoulder pain compared to participants without pain; another study explored the influence of work-related pain on within-subject spatial and temporal movement variability in participants with MSDs at the upper extremity compared to healthy controls; three studies investigated the influence of pain and discomfort in the neck-shoulder region on within-subject movement variability among symptomatic butchers compared to healthy butchers; the last study explored the within-subject variability of scapular kinematics in patients with and without shoulder pain. The three remaining studies explored the association between MSK pain or injury and variability by means of correlation/regression statistics: one study explored the association between shoulder injury and within-subject movement variability during humeral elevation; a second study explored the influence of chronic lateral epicondylalgia on within-subject variability of muscle activity; the last study explored the influence of unilateral shoulder injury on within-subject variability in muscle recruitment of the scapular

rotators.

Table 2

Studies excluded after full review

Reason for exclusion	Number of studies	Author(s), year
Pain or disability was induced	n = 3	Adams et al., 2003; Bergin et al., 2014; Salomoni et al., 2012
No primary pain or MSK injury	n = 9	Amasay et al., 2009; Ancillao et al., 2017; Avanzino et al., 2013; Balendra et al., 2014; Chihara et al., 2014; Chopp-Hurley et al., 2016; Gates et al., 2011; Kontson et al., 2018; Rice et al., 2014
Outcome other than pain or MSK injury	n = 8	Ahamed et al., 2014; Cagnie et al., 2010; Cowley et al., 2017; Cowley et al., 2018, Hotta et al., 2018; Januario et al., 2017; Kocyigit et al., 2016; Voerman et al., 2007;

MSK: musculoskeletal

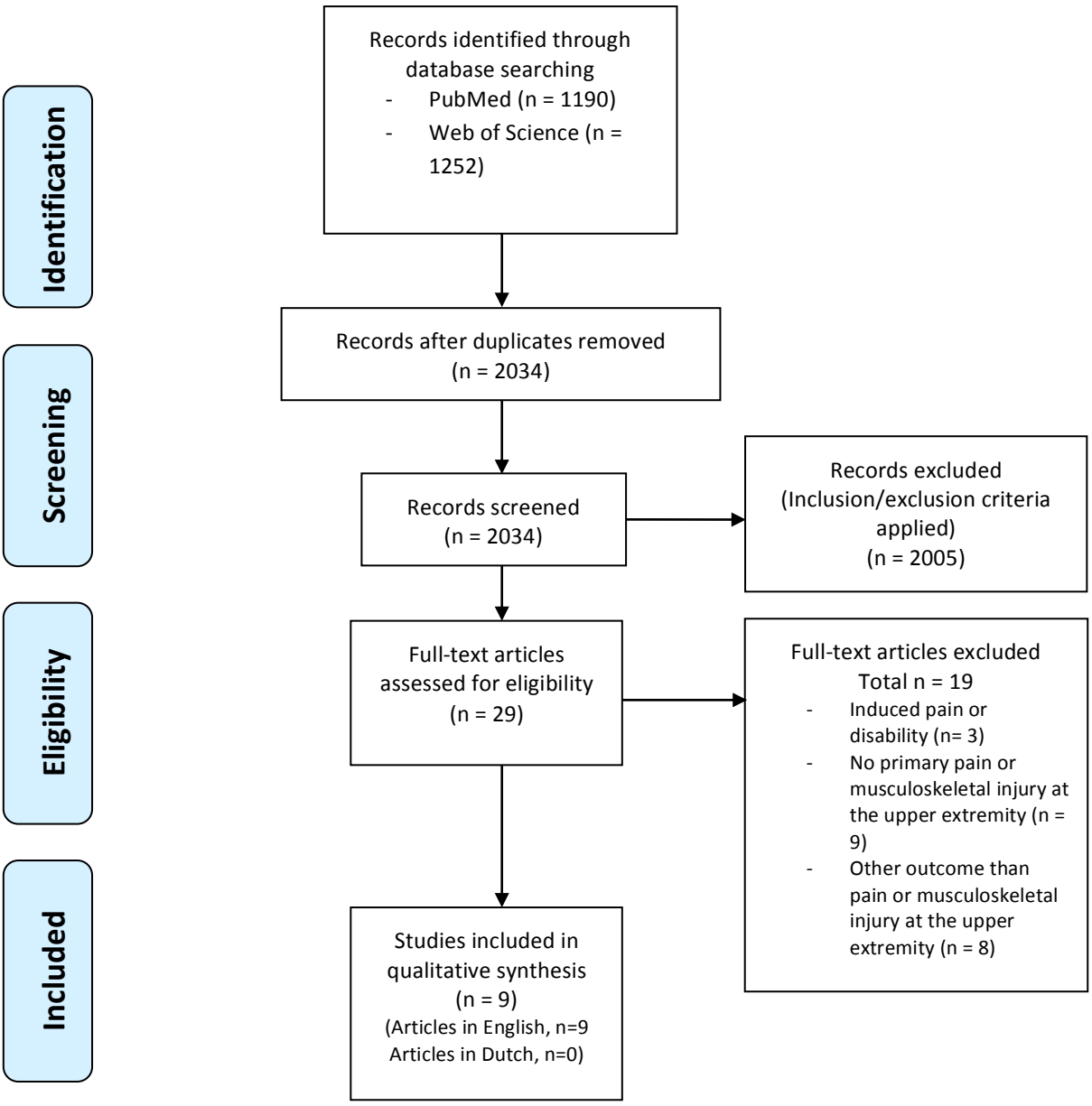

Figure 1. Flowchart of the search strategy.

3.2 Quality assessment

The author used the STROBE-checklist to assess the scientific quality of the included studies. A summary of the assessment is illustrated in Table 3. Scores ranged from 7 to 11 points out of 12, with an average score of 8.5. Each criterion of the checklist was scored as follows: 0 (no description), 1 (moderate description) and 2 (good description). All included studies achieved a maximum score for three important parts of the checklist, namely defining the outcomes, methods of assessment and statistical procedure. No study properly described the risk of potential bias. Furthermore, only three of the nine studies clearly defined the inclusion and exclusion criteria (Longo, Meulenbroek, Haid, & Federolf, 2018; Rossi, Resende, da Fonseca, & de Oliveira, 2018; Wadsworth & Bullock-Saxton, 1997). Finally, no studies were excluded based on poor quality, defined as a score lower than six out of 12.

Table 3

Critical appraisal of included studies using the STROBE-checklist

Study	Eligibility criteria	Outcomes defined	Methods of assessment	Description of bias	Statistical procedures	Generalizability	Final score (max. 12)
(Lomond & Cote, 2010)	1	2	2	0	2	1	8
(Longo et al., 2018)	2	2	2	1	2	2	11
(Lopez-Pascual, Page, & Serra-Ano, 2018)	1	2	2	1	2	2	10
(Madeleine & Madsen, 2009)	0	2	2	0	2	1	7
(Madeleine, Mathiassen, et al., 2008)	0	2	2	0	2	1	7
(Madeleine, Voigt, & Mathiassen, 2008)	1	2	2	0	2	2	9
(Manickaraj, Bisset, Devanaboyina, & Kavanagh, 2017)	1	2	2	0	2	0	7
(Rossi et al., 2018)	2	2	2	0	2	1	9
(Wadsworth & Bullock-Saxton, 1997)	2	2	2	0	2	1	9

2: Good description; 1: Moderate description; 0: No description.

Table 4

Strength-weakness analysis of the included studies

Study	Strength	Weakness
(Lomond & Cote, 2010)	- Inclusion criteria properly defined - Well described statistical analysis - EMG measurements are standardized - Outcomes properly defined	- Small sample size (n=32) - Exclusion criteria were described in another study - No description of potential bias - No blinding of participants, therapists or assessors - Reduced generalizability due to the small sample size
(Longo et al., 2018)	- Eligibility criteria properly defined - Properly described protocol - Well described statistical analysis - Outcomes well described	- Small sample size (n=41) - Reduced generalizability due to the small sample size - The hypothesis suggests that including volunteers in pain can constitute the risk of biasing the analysis - No blinding of participants, therapists or assessors
(Lopez-Pascual et al., 2018)	- Large sample size (n=95) - Inclusion criteria properly defined - Measurements are standardized - Protocol well described - Thoroughly defined statistical analysis - Effort done to avoid potential selection bias - Outcomes well described	- No blinding of participants, therapists or assessors - Statistical differences between groups in age and BMI, results should be used with caution
(Madeleine & Madsen, 2009)	- Measurements are standardized - Protocol well described - Thoroughly defined statistical analysis - Outcomes well described	- Small sample size (n=18) - Eligibility criteria not thoroughly described - No description of potential bias - No blinding of participants, therapists or assessors - Reduced generalizability due to the small sample size
(Madeleine, Mathiassen, et al., 2008)	- Motor recordings are standardized - Protocol well described - Statistical procedure well defined - Outcomes well described	- Small sample size (n=18) - Eligibility criteria not thoroughly described - No description of potential bias - No blinding of participants, therapists or assessors

		- Reduced generalizability due to the small sample size
(Madeleine, Voigt, et al., 2008)	- Inclusion criteria well defined - EMG measurements are standardized - Statistical procedure well defined - Outcomes well described	- Small sample size (n=38) - Differences in baseline characteristics - No description of potential bias - No blinding of participants, therapists or assessors - Reduced generalizability due to the small sample size
(Manickaraj et al., 2017)	- EMG measurements are standardized - Statistical procedure well defined - Protocol well described - Outcomes well described	- Small sample size (n=22) - No description of potential bias - No blinding of participants, therapists or assessors - Reduced generalizability due to the small sample size
(Rossi et al., 2018)	- Large sample size (n=98) - Eligibility criteria thoroughly described - Protocol well described - Measurements are standardized - Outcomes properly defined	- The examiner is not blinded to the presence of shoulder pain, the physiotherapist was not blinded to the presence/absence of shoulder pain - Baseline characteristics differed in age and BMI suggesting a potential selection bias - No description of potential bias
(Wadsworth & Bullock-Saxton, 1997)	- Eligibility criteria thoroughly described - Protocol well described - Measurements are standardized - Outcomes properly defined	- Small sample size (n=18) - No description of potential bias - No blinding of participants, therapists or assessors - Reduced generalizability due to the small sample size

3.3 Data extraction

To address the research question, relevant outcomes of the included studies were extracted. A summary is presented in Table 4. Four of the included studies demonstrated significantly higher within-subject movement variability in participants experiencing MSK pain or injuries. A first study showed that participants with chronic neck-shoulder pain demonstrated higher within-subject shoulder relative spatial and temporal variability for the anterior-posterior ($p=0.02$) and superior-inferior ($p=0.03$) directions during a reaching task (Lomond & Cote, 2010). In line with this finding, a second study demonstrated that participants with MSDs at the upper extremity who experienced mild or severe pain often changed their postures, indicating a higher within-subject spatial variability ($p=0.016$) (Longo et al., 2018). In addition, this study reported that severe pain groups also exhibited more interruptions of the cyclic movement, indicating higher within-subject temporal variability ($p=0.003$) (Longo et al., 2018). Furthermore, another study revealed that patients with shoulder injuries and pain displayed higher within-subject functional variability in the shoulder ($r= 0.48$, $p<0.01$) and significantly lower approximate entropy ($r=-0.52$, $p<0.01$) during humeral elevation (Lopez-Pascual et al., 2018). Finally, Wadsworth et al. (1997) showed that within-subject variability in the activation of the upper trapezius and lower trapezius muscles is higher and the variance of the serratus anterior muscle is considerably greater in injured subjects (both $p<0.05$) (Wadsworth & Bullock-Saxton, 1997). Furthermore, this is the only study calculating the standard deviation for all subjects in each group to determine whether any variances were reflecting inter- or intra-subject variability. These results indicated that these values, on both the injured and non-injured side, were substantially greater for all muscles, demonstrating that injured subjects displayed greater intra-subject variability (Wadsworth & Bullock-Saxton, 1997). Four other studies documented both increased and decreased within-subject variability, depending on the parameters that were measured. First, Madeleine & Madsen (2009) compared workers with neck-shoulder discomfort to workers without discomfort and found a lower coefficient of variation for the head-shoulder displacement ($p=0.03$) and lower shoulder-hip displacement ($p=0.05$) (Madeleine & Madsen, 2009). In contrast, participants with neck-shoulder discomfort demonstrated higher standard deviation of the elbow-hip displacement ($p=0.011$), higher approximate entropy, and higher sample entropy compared to healthy

controls (Madeleine & Madsen, 2009). Second, compared to healthy persons, participants with chronic neck-shoulder pain showed smaller within-subject variability in EMG activity ($p<0.05$) and smaller within-subject variability in the amplitude of arm and trunk acceleration ($p<0.001$). However, the variability of task cycle duration was increased during pain ($p=0.042$) (Madeleine, Mathiassen, et al., 2008). In a third study, the same research group examined the influence of sub-chronic neck-shoulder pain and discovered a smaller standard deviation in starting position of the arm ($p=0.028$), and a greater standard deviation in starting position for the trunk ($p=0.042$) (Madeleine, Voigt, et al., 2008). In addition, the standard deviation of the work cycle and range of motion of the trunk tended to be smaller in presence of pain, although not statistically significant ($p=0.098$ and $p=0.074$, respectively) (Madeleine, Voigt, et al., 2008). The last study showed greater within-subject variability in scapular tilt at the end of the arm-lowering phase (no p-value mentioned) (Rossi et al., 2018). However, smaller variability in scapular anterior tilt was seen in participants with pain and scapular dyskinesis (SDK) at the beginning of the arm-lowering phase (no p-value mentioned). In addition, pain-free participants with SDK showed a smaller within-subject variability in anterior tilt at the end of the arm-lowering phase (no p-value mentioned) (Rossi et al., 2018). Only one study exclusively reported lower within-subject variability in patients with chronic elbow pain, reporting that a decrease in pain was significantly associated with decreased activation of synergies ($p=0.025$) (Manickaraj et al., 2017).

Table 4.
Characteristics of included studies

Author, year	Characteristics of study population (Number, sex, mean age (SD); type of pain or musculoskeletal injury)	Aim of the study	Methods used (measurements)	Key findings	Conclusions
COMPARISON BETWEEN PAIN/MUSCULOSKELETAL INJURY AND NO PAIN/MUSCULOSKELETAL INURY GROUPS					
(Lomond & Cote, 2010)	N = 16 (M/F), 40.1(12.1) Participants with chronic neck/shoulder pain N = 16 (M/F), 39.7(13.2) Healthy controls	To investigate the influence of pain on variability in muscle timing variability and movement variability, in particular in spatial and temporal characteristics in within- and between-dynamic movements during a repetitive reaching task.	EMG Kinematics (camera + reflective markers) Pain (NRS)	The pain group demonstrated increased shoulder relative spatial/temporal variability for the AP ($p = 0.02$) and SI ($p = 0.03$) directions during a reaching task.	Participants with chronic neck/shoulder pain demonstrate increased relative variability of shoulder movements.
(Longo et al., 2018)	N = 22 (M/F), 30.5(10.1) Right-handed participants with MSDs of the upper extremity N = 19 (M/F), 30.2(9.5) Healthy controls	To explore the influence of emerging work-related pain on spatial and temporal movement variability.	3D Kinematics	MSD groups with pain and severe pain changed their posture more often demonstrating higher spatial variability ($p = 0.016$). The MSD group with severe pain showed more interruptions of the cyclic movement demonstrating higher temporal variability ($p=0.003$).	Motor variability increases when accompanied by pain.

(Madeleine & Madsen, 2009)	N = 18 (M), 35.9(9.4) Participants with low or high work experience and with or without discomfort in the neck-shoulder region	To investigate motor variability in relation to the subjects' work experience and reported discomfort in the neck-shoulder region.	Kinematics (digital video camera + markers)	The coefficient of variation was lower for workers with neck-shoulder discomfort compared to workers without discomfort for the head-shoulder displacement ($p=0.03$) and the shoulder-hip displacement ($p=0.05$), while it was opposite for the SD of the elbow-hip displacement ($p=0.011$). Further, approximate entropy and sample entropy were higher for workers with neck-shoulder discomfort compared to workers without discomfort for the elbow-hip displacement ($p=0.03$ & $p = 0.007$).	In presence of discomfort in the neck-shoulder region lower amount of variability was found for the head-shoulder vertical displacement, in contrast to a greater amount of variability for the vertical displacement of elbow-hip.
(Madeleine, Mathiassen, et al., 2008)	N = 12 (gender not shown), 48.6 (7.2) Butchers with chronic neck-shoulder pain N = 6 (gender not shown), 43.8 (6.7) Healthy controls	To investigate the effects of chronic neck/shoulder pain on the magnitude of cycle-to-cycle variability of task timing, kinematics and muscle activation during repetitive arm movement.	3D kinematics: 3D motion analysis system (camera's + reflective markers) EMG	Cycle-to-cycle variability in amplitude of arm and trunk acceleration ($p <0.001$) and variability magnitude of EMG activity ($p <0.05$) are smaller in patients with chronic neck-shoulder pain compared to healthy controls, while variability of task cycle duration was increased in patients with chronic neck-shoulder pain compared to healthy controls ($p = 0.042$).	Patients with chronic neck/shoulder pain demonstrate smaller EMG activity and greater variability in durations of task events.

(Madeleine, Voigt, et al., 2008)	Learning and pain study: N = 12 (F), 27.8(8.7) Work experience study: N = 20 (M), 26.1(2.9) Healthy students without experience N = 6 (M), 43.8 (6.7) Non-symptomatic experienced butchers	To investigate potential changes in motor variability with pain among butchers.	EMG 3D analyses	The presence of sub-chronic neck/shoulder pain exhibits smaller SD of the work cycle ($p = 0.098$), smaller SD in starting position for the arm ($p = 0.028$), smaller SD for the ROM of the trunk ($p = 0.074$) and greater SD in starting position for the trunk ($p = 0.042$).	Sub-chronic shoulder pain exhibits a decrease in variability of the arm-movement and an increase of the ROM of the trunk.
(Rossi et al., 2018)	N = 24 (M/F), 47.21 (8.6) Participants with pain and SDK N = 25 (M/F), 48.6 (8.7) Participants with pain N = 24 (M/F), 34.38(8.6) Participants with SDK N = 25 (M/F), 40.76(10.5) Participants without SDK and pain	To investigate the variability of scapular kinematics in patients with shoulder pain and in asymptomatic participants with and without SDK.	Electromagnetic tracking device Pain (NRS)	Participants with pain and SDK exhibit smaller variability in scapular anterior tilt at the beginning of the arm-lowering phase but greater variability in tilt at the end. SDK only demonstrates smaller within-subject variability in anterior tilt at the end of the arm lowering.	Shoulder pain and SDK exhibit greater within-subject variability of scapular anterior tilt while lowering the arm after elevation. There is smaller within-subject variability in anterior tilt at the end of the arm lowering.
ASSOCIATION BETWEEN PAIN/INJURY AND MOVEMENT VARIABILITY					
(Lopez-Pascual et al., 2018)	N = 37 (M/F), 49.81(11.55) Participants with right shoulder injury N = 58 (M/F), 42.47(11.55) Healthy controls	To investigate the characteristics of movement variability during humeral elevation.	Kinematics (reflective markers + camera) Pain (VAS)	Participants with shoulder injury and pain demonstrate higher functional variability in the shoulder ($r= 0.48$, $p<0.01$) and lower approximate entropy ($r= -0.52$, $p<0.01$) during humeral elevation.	Shoulder injuries and pain exhibit higher movement variability, showing a correlation between movement variability and perceived pain.

(Manickaraj et al., 2017)	N = 11 (M/F), 42(11) Participants with chronic elbow pain (LE) N = 11 (M/F), 42(11) Healthy controls	To investigate the variability of forearm muscle activity during the development of grip force.	EMG Pain (NRS)	A significant linear relationship was demonstrated between the level of synergy activation and pain. A decrease in pain is associated with a decreased level of synergy activation ($p = 0.025$).	Patients with chronic elbow pain exhibited less variability in the motor system and exhibited greater similarity in muscle synergies across wrist postures when developing grip force.
(Wadsworth & Bullock-Saxton, 1997)	N = 9 (gender not shown), 23.2 Swimmers with unilateral shoulder pathology N = 9 (gender not shown), 19.3 Non-injured swimmers	To investigate the effect of a current shoulder injury on the temporal recruitment pattern of the scapular rotators, determine whether these effects extend to the non-injured side, and investigate the normal intra-subject variability in muscle recruitment and the effect of injury on variability.	EMG	Injured subjects displayed far greater variability in the activation of the upper trapezius, lower trapezius, and serratus anterior. The variance of the serratus anterior muscle activity was significantly greater on the injured side of subjects in the injured group. In order to determine whether any variances found to be significantly different were reflecting inter- or intra-subject variability, the standard deviation of the three trials for each subject in each group were calculated. These comparisons indicated that the values on both the injured and non-injured side were substantially greater for all muscles than those for the control group, implying that injured subjects displayed greater intra-subject variability.	There is a bilaterally increased variability in the temporal recruitment patterns of unilateral shoulder injured swimmers when compared to non-injured swimmers.

3D: three dimensional; AP: anterior-posterior; EMG: electromyography; LE: lateral epicondylalgia; MSD: musculoskeletal disorders; NRS: numeric rating scale; ROM: range of motion; SD: standard deviation; SDK: scapular dyskinesis; SI: superior-inferior; VAS: visual analogue scale

4 Discussion

4.1 Reflection about quality of the studies

Although none of the studies were excluded based on poor quality, some studies did reach the margin of the minimum score, indicating the presence of several limitations. A first limitation was the reduced generalizability of the studies mostly due to small sample sizes or inclusion of a specific population such as butchers. Seven out of nine studies had a small sample size ranging between 18 and 41 participants. Two remaining studies included a large sample size of 95 and 98 participants. A second limitation is the lack of thoroughly described potential bias or confounders (e.g. differences in baseline characteristics between groups causing potential bias). Furthermore, a final limitation was the lack of blinding of the participants or physiotherapists in all studies, resulting in the second cause of possible bias. Despite these minor limitations, the studies maintained sufficient quality to be included.

4.2 Reflection about findings in function of the research question

Hamill et al. (1999) developed a theory called the dynamic systems theory. This theory provides knowledge and understanding of the association between motor performance and variability (Hamill, van Emmerik, Heiderscheit, & Li, 1999). Hamill et al. (1999) presented the relationship between motor performance and variability as a U-shaped association where either too little or too much variability is thought to have a detrimental impact on performance and may be associated with pathological populations (Hamill et al., 1999). This systematic review investigates the influence of MSK pain or injury on within-subject movement variability at the upper extremity in pain groups solely and in pain groups compared to healthy controls. Research shows that factors such as pain can cause changes in the size and structure of motor variability (Madeleine & Madsen, 2009; Srinivasan & Mathiassen, 2012). These changes cause alterations in movement patterns, which can be explained by the pain adaptation model (Hodges & Tucker, 2011). This model implies a reduction in the capacity of the painful muscle to contract, which causes an increase of activity of the healthy antagonist or synergist (Lund, Donga, Widmer, & Stohler, 1991). In this review, findings suggest that there is still controversy about the impact of MSK pain or injury on within-subject movement variability at the upper extremity. Four out of nine

included studies showed that participants experiencing pain or having MSK injuries demonstrate greater within-subject variability in movements than healthy controls. Increased relative within-subject variability of the movements of the shoulder is seen in participants with chronic neck-shoulder pain (Lomond & Cote, 2010). The study of Lopez-Pascual et al. (2018) demonstrated a correlation between movement variability and perceived pain, showing higher within-subject variability of movement in patients with chronic pain and shoulder injuries (Lopez-Pascual et al., 2018). Based on temporal recruitment patterns in muscle activity, increased within-subject variability was observed in patients with acute shoulder injury (Wadsworth & Bullock-Saxton, 1997). Furthermore, right-handed patients with upper extremity MSDs showed significantly greater within-subject movement variability at the upper extremity in chronic pain (Longo et al., 2018). Longo et al. (2018) also stated that an increase in movement variability was associated with the appearance of pain, suggesting that the regular change of one's posture was used as a strategy to cope with chronic pain or MSD (Longo et al., 2018). Possible causes resulting in greater movement variability are poorly controlled movement and the use of compensatory movement strategies to reduce loading on painful tissues (Hodges & Tucker, 2011; Madeleine & Madsen, 2009; Tsao, Galea, & Hodges, 2008). Patients use compensatory movement mechanisms as a short-term goal to protect painful tissues or to prevent overuse injuries, although this cannot be seen as a long-term solution (Baida et al., 2018; Madeleine et al., 2003; Mathiassen et al., 2003). In contrast, four other studies demonstrated both lower and higher within-subject movement variability at the upper extremity in shoulder pain (Madeleine & Madsen, 2009; Madeleine, Mathiassen, et al., 2008; Madeleine, Voigt, et al., 2008; Rossi et al., 2018). For example, Madeleine et al. (2008) demonstrated that the presence of pain is associated with lower variability of muscle activity, which indicates the use of an adaptation strategy were the joint gets stabilized to prevent further pain or injury, to protect all tissues(Madeleine, Mathiassen, et al., 2008). In addition, one study showed that patients with chronic lateral epicondylalgia demonstrated a decrease in variability of the motor system with greater similarity in muscle synergies during grip force (Manickaraj et al., 2017). Furthermore, research shows a decrease in variability, which can be a potential cause of MSDs (Mathiassen, 2006). Moreover, Hamill et al. (1999) stated that dysfunction is often characterized by a loss of flexibility, which is associated with a lack of variability (Hamill et al., 1999). In line with our findings about the influence of MSK pain or injury on

within-subject movement variability at the upper extremity, Baida et al. (2018) reported a similar trend towards greater variability in movement in the injured lower extremity (Baida et al., 2018).

4.3 Limitations and strengths of this literature study

A first limitation of this study is that only one dependent author conducted this literature review. In addition, merely two different databases were used. Another limitation of this review is the underlying assumption that a 'normal' magnitude of variability exists and is associated with healthy individuals. However, no references regarding a 'normal' magnitude of variability were documented. Furthermore, a strength of this article is that despite the limited presence of scientific evidence on this subject, the author could already gather information that could support possible outcomes in a study that will take place next academic year.

4.4 Recommendations for the future

Future research should focus on analyzing the influence of pain or primary MSK injury on variability in motor behavior during the performance of repetitive task-related movements in large samples to strengthen scientific evidence and to emphasize the importance of targeting variability in rehabilitation in patients with pain or MSK disorders. Furthermore, assessing which pain-related factors (e.g. pain-related fear, pain catastrophizing) are influencing the amount of movement variability in persons with pain or primary MSK injury would be of interest.

5 Conclusion

Findings suggest that within-subject movement variability differs in people experiencing MSK pain or injury at the upper extremity. Although there seems to be a trend towards greater within-subject movement variability in MSK pain or injury groups, the precise course of variability, as well as its potential consequences, still remain unclear.

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Part 2 Research protocol

1 Introduction

Musculoskeletal disorders (MSDs) represent 21.3% of the total years lived with disability, making them the third most common reason to seek medical help (Murray et al., 2012) Gatchel & Schultz, 2014). MSDs can be work-related and are often associated with pain (Gatchel & Schultz, 2014). Various studies demonstrate that people in pain move different, also with regard to movement variability (Hodges & Tucker, 2011). Research shows that due to pain, motor adaptations occur (Hodges, 2011), which show short-term benefits but can have long-term chronic consequences that contribute to the recurrence of injury and pain (Hodges, 2011). Identifying the relevance of motor adaptations and finding an adequate balance during movement challenges the patients' rehabilitation (Hodges, 2011). Unfortunately, little is known about the influence of musculoskeletal shoulder pain or injury on within-subject movement variability at the upper extremity. It is important to expand research analyzing movement variability to broaden clinicians' knowledge about this topic. More background knowledge is necessary to adjust and add movement variability in treatments and focus on preventing possible negative consequences such as recurrence or relapse of injury or pain in the presence of deviating movement variability.

2 Research goal

2.1 Research question

"How does pain influence within-subject movement variability during the performance of repetitive tasks in the scapular plane in patients with chronic shoulder pain?"

2.2 Hypothesis

Patients with chronic shoulder pain demonstrate higher within-subject variability in 3D scapulothoracic and glenohumeral movement while reaching repetitively towards a target in the scapular plane.

3 Methods

3.1 Research design

The study has a cross-sectional design, which means that there will be an observation of different participants with chronic shoulder pain. There is only one test session per participant.

3.2 Participants

3.2.1 Inclusion criteria

The participants with chronic shoulder pain need to: (a) be at least 18 years old, (b) have shoulder pain for at least three consecutive months (an average pain VAS > 3/10 per week), (c) be able to raise their upper limb above shoulder height, and (d) be able to read and understand the Dutch language.

3.2.2 Exclusion criteria

Participants are excluded when the shoulder pain is secondary to neck pain.

3.2.3 Recruitment

For this study, a group of persons with chronic shoulder pain will be recruited via physiotherapy practices and social media between September 2019 and March 2020.

3.3 Medical ethics

Before inclusion, all participants have to sign an informed consent, as approved by the Ethics Committee of the Jessa Hospital and by the Committee of Medical Ethics of the University of Hasselt (07/02/2018, B24301731206).

3.4 Measurement

All participants will fill in a series of questionnaires, after which a movement analysis of the glenohumeral and scapulothoracic joint during the performance of consecutive reaching tasks will be performed. Before movement analysis, the perceived harmfulness of the reaching task will be questioned. During movement analysis, pain intensity and fatigue will be recorded. Movement analysis will be performed in the movement laboratory of REVAL - Rehabilitation Research Center of Hasselt University. Inertial sensors (Xsens Technologies, the Netherlands) will be attached to the sternum, scapula and upper arm using double-sided tape, thereby recording 3D scapulothoracic and glenohumeral motion during task

performance. Each participant will perform a reaching task in the scapular plane (SP-reach) above shoulder height, consisting of 100 consecutive repetitions. Reaching distance will be standardized based on body dimensions. One repetition starts with the arm on the thigh, followed by a reach towards the fixed end-point (a light that emitted every two seconds) and finished with a return to the start position. The light is used to standardize the velocity of movement execution between participants. Furthermore, before the task, patients will be asked to score the perceived harmfulness of the task on a scale from 0 (not harmful) to 10 (most harmful that can be imagined). After 20, 40, 60, 80 and 100 repetitions, the perceived pain and fatigue of participants will be questioned. Patients have to score pain and fatigue on a scale from 0 (indicating no pain/fatigue) to 10 (indicating maximal pain/fatigue).

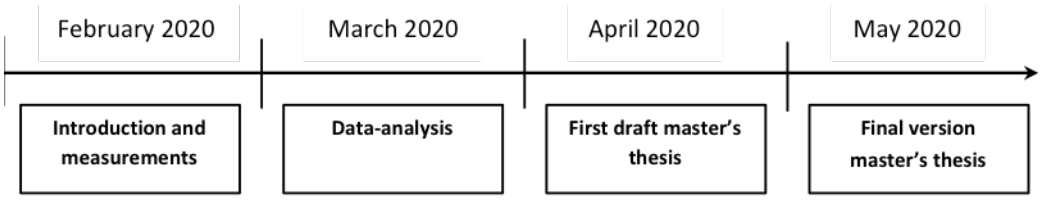
3.5 Outcomes

Outcomes that will be measured are pain, assessed using the visual analogue scale (VAS), and within-subject 3D scapulothoracic and glenohumeral movement variability, measured with inertial sensors, while reaching in the scapular plane.

3.6 Data-analysis

The statistics will be performed using regression analysis. The association between chronic musculoskeletal shoulder pain (independent variable) and within-subject movement variability (dependent variable) in patients with chronic musculoskeletal shoulder pain will be observed.

4 Time planning



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Appendix research protocol

Study ID: Naam:

Onderzoek naar factoren die pijn en beperkingen

in de schouder beïnvloeden

Vragenlijstbundel

in te vullen door personen met schouderpijn

Onderzoek onder leiding van

Dr. Liesbet De Baets en Prof. Dr. Annick Timmermans.

Extra inlichtingen? Liesbet.debaets@uhasselt.be

BIOMED-REVAL
REHABILITATION
RESEARCH CENTER

UHASSELT

Welke arts hebt u geraadpleegd voor uw schouderprobleem? *(kleur het bolletje voor het gepaste antwoord)*

- o Huisarts
- o Orthopedist
- o Fysisch geneesheer
- o Andere (gelieve te specificeren) ……..
- o geen

Bent u geopereerd voor uw schouderprobleem?*(kleur het bolletje voor het gepaste antwoord)*

- o Ja
- o Neen

Volgt u kinesitherapie voor uw schouderprobleem? *(kleur het bolletje voor het gepaste antwoord)*

- o Ja
- o Neen

Indien u kinesitherapie volgt, moet u dan van uw behandelende kinesitherapeut ook oefeningen uitvoeren thuis voor uw schouderprobleem? *(kleur het bolletje voor het gepaste antwoord)*

- o Ja
- o Neen

Kent u de diagnose die de arts of de kinesitherapeut gesteld heeft met betrekking tot uw schouderklacht?

Indien ja, mag u deze hieronder noteren.

……
……

Demografische en persoonlijke karakteristieken

1. **Wat is uw leeftijd:** **……. Jaar**

2. **Geslacht:** *(omcirkel wat past)* **man** **vrouw**

3. **Wat is uw lengte en gewicht:**

   Lengte: …. Meter **Gewicht: …….. kg**

4. **Wat is uw familiale status** *(omcirkel wat past)*

   - **Alleenstaand**
   - **Samenwonend**
   - **Getrouwd**
   - **Gescheiden**
   - **Andere: ……**

5. **Wat is uw hoogste behaalde diploma:** *(omcirkel wat past)*
   - **Lagere school**
   - **Middelbare school**
   - **Hoger onderwijs (hoge school, universiteit)**
   - **Andere: ……..**

6. **Heeft u op dit moment betaald werk:** *(omcirkel wat past)*
   - **Ja, en ik voer mijn job zoals gewoonlijk uit**
   - **ja, maar ik ben in ziekteverlof**

     Gelieve hieronder weer te geven hoeveel dagen u door uw schouderaandoening werk onbekwaam bent: **……. dagen**
   - **Neen, want ik ben gepensioneerd**
   - **Neen, want ik ben student**
   - **Neen, ik ben werkloos**

7. **Oefent u een sport uit** (met de term 'sport' worden activiteiten bedoeld die intensief genoeg zijn zodat u er tenminste in lichte mate van zweet): *(omcirkel wat past)*

Ja **Neen**

- **Indien ja, hoeveel uur per week?** **…… uur per week**

Gelieve hieronder weer te geven hoeveel dagen u door uw schouderaandoening uw sport niet hebt kunnen uitvoeren **……. Dagen**

Welke sport beoefent u? **……..**

8. **Oefent u een hobby uit:** *(omcirkel wat past)* **Ja** **Neen**
   - **Indien ja, hoeveel uur per week?** **…… uur per week**

Gelieve hieronder weer te geven hoeveel dagen u door uw schouderaandoening uw hobby niet hebt kunnen uitvoeren **……. Dagen**

9. **Rookt u (sigaretten, sigaar of pijp**): *(omcirkel wat past)* **Ja** **Neen**

10. **Heeft u nog andere gezondheidsproblemen *(omcirkel wat past)***
    - Hartproblemen
    - Suikerziekte
    - Psychische problemen
    - Epilepsie
    - Kanker
    - Oncontroleerbare hoge bloeddruk
    - Reumatoïde artritis
    - Een grote operatie in het verleden
    - Osteoporose
    - Gewrichtsprothese
    - Andere: …….

<u>Volgende vragen hebben betrekking op uw schouderpijn:</u>

Aan welke zijde heeft u schouderpijn? ***(omcirkel wat past)*** **Links rechts**

Is dit de zijde waarmee u schrijft? ***(omcirkel wat past)*** **Ja neen**

Hoeveel pijnmedicatie neemt u op dit moment *(omcirkel wat past)*

- **Geen**
- **Zelden**
- **De meeste dagen en/of nachten**
- **Alle dagen en/of nachten**

Omcirkel het cijfer dat best weergeeft hoe hevig uw pijn op dit moment is <u>in rust</u>

0 1 2 3 4 5 6 7 8 9 10

Geen pijn Ergst denkbare pijn

Omcirkel het cijfer dat best weergeeft hoe hevig uw pijn op dit moment is <u>tijdens beweging</u>

0 1 2 3 4 5 6 7 8 9 10

Geen pijn Ergst denkbare pijn

Omcirkel het cijfer dat best weergeeft hoe hevig uw pijn op dit moment is <u>'s nachts</u>

0 1 2 3 4 5 6 7 8 9 10

Geen pijn Ergst denkbare pijn

Omcirkel het cijfer dat best weergeeft hoe hevig uw pijn <u>gemiddeld</u> was de <u>afgelopen week</u>

0 1 2 3 4 5 6 7 8 9 10

Geen pijn Ergst denkbare pijn

Gelieve in dagen of weken of maanden aan te geven hoe lang de pijn die u nu aan uw schouder hebt en waarvoor u naar de kinesitherapeut komt, reeds aanwezig is:

…….. dagen OF …… weken OF …… maanden

Is de pijn in die periode continu aanwezig geweest? *(omcirkel wat past)* **Ja** **Neen**

Heeft u al vaker periodes van schouderpijn gehad in de afgelopen jaren *(omcirkel wat past)*

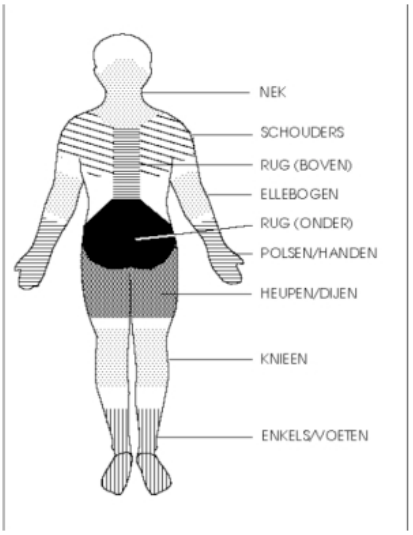
Ja **Neen**

Indien ja, hoeveel keer heeft u een periode van schouderpijn gehad de afgelopen jaren: ….. keer

Bekijk de onderstaande afbeelding en beantwoord onderstaande vragen:

Heeft u <u>ooit</u> last (pijn, ongemak) gehad:

- **van uw nek** **ja □** **nee□**
- **boven in de rug** **ja □** **nee□**
- **onder in de rug** **ja □** **nee□**
- **van uw schouders** **ja □** **nee□**
- **van uw ellebogen** **ja □** **nee□**
- **van uw polsen/handen** **ja □** **nee□**
- **van uw heupen/dijen** **ja □** **nee□**
- **van uw knieën** **ja □** **nee□**
- **van uw enkels/voeten** **ja □** **nee□**



Heeft u <u>de afgelopen 7 dagen</u> last (pijn, ongemak) gehad:

- **van uw nek** **ja □** **nee□**
- **boven in de rug** **ja □** **nee□**
- **onder in de rug** **ja □** **nee□**
- **van uw schouders** **ja □** **nee□**
- **van uw ellebogen** **ja □** **nee□**
- **van uw polsen/handen** **ja □** **nee□**
- **van uw heupen/dijen** **ja □** **nee□**
- **van uw knieën** **ja □** **nee□**
- **van uw enkels/voeten** **ja □** **nee□**

The Fear-Avoidance Component Scale – Nederlandse versie

Mensen reageren op verschillende manieren op pijn. We willen achterhalen hoe jij denkt en staat tegenover jouw pijnlijke medische toestand en hoe deze jouw niveau van activiteiten beïnvloed heeft. Denk even na hoe je je voelde tijdens de afgelopen week. Omcirkel dan een getal tussen 0 en 5 volgens onderstaande schaal om antwoord te geven op elke vraag

5 = helemaal mee eens
4 = in hoge mate
mee eens 3=
enigszins mee eens
2 = enigszins mee oneens
1 = in hoge mate oneens
0 = helemaal mee oneens

In hoeverre ga je akkoord met onderstaande stellingen over jouw pijnlijke medische toestand, gedurende de voorbije week?

	helemaal mee eens	in hoge mate mee eens	enigszins mee eens	enigszins mee oneens	in hoge mate oneens	helemaal mee oneens
1. Ik probeer activiteiten en bewegingen te vermijden die mijn pijn verergeren.	5	4	3	2	1	0
2. Ik maak me zorgen over mijn pijnlijke medische toestand.	5	4	3	2	1	0
3. Ik geloof dat mijn pijn steeds erger gaat worden, tot wanneer ik helemaal niet langer meer kan functioneren.	5	4	3	2	1	0
4. Ik raak overweldigd door angst wanneer ik denk aan mijn pijnlijke medische toestand.	5	4	3	2	1	0
5. Ik begin niet aan bepaalde activiteiten omdat ik angstig ben dat ik mezelf (opnieuw) zal bezeren.	5	4	3	2	1	0
6. Wanneer mijn pijn heel erg fel is, heb ik ook andere symptomen zoals misselijkheid, moeite met ademhalen, hartkloppingen, beven en/of duizeligheid.	5	4	3	2	1	0
7. Het is oneerlijk dat ik met deze pijnlijke medische toestand moet leven.	5	4	3	2	1	0
8. Mijn pijnlijke medische toestand vergroot de kans op toekomstige (of herhaalde) kwetsuren, en dit voor de rest van mijn leven.	5	4	3	2	1	0

	helemaal mee eens	in hoge mate mee eens	enigszins mee eens	enigszins mee oneens	in hoge mate oneens	helemaal mee oneens
9. Door mijn pijnlijke medische toestand zal mijn leven nooit meer hetzelfde zijn.	5	4	3	2	1	0
10. Ik heb geen controle over mijn pijn.	5	4	3	2	1	0
11. Ik durf bepaalde activiteiten en bewegingen niet uit te voeren omdat ik angst heb dat deze mijn pijn zullen verergeren	5	4	3	2	1	0
12. Het is de schuld van iemand anders dat ik me in deze pijnlijke medische toestand bevind	5	4	3	2	1	0
13. De pijn van mijn medische toestand is een waarschuwing dat er iets heel ernstig fout is met mij.	5	4	3	2	1	0
14. Niemand begrijpt hoe erg mijn pijnlijke medische toestand is.	5	4	3	2	1	0

Begin elk van onderstaande stellingen met de volgende uitspraak: Tijdens de afgelopen week heb ik, door mijn pijnlijke medische toestand, het volgende vermeden:

15. Erg inspannende activiteiten (zoals zwaar werk in de tuin of het verplaatsen van zware meubels)	5	4	3	2	1	0
16. Matig inspannende activiteiten (zoals koken of schoonmaken)	5	4	3	2	1	0
17. Licht inspannende activiteiten (zoals naar de film gaan of gaan lunchen)	5	4	3	2	1	0
18. Al mijn taken en klusjes thuis en op het werk	5	4	3	2	1	0
19. Ontspanning en/of sport activiteiten (dingen die ik voor het plezier doe en/of voor een goede gezondheid)	5	4	3	2	1	0
20. Activiteiten waarbij ik mijn pijnlijk(e) lichaamsdeel/lichaamsdelen moet gebruiken	5	4	3	2	1	0

Persoonlijke doelen en ervaringen

Hieronder vindt u een aantal uitspraken over persoonlijke doelen en ervaringen.

Lees iedere uitspraak goed door en zet een kruisje in het vakje bij het antwoord dat het beste weergeeft in welke mate die uitspraak in het algemeen op u betrekking heeft.

Denk niet te lang na over uw antwoord. Uw eerste reactie op elke vraag is waarschijnlijk betrouwbaarder dan een lang doordacht antwoord.

	Absoluut mee eens	Mee eens	Deels mee eens	Niet mee eens	Absoluut niet mee eens
1. Op momenten van onzekerheid en twijfel, heb ik toch meestal de beste verwachtingen					
2. Ik kan me gemakkelijk ontspannen					
3. Als er iets in mijn leven mis kan gaan, dan gaat het ook mis					
4. Ik ben altijd optimistisch over mijn eigen toekomst					
5. Ik kan mijn vrienden veel plezier geven					
6. Het is belangrijk voor mij actief te blijven					
7. Ik verwacht eigenlijk nooit dat de dingen zullen lopen zoals ik graag zou willen dat ze lopen					
8. Ik raak niet snel opgewonden					
9. Ik reken er meestal niet op dat mij iets goeds zal overkomen					
10. Over het algemeen verwacht ik dat me meer goede dingen dan slechte dingen zullen overkomen					

Klachten-perceptie vragenlijst

Omcirkel alstublieft bij elke vraag het getal dat het beste uw mening weergeeft.

1. Hoe beïnvloed uw klacht uw leven?

1	2	3	4	5	6	7	8	9	10
Helemaal geen invloed									Zeer veel invloed

2. Hoe lang denkt u dat uw klacht zal duren?

1	2	3	4	5	6	7	8	9	10
Een zeer korte tijd									Mijn hele leven

3. Hoeveel controle vindt u dat u heeft over uw klacht?

1	2	3	4	5	6	7	8	9	10
Helemaal geen controle									Zeer veel controle

4. Hoeveel denkt u dat uw behandeling kan helpen bij uw klacht?

1	2	3	4	5	6	7	8	9	10
Helemaal niet									Zeer veel

5. Hoe sterk ervaart u klachten door uw klacht?

1	2	3	4	5	6	7	8	9	10
Helemaal geen klachten									veel ernstige klachten

6. Hoe bezorgd bent u over uw klacht?

1	2	3	4	5	6	7	8	9	10
Helemaal Niet bezorgd									Zeer bezorgd

7. In welke mate vindt u dat u uw klacht begrijpt?

1	2	3	4	5	6	7	8	9	10
Helemaal geen begrip									Zeer veel begrip

8. Hoeveel invloed heeft de klacht op uw stemming?(bijvoorbeeld, maakt de klacht u boos, bang, van streek of somber?)

1	2	3	4	5	6	7	8	9	10
Helemaal geen invloed									Zeer veel invloed

Duid aan **hoe zeker** u van uzelf bent dat u **op dit moment** de onderstaande dingen kan doen, **ondanks uw pijn**. Omcirkel het cijfer dat uw antwoord het best weergeeft, waarbij 0= helemaal niet zeker of helemaal geen vertrouwen, en 6= volledig zeker of vol vertrouwen.

Bijvoorbeeld:

0 1 2 3 4 5 6

Helemaal niet zeker **Volledig zeker**

Let op, er wordt niet gevraagd of u deze dingen al dan niet doet, maar wel **hoe zeker u van u zelf bent dat u deze dingen kan doen, ondanks uw pijn**.

1. **Ik kan van dingen genieten, ondanks mijn pijn.**

0 1 2 3 4 5 6

Helemaal niet zeker **Vol edig zeker**

2. **Ik kan de meeste huishoudelijke taken (vb. Opruimen, afwassen, enz.) doen, ondanks mijn pijn.**

0 1 2 3 4 5 6

Helemaal niet zeker **Vol edig zeker**

3. **In vergelijking met vroeger, kan ik even vaak met mijn vrienden en familie afspreken, ondanks mijn pijn.**

0 1 2 3 4 5 6

Helemaal niet zeker **Vol edig zeker**

4. **Ik kan met mijn pijn omgaan in de meeste situaties.**

0 1 2 3 4 5 6

Helemaal niet zeker **Vol edig zeker**

5. Ik kan enige vorm van werk doen, ondanks mijn pijn ('werk' houdt zowel huishoudelijk werk, onbetaald als betaald werk in)

0 1 2 3 4 5 6

Helemaal niet zeker — Volledig zeker

6. Ik kan nog altijd veel dingen doen waar ik van geniet, zoals hobby's en vrije tijds-activiteiten, ondanks mijn pijn.

0 1 2 3 4 5 6

Helemaal niet zeker — Volledig zeker

7. Ik kan met mijn pijn omgaan zonder medicatie.

0 1 2 3 4 5 6

Helemaal niet zeker — Volledig zeker

8. Ik kan nog steeds de meeste van mijn doelen in mijn leven behalen, ondanks mijn pijn.

0 1 2 3 4 5 6

Helemaal niet zeker — Volledig zeker

9. Ik kan een normale levensstijl behouden, ondanks mijn pijn.

0 1 2 3 4 5 6

Helemaal niet zeker — Volledig zeker

10. Ik kan geleidelijk aan meer actief worden, ondanks mijn pijn.

0 1 2 3 4 5 6

Helemaal niet zeker — Volledig zeker

Centrale sensitisatie vragenlijst

Geef aan in welke mate u de volgende klachten heeft. Zet een kruisje in de juiste kolom na elke stelling

		Nooit	Zelden	Soms	Vaak	Altijd
1	Ik voel me niet uitgeslapen ’s morgens als ik wakker word					
2	Mijn spieren voelen stijf en pijnlijk					
3	Ik heb angstaanvallen					
4	Ik knars of klem met mijn tanden					
5	Ik heb last van diarree en/of constipatie					
6	Ik heb hulp nodig bij het uitvoeren van dagelijkse activiteiten					
7	Ik ben gevoelig voor fel licht					
8	Ik ben snel moe bij fysieke activiteiten					
9	Ik heb pijn over mijn gehele lichaam					
10	Ik heb last van hoofdpijn					
11	Ik heb een ongemakkelijk gevoel in mijn blaas en/of een branderig gevoel bij het					
12	Ik slaap niet goed					
13	Ik kan me moeilijk concentreren					
14	Ik heb huidproblemen zoals droge huid, jeuk of huiduitslag					
15	Stress verergert mijn lichamelijke klachten					
16	Ik voel me neerslachtig of depressief					
17	Ik heb weinig energie					
18	Ik heb spierspanning in mijn nek en schouders					
19	Ik heb pijn in mijn kaak					
20	Bepaalde geuren, zoals parfums, maken me duizelig en misselijk					
21	Ik moet vaak plassen					
22	Mijn benen voelen ongemakkelijk en rusteloos wanneer ik ’s avonds wil gaan					
23	Ik heb moeite om dingen te onthouden					
24	Als kind heb ik traumatische gebeurtenissen meegemaakt					
25	Ik heb pijn in mijn bekkenregio					

Zijn er door een arts in het verleden bij u één van volgende aandoeningen gediagnosticeerd?
Vink het vakje rechts aan voor elke diagnose en schrijf het jaar van de diagnose indien van toepassing.

	Nee	Ja	Jaar diagnose
1. Restless legs syndrome (rusteloze benen)			
2. Chronisch vermoeidheidssyndroom			
3. Fibromyalgie			
4. Kaakklachten			
5. Migraine of spanningshoofdpijn			
6. Prikkelbare darm syndroom			
7. Overgevoeligheid voor chemische stoffen			
8. Nekletsel (inclusief whiplash)			
9. Angst- of paniekaanvallen			
10. Depressie			

Beperkingen van arm, schouder en hand vragenlijst

Deze vragenlijst heeft betrekking op zowel uw symptomen als uw mogelijkheid om bepaalde handelingen te verrichten. Beantwoord alle vragen door een kruisje te zetten in het juiste vakje, gebaseerd op uw conditie van de afgelopen week.
Als u de afgelopen week geen activiteiten heeft uitgevoerd, schat dan het meest nauwkeurige antwoord. Het maakt niet uit welke hand of arm u gebruikt om de handeling te verrichten; baseer uw antwoord alstublieft op de mogelijkheid een opdracht uit te voeren ongeacht de manier waarop.

Bepaal alstublieft uw mogelijkheid om de volgende activiteiten uit te voeren gedurende de afgelopen week door een kruisje in de kolom onder het juiste antwoord te zetten.

		Geen moeite	Geringe moeite	Meer moeite	Zeer veel moeite	Niet in staat
1	Een dichte of een nieuwe pot openen					
2	Schrijven					
3	Een sleutel omdraaien					
4	Koken					
5	Een zware deur openen					
6	Een voorwerp op een plank boven uw hoofd plaatsen					
7	Zwaar huishoudelijk werk doen (bv. Tegels afwassen, vloeren schrobben)					
8	Tuinieren					
9	Bed opmaken					
10	Boodschappentas of aktetas dragen					
11	Zeer zwaar voorwerp dragen (meer dan 5 kg)					
12	Een lamp boven uw hoofd verwisselen					
13	Haren wassen of föhnen					
14	Uw rug wassen					
15	Een trui aantrekken					
16	Met een mes eten snijden					
17	Recreatieve activiteiten die weinig moeite kosten (bv. Kaarten, breien, etc.)					
18	Recreatieve activiteiten die kracht of druk uitoefenen op arm, schouder of hand (bv. Golfen, timmeren, tennissen, etc.)					

		Geen moeite	Geringe moeite	Meer moeite	Zeer veel moeite	Niet in staat
19	Recreatieve activiteiten waarbij je de arm vrij beweegt (bv. Frisbeeën, badmintonnen, etc.)					
20	Van de ene naar de andere plaats gaan					
21	Seksuele activiteiten					

		Helemaal niet	In geringe mate	Matig	Aardig wat	Zeer veel
22	Heeft uw probleem aan uw arm, hand of schouder u de afgelopen week belemmerd in uw normale sociale activiteiten met familie, vrienden, buren of groepen?					

		Helemaal niet beperkt	In geringe mate beperkt	Matig beperkt	Erg beperkt	Niet in staat
23	Was u in de afgelopen week beperkt in uw werk of andere dagelijkse activiteiten als gevolg van uw probleem aan uw hand, arm of schouder?					

		Geen	Licht	Matig	Ernstig	Extreem
24	Pijn aan arm, schouder of hand					
25	Pijn aan arm, schouder of hand bij welke activiteit dan ook					
26	Tintelingen (slapend gevoel) in arm, schouder of hand					
27	Zwakheid in uw arm, schouder of hand					
28	Stijfheid in uw arm, schouder of hand					

		Geen moeite	Geringe moeite	Meer moeite	Zeer veel moeite	Niet in staat
29	Hoeveel moeite heeft u de afgelopen week gehad met slapen vanwege de pijn in uw arm, schouder of hand?					

		Sterk mee oneens	Oneens	Niet eens, niet oneens	Mee eens	Sterk mee eens
30	Ik voel me minder bekwaam, minder zeker of minder nuttig door de problemen aan mijn arm, schouder of hand					

Sport/podiumkunsten module (naar keuze)

De onderstaande vragen hebben betrekking op de impact die het probleem aan uw arm, schouder of hand heeft op het bespelen van een muziekinstrument of het beoefenen van een sport, of beide.
Als u meer dan één sport beoefent of instrument bespeelt (of beide), antwoordt dan uitgaande van de activiteit die het belangrijkste voor u is.
Geeft u alstublieft aan welke sport of welk instrument het belangrijkste voor u is.
……

Ik beoefen geen sport, of bespeel geen instrument (U mag dit gedeelte overslaan).

Duid aan wat het beste uw fysieke vermogen van de afgelopen week beschrijft. Had u moeite met:

		Geen moeite	Geringe moeite	Meer moeite	Zeer veel moeite	Niet in staat
1	Het toepassen van uw gebruikelijke techniek om uw instrument te bespelen of uw sport te beoefenen?					
2	Het bespelen van uw instrument of het beoefenen van uw sport vanwege uw pijn aan arm, scouder of hand?					
3	Het bespelen van uw instrument of het beoefenen van uw sport zo goed als u zou willen					
4	Het besteden van uw gebruikelijke hoeveelheid aan het bespelen van uw instrument of beoefenen van uw sport?					

Werkmodule (naar keuze)

De volgende vragen gaan over de invloed van uw probleem aan arm, schouder of hand op uw mogelijkheid om te werken (inclusief huishouden als dat uw hoofdtaak is). Geeft u alstublieft aan wat uw beroep/werk is:

……..

Ik werk niet (U mag dit gedeelte overslaan)

Duid aan met een kruisje wat uw fysieke vermogen van de afgelopen week het beste beschrijft. Had u moeite met:

		Geen moeite	Geringe moeite	Meer moeite	Zeer veel moeite	Niet in staat
1	Het toepassen van uw gebruikelijke techniek voor uw werk?					
2	Het doen van uw normale werk door de pijn aan arm, schouder of hand?					
3	Het doen van uw werk zo goed als u dat zou willen?					
4	Het doen van uw werk binnen de normale tijd?					

Gezondheidsvragenlijst

Kleur onder elke titel het bolletje voor de stelling die het best uw gezondheid VANDAAG beschrijft.

MOBILITEIT

o Ik heb geen problemen met rondwandelen
o Ik heb een beetje problemen met rondwandelen o Ik heb matige problemen met rondwandelen
o Ik heb ernstige problemen met rondwandelen o Ik ben niet in staat om rond te wandelen

ZELFZORG

o Ik heb geen problemen met mijzelf te wassen of aan te kleden
o Ik heb een beetje problemen met mijzelf te wassen of aan te kleden o Ik heb matige problemen met mijzelf te wassen of aan te kleden
o Ik heb ernstige problemen met mijzelf te wassen of aan te kleden o Ik ben niet in staat mijzelf te wassen of aan te kleden

DAGELIJKSE ACTIVITEITEN *(bijv. Werk, studie, huishouden, gezins- en vrijtijdsactiviteiten)*

o Ik heb geen problemen met mijn dagelijkse activiteiten
o Ik heb een beetje problemen met mijn dagelijkse activiteiten o Ik heb matige problemen met mijn dagelijkse activiteiten
o Ik heb ernstige problemen met mijn dagelijkse activiteiten o Ik ben niet in staat mijn dagelijkse activiteiten uit te voeren

PIJN/ONGEMAK

o Ik heb geen pijn of ongemak
o Ik heb een beetje pijn of ongemak o Ik heb matige pijn of ongemak
o Ik heb ernstige pijn of ongemak o Ik heb extreme pijn of ongemak

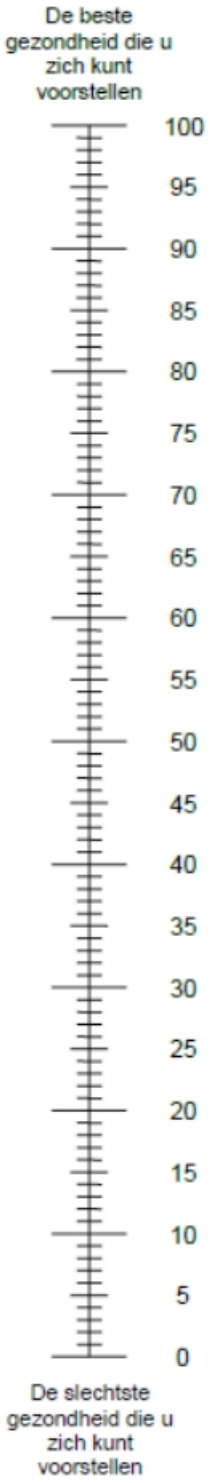
ANGST/DEPRESSIE

o Ik ben niet angstig of depressief
o Ik ben een beetje angstig of depressief o Ik ben matig angstig of depressief
o Ik ben erg angstig of depressief
o Ik ben extreem angstig of depressief

We willen weten hoe goed of slecht uw gezondheid VANDAAG is.

Onderstaande meetschaal (te vergelijken met een thermometer) is genummerd van 0 tot 100.
100 staat voor de beste gezondheid die u zich kunt voorstellen.
0 staat voor de slechtste gezondheid die u zich kunt voorstellen.

Plaats een X op de meetschaal om aan te geven hoe uw gezondheid VANDAAG is.



Vragenlijst met betrekking tot vermijdingsgedrag

Hieronder volgen enkele uitspraken van mensen met schouderpijn. Wilt u voor iedere uitspraak aangeven in welke mate lichamelijke activiteiten zoals iets uit de kast nemen, iets optillen, met de ram zwaaien tijdens het wandelen, … uw schouderpijn beïnvloeden door een kruisje te zetten in de juiste kolom.

	Geheel oneens	Tamelijk oneens	Enigszins oneens	Weet het niet	Enigszins eens	Tamelijk eens	Geheel eens
1. De pijn werd veroorzaakt door lichamelijke							
2. Lichamelijke activiteit verergert de pijn							
3. Lichamelijke activiteit zou mijn schouderpijn kunnen schaden							
4. Ik zou geen lichamelijke activiteiten moeten uitvoeren die de pijn (kunnen) verergeren							
5. Ik kan geen lichamelijke activiteiten uitvoeren die de pijn (kunnen) verergeren							

De volgende uitspraken gaan over de mate waarin uw normale werk uw schouderpijn beïnvloedt.

	Geheel oneens	Tamelijk oneens	Enigszins oneens	Weet het niet	Enigszins eens	Tamelijk eens	Geheel eens
6. De pijn is ontstaan door mijn werk of door een ongeval tijdens mijn werk							
7. Door mijn werk is de pijn erger geworden							
8. Ik heb beroep op uitkering van ziektegeld vanwege mijn schouderpijn							
9. Mijn werk is te zwaar voor mij							

	Geheel oneens	Tamelijk oneens	Enigszins oneens	Weet het niet	Enigszins eens	Tamelijk eens	Geheel eens
10. Mijn werk verergert de pijn (of zou dat kunnen verergeren)							
11. Mijn werk zou mijn schouder kunnen schaden							
12. Ik zou mijn normale werk niet moeten doen met mijn huidige pijn							
13. Ik kan mijn normale werk niet uitvoeren met mijn huidige pijn							
14. Ik kan mijn normale werk niet uitvoeren totdat de pijn wordt behandeld							
15. Ik denk niet dat ik mijn normale werk binnen drie maanden zal hervatten							
16. Ik denk niet dat ik ooit zal terugkeren naar mijn werk							

Angst en depressie vragenlijst

Het is bekend dat emoties bij de meeste pijnklachten een belangrijke rol kunnen spelen. Deze vragenlijst dient als hulpmiddel om te weten te komen hoe u zich voelt. Lees iedere vraag en kleur het bolletje voor het antwoord dat het beste weergeeft hoe u zich **gedurende de laatste week** gevoeld heeft.
Denk niet te lang na over uw antwoord. Uw eerste reactie op elke vraag is waarschijnlijk betrouwbaarder dan een lang doordacht antwoord. Gelieve zo eerlijk mogelijk te antwoorden.

1. Ik voel me gespannen:

   o Meestal o
   Vaak
   o Af en toe, soms o
   Helemaal niet

2. Ik geniet nog steeds van de dingen waar ik vroeger van genoot:

   o Zeker zo veel
   o Niet zo veel als vroeger o
   Weinig
   o Haast helemaal niet

3. Ik krijg een soort angstgevoel alsof er elk moment iets vreselijks zal gebeuren:

   o Heel zeker en vrij erg o
   Ja, maar niet zo erg
   o Een beetje, maar ik maak me er geen zorgen over o
   Helemaal niet

4. Ik kan lachen en de dingen van de vrolijke kant zien:

   o Net zoveel als vroeger
   o Niet zo goed als vroeger
   o Beslist niet zoveel als vroeger o
   Helemaal niet

5. Ik maak me vaak ongerust:

   o Heel erg vaak
   o Vaak
   o Af en toe maar niet te vaak o
   Alleen soms

6. Ik voel me opgewekt:

   o Helemaal niet o
   Niet vaak
   o Soms
   o Meestal

7. Ik kan rustig zitten en me ontspannen:

   o Zeker
   o Meestal
   o Niet vaak
   o Helemaal niet

8. Ik voel me alsof alles moeizamer gaat:

   o bijna altijd o
   heel vaak o
   soms
   o helemaal niet

9. Ik krijg een soort benauwd, gespannen gevoel in mijn maag:

   o Helemaal niet o
   Soms
   o Vrij vaak o
   Heel vaak

10. Ik heb geen interesse meer in mijn uiterlijk:

    o Zeker
    o Niet meer zoveel als ik zou moeten o
    Waarschijnlijk niet zoveel
    o Evenveel interesse als vroeger

11. Ik voel me rusteloos en voel dat ik iets te doen moet hebben:

    o Heel erg
    o Tamelijk veel o
    Niet erg veel o
    Helemaal niet

12. Ik verheug me van tevoren al op dingen:

    o Net zoveel als vroeger
    o Een beetje minder dan vroeger o
    Zeker minder dan vroeger
    o Bijna nooit

13. Ik krijg plotseling gevoelens van panische angst:

    o Zeer vaak
    o Tamelijk vaak o
    Niet erg vaak o
    Helemaal niet

14. Ik kan van een goed boek genieten, of van een radio- of televisieprogramma:

    o Vaak
    o Soms
    o Niet vaak
    o Heel zelden

Vragenlijst met betrekking tot
impact van de klacht op het leven

Wanneer we een letsel of trauma oplopen, dan heeft dat vaak een grote impact op ons leven. Deze lijst is ontworpen om de impact van de ontstane klacht op ons leven te meten.

Hieronder vindt u 12 beweringen die verschillende gedachten en gevoelens beschrijven die u mogelijk ervaart als u denkt aan uw schouderklacht. Zet een kruisje in de juiste kolom om aan te geven hoe frequent je deze gedachten en gevoelens ervaart wanneer u aan uw klacht denkt.

	Nooit	Zelden	soms	vaak	continu
1. De meeste mensen begrijpen niet hoe ernstig mijn aandoening is.					
2. Mijn leven zal nooit meer hetzelfde zijn.					
3. Mijn lijden is een gevolg van de nalatigheid van iemand anders.					
4. Niemand verdient het om op deze manier te leven.					
5. Alles wat ik wil is mijn leven terug.					
6. Ik voel dat dit mij voor altijd veranderd heeft.					
7. Het is allemaal erg oneerlijk.					
8. Ik maak er mij zorgen over dat mijn aandoening niet serieus wordt genomen.					
9. Niets kan nog goedmaken wat ik heb doorgemaakt.					
10. Ik heb het gevoel bestolen te zijn van iets zeer dierbaars.					
11. Ik ben bang dat ik nooit mijn dromen zal kunnen waarmaken.					
12. Ik kan niet geloven dat dit mij is overkomen.					

Pijn catastroferen vragenlijst

Iedereen ervaart wel eens pijn in zijn leven zoals hoofdpijn, tandpijn, gewrichts- of spierpijn. Mensen komen ook vaak in situaties terecht die pijn veroorzaken zoals een behandeling bij de tandarts of een chirurgische ingreep.
Wij zijn geïnteresseerd in de soort gedachten en gevoelens die u ervaart als u pijn hebt. In de hierna volgende lijst staan dertien beweringen die verschillende gedachten en gevoelens beschrijven die mogelijk met pijn te maken hebben. Probeer
aan te geven in welke mate deze gedachten en gevoelens ook voor u van toepassing zijn. Duid aan met een kruisje in de juiste kolom achter elke stelling.

Als ik pijn heb….

	Helemaal niet	In lichte mate	In zekere mate	In grote mate	Altijd
1. Vraag ik mij voortdurend af of de pijn wel zal ophouden.					
2. Voel ik dat ik zo niet verder kan.					
3. Is dat verschrikkelijk en denk ik dat het nooit beter zal worden.					
4. Is dat afschuwelijk en voel ik dat de pijn mij overweldigt.					
5. Voel ik dat ik het niet meer uithoud.					
6. Word ik bang dat de pijn erger zal worden.					
7. Blijf ik denken aan andere pijnlijke gebeurtenissen.					
8. Verlang ik hevig dat de pijn weggaat.					
9. Kan ik de pijn niet uit mijn gedachten zetten.					
10. Blijf ik eraan denken hoeveel pijn het wel doet.					
11. Blijf ik denken hoe graag ik zou willen dat de pijn ophoudt.					
12. Is er niets dat ik kan doen om de intensiteit van de pijn te verminderen.					
13. Vraag ik mij af of er iets ernstigs kan gebeuren.					

TAMPA-SCHAAL VOOR KINESIOFOBIE

Met deze lijst willen wij onderzoeken op welke wijze u tegen uw pijn aankijkt en hoe u deze ervaart. Duidt met een kruisje aan wat bij u van toepassing is per uitspraak. Het is van essentieel belang dat u bij de beoordeling uitgaat van uw eigen gevoelens; wat anderen denken is hierbij niet relevant. Het is ook niet de bedoeling uw medische kennis te testen. Waar het om gaat is dat u aangeeft hoe u uw pijn ervaart. Zet een kruisje in de juiste kolom na elke stelling

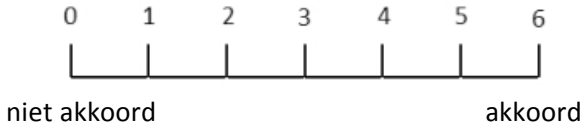
	In hoge mate mee oneens	Enigszins mee oneens	Enigszins mee eens	In hoge mate mee eens
1. Ik ben bang om bij het doen van lichaamsoefeningen een letsel op te lopen.				
2. Als ik me over de pijn heen zou zetten, dan zou hij erger worden.				
3. Mijn lichaam zegt me dat er iets gevaarlijks mis mee is.				
4. Mijn pijn zou waarschijnlijk minder worden als ik lichaamsoefeningen zou doen				
5. Mijn gezondheidstoestand wordt door anderen niet serieus genoeg genomen.				
6. Door mijn pijnproblemen loopt mijn lichaam de rest van mijn leven				
7. Mijn pijn betekent dat er sprake is van				
8. Als mijn pijn erger wordt door iets, betekent dat nog niet dat dat gevaarlijk is.				
9. Ik ben bang om per ongeluk letsel op				
10. De veiligste manier om te voorkomen dat mijn pijn erger wordt, is gewoon oppassen dat ik geen onnodige bewegingen				
11. Ik had wellicht minder pijn als er niet iets gevaarlijks aan de hand zou zijn met mijn lichaam.				
12. Hoewel ik pijn heb, zou ik er beter aan toe zijn als ik lichamelijk				
13. Mijn pijn zegt me wanneer ik moet stoppen met lichaamsoefeningen doen om				

	In hoge mate mee oneens	Enigszins mee oneens	Enigszins mee eens	In hoge mate mee eens
14. Voor iemand in mijn toestand is het echt af te raden om lichamelijk actief te zijn.				
15. Ik kan niet alles doen wat gewone mensen doen, omdat ik te gemakkelijk letsel oploop.				
16. Zelfs als ik ergens veel pijn door krijg, geloof ik niet dat dat gevaarlijk is.				
17. Ik zou geen lichaamsoefeningen hoeven doen wanneer ik pijn heb.				

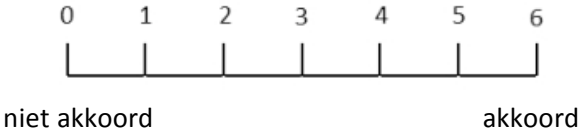
Acceptatie van pijn vragenlijst

Gelieve hieronder aan te geven (door een cijfer te omcirkelen) in welke mate u akkoord bent met onderstaande stellingen, of in welke mate deze stellingen van toepassing zijn op u.

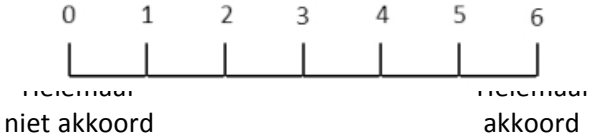
1. Ik ga gewoon verder met mijn leven, hoe erg mijn pijn ook is.



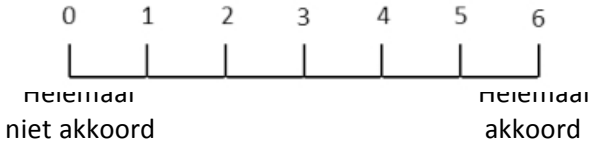
2. Mijn leven verloopt uitstekend, zelfs al heb ik pijn.



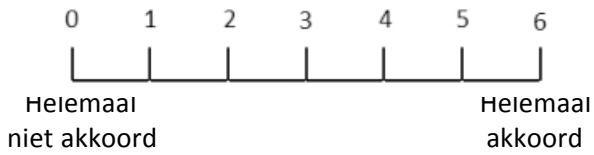
3. Het is oké om pijn te ervaren.



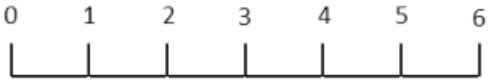
4. Ik zou het niet erg vinden om belangrijke zaken in mijn leven op te geven als ik daardoor minder pijn zou hebben.



5. Ik hoef niet noodzakelijk minder pijn te hebben om mijn leven aan te kunnen.

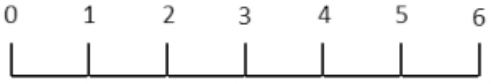


6. Hoewel sommige zaken veranderd zijn, heb ik ondanks de pijn een normaal leven.



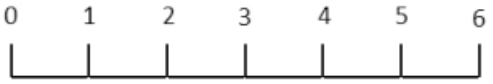
Helemaal niet akkoord — Helemaal akkoord

7. Het is belangrijk voor mij om te weten hoe ik van de pijn af kom.



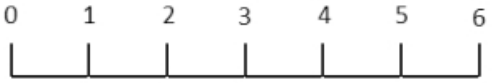
Helemaal niet akkoord — Helemaal akkoord

8. Ik onderneem veel activiteiten als ik pijn voel.



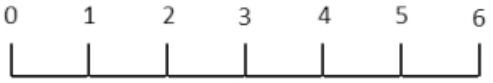
Helemaal niet akkoord — Helemaal akkoord

9. Ik leid een volwaardig leven ook al heb ik chronische pijn.



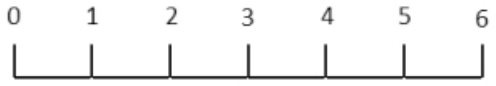
Helemaal niet akkoord — Helemaal akkoord

10. Er zijn andere dingen die belangrijker zijn in mijn leven dan de pijn proberen te verminderen.



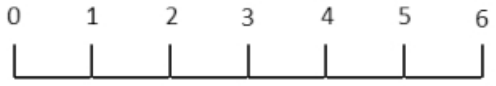
Helemaal niet akkoord — Helemaal akkoord

11. Mijn gedachten en gevoelens over de pijn moeten veranderen voor ik belangrijke stappen in mijn leven zet.



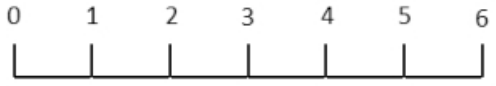
Helemaal niet akkoord — Helemaal akkoord

12. Ondanks de pijn blijf ik vasthouden aan mijn manier van leven.



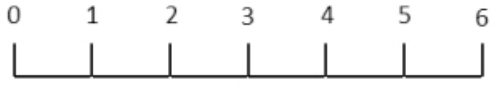
Helemaal niet akkoord — Helemaal akkoord

13. Als ik ergens aan begin, dan zorg ik ervoor dat de pijn niet zal toenemen.



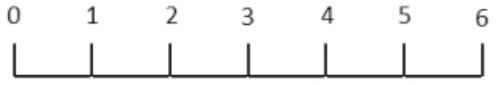
Helemaal niet akkoord — Helemaal akkoord

14. Voor ik grote plannen maak, moet de pijn eerst iets minder worden.



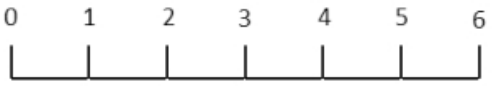
Helemaal niet akkoord — Helemaal akkoord

15. Ook al wordt de pijn erger als ik iets onderneem, ik blijf de dingen doen die ik mij heb voorgenomen.



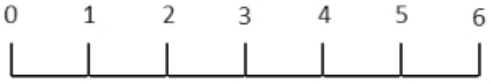
Helemaal niet akkoord — Helemaal akkoord

16. Mijn leven wordt aangenamer als ik niet negatief over mijn pijn denk.



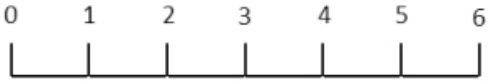
Helemaal niet akkoord — Helemaal akkoord

17. Ik vermijd situaties die mijn pijn verergeren.



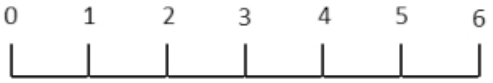
Helemaal niet akkoord — Helemaal akkoord

18. Ik maak mij echt zorgen over wat de pijn zal aanrichten in mijn leven.



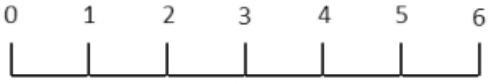
Helemaal niet akkoord — Helemaal akkoord

19. Het is een opluchting om te beseffen dat ik mijn pijn niet moet veranderen om door te gaan met leven.



Helemaal niet akkoord — Helemaal akkoord

20. Als ik pijn heb, heb ik veel moeite met het uitvoeren van activiteiten.



Helemaal niet akkoord — Helemaal akkoord

Pijn Coping Inventarisatie lijst

Mensen die pijn lijden ontwikkelen diverse manieren om met deze pijn om te gaan. Hieronder vindt u een aantal uitspraken die gaan over wat u kunt doen of denken als u pijn heeft.

Wij vragen u om achter iedere uitspraak aan te geven hoe vaak u het beschreven gedrag uitvoert. U doet dit door het omcirkelen van een van de antwoordmogelijkheden die achter de uitspraak staan.

	Zelden of nooit	Soms	Vaak	Zeer vaak
1. Ik houd op met mijn bezigheden	1	2	3	4
2. Ik ga door met mijn bezigheden, maar met minder inspanning	1	2	3	4
3. Ik ga door met mijn bezigheden, maar in een langzamer tempo	1	2	3	4
4. Ik ga door met mijn bezigheden, maar minder nauwgezet	1	2	3	4
5. Ik beperk me tot eenvoudige bezigheden	1	2	3	4
6. Ik zorg dat ik me niet lichamelijk hoef in te spannen	1	2	3	4
7. Ik neem rust door te gaan zitten of te gaan liggen	1	2	3	4
8. Ik neem een prettige lichaamshouding aan	1	2	3	4
9. Ik neem een bad of douche	1	2	3	4
10. Ik zorg ervoor dat ik me niet opwind	1	2	3	4
11. Ik trek me terug in een rustige omgeving	1	2	3	4
12. Ik zorg ervoor dat ik niet gehinderd word door storende geluiden	1	2	3	4
13. Ik zorg ervoor dat ik niet gehinderd word door het licht (bv. Door een zonnebril op te zetten, de gordijnen dicht te doen)	1	2	3	4
14. Ik houd rekening met wat ik eet of drink	1	2	3	4
15. Ik doe alsof de pijn er niet is	1	2	3	4
16. Ik doe alsof de pijn niet mijn lichaam betreft	1	2	3	4
17. Ik blijf voortdurend op de pijn letten	1	2	3	4
18. Ik stel me de pijn als minder hevig voor dan deze in feite is	1	2	3	4
19. Ik denk aan plezierige dingen of gebeurtenissen	1	2	3	4
20. Ik zoek afleiding door een lichamelijke activiteit te gaan doen (bv. Wandelen, fietsen, zwemmen)	1	2	3	4
21. Ik zoek afleiding door mijn aandacht te richten op lezen, muziek, een tv-programma of iets dergelijks	1	2	3	4
22. Ik ga doen wat ik plezierig vind	1	2	3	4

23. Ik dien mezelf andere lichamelijke prikkels toe (bv. Door mijn vuisten te ballen, mezelf te knijpen of wrijven op de plaats van de pijn)	1	2	3	4
24. Ik denk aan alle dingen die blijven liggen omdat ik pijn heb	1	2	3	4
25. Ik ga piekeren	1	2	3	4
26. Ik vraag me af wat de oorzaak van de pijn is	1	2	3	4
27. Ik denk dat de pijn erger zal worden	1	2	3	4
28. Ik denk aan momenten waarop ik geen pijn had	1	2	3	4
29. Ik denk dat ik gek word van de pijn	1	2	3	4
30. Ik bedenk dat anderen het ook wel eens moeilijk hebben	1	2	3	4
31. Ik denk dat anderen niet begrijpen wat het is om zo'n pijn te hebben	1	2	3	4
32. Ik zonder me af	1	2	3	4
33. Als ik buitenshuis ben probeer ik zo snel mogelijk thuis te komen	1	2	3	4

34

a. Ik heb een eigen manier om de pijn te verminderen of draaglijker te maken 1 2 3 4

b. Geef aan welke

……

……

……

Bedankt voor uw deelname!

Controleert u nog even of u alle vragenlijsten,

en alle items per vragenlijst invulde?

Dan mag u deze bundel posten in de daartoe voorziene envelop.

Onderzoek onder leiding van

Dr. Liesbet De Baets en Prof. Dr. Annick Timmermans.

Extra inlichtingen? Liesbet.debaets@uhasselt.be

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Appendix progress form

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KNOWLEDGE IN ACTION

VOORTGANGSFORMULIER WETENSCHAPPELIJKE STAGE DEEL 1

DATUM	INHOUD OVERLEG	HANDTEKENINGEN
26/11/2018	Uitleg inhoud masterproef	Promotor: Liesbet De Baets Copromotor/begeleider: Student(e): Sarah Den Hond Student(e):
18/03/2019	Geïncludeerde studies bespreken	Promotor: Liesbet De Baets Copromotor/begeleider: Student(e): Sarah Den Hond Student(e):
17/05/2019	Bespreking resultaten	Promotor: Liesbet De Baets Copromotor/begeleider: Student(e): Sarah Den Hond Student(e):
05/06/2019	Bespreking laatste aanpassingen + ondertekenen inschrijvingsformulier	Promotor: Liesbet De Baets Copromotor/begeleider: Student(e): Sarah Den Hond Student(e):
		Promotor: Copromotor/begeleider: Student(e): Student(e):
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	Niet-bindend advies: De promotor verleent hierbij het advies om de masterproef WEL/NIET te verdedigen.	Promotor: Copromotor/begeleider: Liesbet De Baets Student(e): Sarah Den Hond Student(e):