Book of Abstracts

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PAIN IN MOTION

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Content

Program March 26th

9h00 Welcome & Introduction
auditorium P. Brouwer

9h15 “Pain science: it's all about behaviour!” Keynote lecture

Johan W.S. Vlaeyen (PhD), Professor in Health Psychology, University of Leuven, Belgium & Maastricht University, the Netherlands
auditorium P. Brouwer

10h15 **Parallel sessions** with lectures by PhD researchers

	Session 1: Treatment studies Chair: C.P. van Wilgen – the Netherlands *auditorium P. Brouwer*		Session 2: Psychology research Chair: S. Van Damme – Belgium auditorium 5
10h15	“Emotion and Information: What is effective reassurance in Low Back Pain Consultations?” Nicola Holt – United Kingdom	10h15	“Influence of emotional stress on pain” Linda Hermans - Belgium
10h35	“Preoperative Pain Neuroscience Education for Lumbar Radiculopathy” Adriaan Louw – South Africa & U.S.A.	10h35	“What trait anxiety and sensory processing profile characteristics do patients with non-specific chronic low back pain with central sensitisation pain have? Pilot Study” Jacqui Clarck – New Zealand & U.K.
10h55	“Prehabilitation for persons who will undergo spinal fusion surgery - Incorporating a cognitive behavioral approach within the orthopedic context” Hanna Lotzke - Sweden	10h55	“Defensive Coping Styles in a Chronic Musculoskeletal Pain population” Zoe Franklin – United Kingdom

11h15 Coffee break

11h45 “Research methods to critically appraise measurement proprieties in pain measurement” Keynote lecture

Raymond Ostelo (PhD), Professor Evidence Based Physiotherapy, University Amsterdam, the Netherlands
auditorium P. Brouwer

12h45 Lunch break

14h00 **Parallel sessions** with lectures by PhD researchers

	Session 3: Treatment studies Chair: L. Voogt – the Netherlands auditorium P. Brouwer		Session 4: Literature reviews Chair: M. Moens – Belgium auditorium 5
14h00	“PREvention STudy On preventing or reducing disability from musculoskeletal complaints in conservatory students (PRESTO): protocol of a randomised controlled trial” Vera Baadjou – the Netherlands	14h00	“Structural and functional brain abnormalities in chronic low back pain: A systematic review” Jeroen Kregel – Belgium & the Netherlands
14h20	“Study protocol “back on track”; chronic low back pain rehabilitation program in primary care” Reni van Erp – the Netherlands	14h20	“Unraveling the deconditioning paradigm in chronic low back pain: a systematic review” Bart Pepels – the Netherlands
14h40	“2B Active: Outpatient rehabilitation for adolescents with chronic pain” Carolien Dekker – the Netherlands	14h40	“Sensorimotor incongruence and visual feedback in patients with musculoskeletal pain: a systematic review” Sanneke Don – Belgium & the Netherlands
15h00	“Investigating analgesic effects of multi-sensory illusions in hand osteoarthritis” Kristy Themelis – United Kingdom	15h00	Is ther evidence for central sensitization in non-specific, non-traumatic Neck pain? Anneleen Malfliet - Belgium

15h30 Two ‘Meet the Expert’-sessions in parallel

Johan Vlaeyen auditorium P. Brouwer

Raymond Ostelo *auditorium 5*

16h30 End of day 1

Social program

Program March 27th

9h00 “To study pain mechanisms without invasive methods: What can we learn from combining genetics, imaging and pain testing?” Keynote lecture

Eva Kosek (MD, PhD), Associate professor at the department of clinical neuroscience, Karolinska Institute, Stockholm, Sweden
auditorium P. Brouwer

10h00 Parallel sessions with lectures by PhD researchers

	Session 5: Psychology & assessment Chair: P. Vaes - Belgium auditorium P. Brouwer		Session 6: Pain mechanisms studies Chair: F. Camu - Belgium auditorium 5
10h00	“Design of an experience sampling study on predictors of mood fluctuations in chronic migraine patients” Yvette Ciere – the Netherlands	10h00	“Cognitive performance is related to central sensitization in patients with chronic whiplash-associated disorders and fibromyalgia: A case-control study” Iris Coppieters – Belgium
10h20	“The validity and reliability of a breast pain diary for women with cyclic breast pain” Emma Burnett – United Kingdom	10h20	“Exercise induced analgesia in people with osteoarthrits of the knee” Caitriona Fingleton – Ireland
10h40	“What is important in pain education? The experience of patients with chronic pain” Amarins Wijma – Belgium & the Netherlands	10h40	“Are changes in central pain processing involved in chronicity of low back pain?: Preliminary results” Dorien Goubert – Belgium
11h00	“Living well with chronic pain - Classical grounded theory” Bronwyn Lennox Thompson – New Zealand	11h00	“Development of a core outcome set for Clinical trials in non-specific low back pain” Alessandro Chiarotto – Italy/the Netherlands

11h20 Coffee break

11h50 **'Meet the Expert'-session** with **Eva Kosek** *auditorium P. Brouwer*

12h50 Lunch break

14h00 Plenary session "**East meets West in Pain science**" sponsored by Wuhan Union Hospital - China

Chairs: S. Yao – China & B. Morlion – Belgium

Organized by the Scientific Committee in collaboration with L. Shi

auditorium P. Brouwer

14h00 "The challenges in chronic pain management in Europe" Keynote lecture

Bart Morlion (MD, PhD), Director of the Leuven Center for Algology & Pain Management, University Hospitals Leuven, KU Leuven, Belgium; Hon. Assoc. Professor, University of Groningen, The Netherlands; President-elect European Pain Federation EFIC

14h30 "A variety of minimal and non-invasive procedure for chronic pain management in Shenzhen"
L. Xiao – China

15h00 "Hyperpolarization-activated cyclic nucleotide-gated (HCN) channels and Pain" X. Chen – China

15h20 "Human brain responses to concomitant stimulation of aδ and c nociceptors"
L. Hu – China

15h40 "A multi-center study of teaching the public about pain science"
A. Louw – South Africa & USA

16h00 "East meets West in pain science: how optimizing collaboration?"
Discussion with the audience led by S. Yao & B. Morlion

16h30 Prize winner announcements: Best Oral Presentation & Best Abstract

auditorium P. Brouwer

17h00 End of Colloquium

Theme of the conference

The focus of this research colloquium is on research methods in pain sciences, rather than on research findings or (clinical) applications of research findings from pain science. The field of pain science is broad in focus and divers in research methods. With its focus on research methods in pain science, the colloquium is unique in the field of pain.

The Scientific Committee welcomes researchers form different fields of pain research (e.g. fundamental, clinical, psychological, rehabilitation, pharmacology, neuromodulation, medicine, neurosurgery) to present their work in which they reflect on the research methods used, and to discuss its specific value and opportunities for the field of pain research. This colloquium will provide a forum for PhD-students for sharing ideas, networking, presentation of research findings, and discussion of professional issues relevant to the field of pain science.

The Colloquium is open to all PhD researchers in the field of pain. It does not matter from what country they come from, what discipline, or how far they are in preparing their PhD. Junior PhD researchers in the early stage of preparing their first study are equally welcome as more experienced researchers in the final year of their PhD. If junior researchers do not have results yet, they are welcome to present their research ideas and research design with their international peers. In fact, the scientific committee feels that such presentations might be a unique way to receive valuable input on their study design, and might trigger international collaboration.

This will be the first international meeting in the field of pain dedicated to PhD researchers.

Objectives

The objectives of the research colloquium are multifactorial, including

1) the facilitating of PhD research in pain sciences,

and 2) stimulation of (inter)national collaboration among PhD researchers from various disciplines.

A third and very important objective of the colloquium is allowing PhD researchers to present their work orally in a platform presentation for an international audience.

The colloquium also aims at inspiring young researchers in the field, which will be achieved through the keynote lectures and 'meet the expert' sessions.

Given the interdisciplinary nature of the colloquium, another important scientific objective addresses facilitating collaboration between pain researchers from various disciplines (including medicine, psychology, psychiatry, neurology, neurosurgery, rehabilitation, physiotherapy, occupational therapy, nursing).

Finally, Belgium has a strong track record in the field of pain science. This colloquium will build on that track record, and will further develop the international position of Belgium in the field of pain science.

Scientific importance

The major international pain congresses in the world provide little opportunities for junior or PhD researcher to present their work during platform presentations. During these congresses, PhD researchers are able to present their work with poster presentations, but the platform (oral) presentations are typically taken by established researchers in the field. Therefore, the major scientific importance of the colloquium is allowing PhD researchers to present their work orally during a platform presentation for an international audience. This will be the first pain congress ever to focus on PhD researchers in the field of pain.

The colloquium provides a unique platform for PhD researchers to present their work (in progress) in a friendly environment in the European capital, and to learn from Leaders in the field of pain science. Indeed, the 4 international Keynote lecturers will not only lecture about their specific research skills, they will also respond to questions from the participating PhD researchers (i.e. during the friendly and accessible 'Meet the Expert' sessions). Here is what a PhD researcher said after having attended a 'Meet the Expert' session: '*It was so inspiring to share my everyday PhD problems with one of the leaders in the field. I was surprised to receive clear answers and advice how to handle things more efficiently. What strikes me the most was the empathy for the difficulties I experience. For me it was the definite piece of evidence that all my problems are not 'bad luck' but routine problems many researcher have to deal with!*'

Scientific committee

Prof. Dr. Jo Nijs (Belgium) – Vrije Universiteit Brussel & UZ Brussel

Dr. Lennard Voogt (the Netherlands) – Hogeschool Rotterdam & Vrije Universiteit Brussel

Prof. Dr. Paul van Wilgen (the Netherlands) – Transcare Pijn & Vrije Universiteit Brussel

Prof. Dr. Peter Vaes (Belgium) – Vrije Universiteit Brussel & UZ Brussel

Prof. Dr. Chris van Schravendijk (Belgium) – Vrije Universiteit Brussel

Em. Prof. Dr. Frederic Camu (Belgium) – Vrije Universiteit Brussel & UZ Brussel

Prof. Dr. Stefaan Van Damme (Belgium) – Universiteit Gent

Prof. Dr. Maarten Moens (Belgium) – Vrije Universiteit Brussel & UZ Brussel

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Prof. Dr. Jo Nijs (Belgium) – Vrije Universiteit Brussel & UZ Brussel

Prof. Dr. Chris van Schravendijk (Belgium) – Vrije Universiteit Brussel

Prof. Dr. Paul van Wilgen (the Netherlands) – Transcare Pijn & Vrije Universiteit Brussel

Dr. Lennard Voogt (the Netherlands) – Hogeschool Rotterdam & Vrije Universiteit Brussel

Dr. Kelly Ickmans (Belgium) – Vrije Universiteit Brussel & UZ Brussel

Mevr. Nelly Harnie (Belgium) – Vrije Universiteit Brussel

Mevr. Liesbet Boriau (Belgium) – Vrije Universiteit Brussel

Introducing the Keynotes

Professor Eva Kosek – Keynote lecturer

Dr. Eva Kosek, MD, PhD, Associate Professor, is specialist in rehabilitation medicine and pain medicine. She has a position as Associate Professor at the department of Clinical Neuroscience, Karolinska Institute and is a senior consultant at Spine Center, Stockholm, Sweden. She received her medical degree from the Uppsala University in 1986 and her PhD from the Karolinska Institute in 1996. Dr. Kosek is currently leading a research group focusing on pathophysiological mechanisms in chronic musculoskeletal pain, with special reference to central mechanisms of pain modulation and genetic factors. Dr. Kosek is an elected councilor of the International Association for the Study of Pain (IASP). She is a member of several professional associations such as Scandinavian Association for the Study of Pain (SASP), the Swedish Medical Association and the Swedish Medical Association for Pain Relief. Dr. Kosek is a reviewer for several scientific journals and has published many articles and abstracts. She has lectured at conferences and symposia worldwide.

Professor Johan W.S. Vlaeyen – Keynote lecturer

Johan W.S. Vlaeyen is professor Behavioural Medicine at the Universities of Leuven (Belgium) and Maastricht (the Netherlands). His main interests are the behavioral, cognitive and motivational mechanisms of chronic disability due to bodily complaints, and the development and evaluation of customized cognitive-behavioral management strategies for individuaks suffering chronic bodily symptoms. His experimental work includes research on the acquisition of pain-related fear through direct experience and observational learning, the role of safety behaviors in the extinction of fear, the role of unpredictability on fear generalization and pain sensitivity, and the effects of pain-related goal-conflicts on pain and pain-related fear. He and his team have developed fear-reduction treatments and utilized replicated single-case experimental designs to evaluate the effects of behavioral interventions for patients with chronic pain. Johan W.S. Vlaeyen is on the editorial board of Pain, European Journal of Pain, Clinical Journal of Pain, Cognitive Behaviour Therapy, and Translational Behavioural Medicine. He is principal author of the book "*Pain-related Fear: Exposure-based Treatment of Chronic Pain*" (IASP Press 2012), received the Pain Award of the Dutch Chapter of IASP, and obtained an honorary doctorate at the University of Örebro (Sweden) for his scientific contributions in the area of pain psychology.

Professor Raymond Ostelo – Keynote lecturer

Raymond Ostelo is professor of Evidence-Based Physiotherapy at the EMGO Institute for Health and Care Research, Amsterdam, The Netherlands. He also holds positions as Honorary Professorial Fellow at the Musculoskeletal Division of George Institute for Global Health (University of Sydney, Australia) and at the Physiotherapy Research Group of the University of Bergen (Norway).

His research mainly focuses on effectiveness and cost effectiveness studies (randomized clinical trials and systematic reviews) in the musculoskeletal field. He is also involved in clinimetrical research, mainly focussing on Patient Reported Outcomes (PROMs). His teaching focuses on research methodology for Research Master and PhD students. He (co)authored more than 100 international peer reviewed papers and is the co-editor of textbook on research methodology (in Dutch). Additionally he has been involved in the development of various multi- and mono disciplinary evidence-based guidelines in the field of back pain.

Professor Bart Morlion – Keynote lecturer

Professor Morlion trained as an anaesthesiologist, is director of the Leuven Centre for Algology & Pain Management at the University Hospitals of Leuven and professor at the University of Leuven. He teaches pain management and pharmacology at the KU Leuven and several university colleges in Belgium. He was recently appointed as Honorary Associate Professor at the University of Groningen in the Netherlands.

He is member of the executive board of the European Pain Federation EFIC as President Elect, to take office in 2017. From 2006 till end of 2012 he has been the President of the Belgian Pain Society – the Belgian Chapter of the IASP and represented Belgium as councillor in the European Pain Federation EFIC from 2006-2013. He is program director of the Belgian Interuniversity Postgraduate Studies in Algology and is also an active member of several committees in international scientific societies: chairman of the EFIC website committee, editor-in-chief of EFIC newsletter, section editor of the European Journal of Pain and member of the IASP membership and IASP educational committee.

His professional interests include all aspects of multimodal chronic pain management, analgesics, and quality management. His clinical research focuses on the pharmacological treatment of chronic pain and organizational aspects of multidisciplinary pain management.

Abstracts

Session 1: Treatment studies

EMOTION AND INFORMATION: WHAT IS EFFECTIVE REASSURANCE IN LOW BACK PAIN CONSULTATIONS?

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Pain science: psychology

Introduction: Reassurance from practitioners is recommended in numerous guidelines for the management of Low Back Pain (LBP) in primary care, however what 'reassurance' means in poorly defined and researched. Coia and Morley (1998) suggest a difference between 'cognitive' and 'affective' reassurance, the former being based on information and patient education, and the latter on emotionally reassuring the patient to allay their immediate concerns. They argue that affective reassurance, while providing short-term reductions in anxiety, may be harmful in the long-term as it demotivates patients from absorbing the helpful messages contained within cognitive reassurance. This study aims to construct and validate a measure of practitioner reassurance in primary care, and to assess whether cognitive and affective reassurance from prractitioners affect LBP patients' short-term outcomes differently.

Methods: This study employed a prospective cohort design using questionnaires. A new scale was developed to measure reassurance during consultations. Patients who had recently consulted their General Practitioner (GP) for new episodes of non-specific LBP were invited to take part. Participants completed the new reassurance scale, along with satisfaction (Baker, 1990) and enablement (Howie, 1998) scales. Control variables included were age, gender, education level, marital status, employment status, GP's gender, length of current LBP episode, pain intensity, and function. A second questionnaire was answered one-week later, containing the reassurance, satisfaction and enablement items to assess test-retest reliability. Finally, three-months later the following outcomes were assessed: pain intensity, function, further healthcare utilisation, time off work, depression and anxiety.

Validation of the questionnaire utilised Rasch Modelling (Wright, 1977), while the effect of reassurace on patient outcomes will be evaluated using multi-level modeling.

Limitations and strengths:

Limitations:
1. Reliance on patient self-report data for both consultation and outcome measures.
2. Lack of baseline (pre-consultation) data on participants' state of mind before their consultation, due to inaccessibility in primary care.

Strengths:

1. Development of a well-validated measure for practitioner reassurance which has previously been lacking.
2. Effects of reassurance on outcomes will be controlled for personal characteristics and those of the participant's pain episode.

Process evaluation: After piloting, the original response scale for the reassurance questionnaire was found to produce universally yea-saying results – it seemed that with the original wording, participants did not want to say anything negative about their GPs. After review with an expert panel, the response scale was changed which has produced much more varied responses. Recruitment for the questionnaire study was also slower than anticipated, which prompted a move to an implied consent model with simplified patient documentation, to make the study more appealing to potential participants.

References:

Baker R. British Journal of General Practice 1990; 40:487-490.
Coia P., Morley S. Journal of Psychosomatic Research 1998; 45: 377-386.
Howie JG et al. Family Practice 1998; 15: 165-171.
Wright BD. Journal of Educational Measurement 1977; 14: 97-116.

PREOPERATIVE PAIN NEUROSCIENCE EDUCATION FOR LUMBAR RADICULOPATHY

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Pain science: Physiotherapy

Introduction:

Study Design: Multicenter, randomized, controlled trial on preoperative pain neuroscience education (NE) for lumbar radiculopathy.

Objective: To determine if the addition of NE to usual preoperative education would result in superior outcomes in regards to pain, function, surgical experience and healthcare utilization post-surgery.
Summary of Background Data: One in four patients following lumbar surgery (LS) for radiculopathy experience persistent pain and disability, which is non-responsive to perioperative treatments. NE focusing on the neurophysiology of pain has been shown to decrease pain and disability in chronic low back pain (LBP) populations.

Methods: Eligible patients scheduled for LS for radiculopathy were randomized to receive either usual preoperative care (UC) or a combination of UC plus one session of NE delivered by a physical therapist (verbal one-on-one) and a NE booklet. Sixty-seven patients completed the following outcomes prior to LS (baseline), and one, three, six and 12 months after LS: LBP (Numeric Rating Scale (NRS)), leg pain (NRS), function (Oswestry Disability Index), various beliefs and experiences related to LS (10 item survey with Likert responses), and post-operative utilization of healthcare (Utilization of Healthcare Questionnaire).

Limitations and strengths:

Limitations:
- Underpowered to truly evaluate function and pain difference
- Abbreviated NE versus a more comprehensive program to ensure potential powerful results

Strengths:
- First pre-emptive NE program
- Clinically applicable program in terms of time and cost

Results: At one-year follow up, there were no statistical difference between the experimental and control groups in regards to primary outcome measure of LBP ($p = 0.183$), leg pain ($p = 0.075$) and function ($p = 0.365$). In a majority of the categories regarding surgical experience, the NE group scored significantly better: better prepared for LS ($p = 0.001$); preoperative session preparing them for LS ($p < 0.001$) and LS meeting their expectations ($p = 0.021$). Healthcare utilization post-LS also favored the NE group ($p = 0.007$) resulting in 45% less healthcare expenditure compared to the control group in the 1-year follow-up period.

Discussion: NE resulted in significant behavior change. Despite a similar pain and functional trajectory over the one year trial, LS patients who received NE viewed their surgical experience more favorably and utilized less healthcare in the form of medical tests and treatments.

References:

Ostelo RW, de Vet HC, Waddell G, Kerckhoffs MR, Leffers P, van Tulder M. Spine. Feb 1 2003;28(3):209-218.
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PREHABILITATION FOR PERSONS WHO WILL UNDERGO SPINAL FUSION SURGERY – INCORPORATING A COGNITIVE BEHAVIORAL APPROACH WITHIN THE ORTHOPEDIC CONTEXT

Authors: Hanna Lotzke, PT, PhD student; Marlies den Hollander, OT, PhD Student, Annelie Gutke, PT, PhD; Rob Smeets, MD, Professor; Mari Lundberg, PT, Associate Professor (PhD in Medicine)
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Pain science: Physiotherapy

Introduction: The number of patients who undergo lumbar spinal fusion surgery has increased worldwide, and are related to high costs for society (1), and is associated with a high degree of disability. Kinesiophobia has been shown in 70% of the patients with chronic LBP scheduled for surgery, regardless if the back condition was classified as specific or non-specific (2). By reducing catastrophizing thoughts and fear, using cognitive exposure, the level of depressive symptoms decreased and the function increased (3), which has also been shown postoperatively (4). This approach has not been tested on patients preoperatively. The aim was to design and evaluate a structured individualized pre-rehabilitation program that promotes functioning and health related quality of life for patients scheduled for lumbar fusion surgery, while comparing this program to usual care and investigate how these strategies influence postoperative outcome. This will be performed in a randomized controlled study design. Before starting the RCT we performed a single case study in order to perform a process and effectiveness evaluation.

Methods: The single case study was set up as a cross-over design (A-B-C versus A-C-B). A baseline phase (A) was followed by either an intervention phase (B) or usual care (C). The intervention (B) targeted specific guidance in reducing fear and catastrophizing in relation to physical activity based on CBT principles in the preoperative phase. The usual care (C) contained preoperative information and postoperative exercise regime. The main outcome variables were: physical activity measured by counts and functioning using the patient specific functioning scale, and the process variables were catastrophizing, kinesiophobia and pain intensity.

Limitations and strengths:

Two strengths of the methods used:
- Measures the affective (pain-related fear), the cognitive and the nociceptive components of pain
- Selected target behaviours (main variable: physical activity)
- Clinically relevant method

Two limitations of the methods used:
- Pain intensity as a measure
- Risk of recall bias by distributing the questionnaires too frequently in time

Process evaluation: The intervention needed to be adjusted in relation to the orthopaedic context. The patients' expectation was that surgery should make them pain free and then more physically active, showing a biomedical way of thinking about pain. Our aim was to implement a bio-psycho-social understanding of pain, to shift attention from dealing with pain to functioning despite pain.

We assumed that all patients waiting for spinal fusion surgery had pain catastrophizing thoughts and fear of movement, which was not the case. The intervention was hence adjusted into two treatment strategies, one with a cognitive exposure and on with the aim to increase functioning based on the patient specific functioning goals.

References:

1. Strömqvist B et al. Eur Spine J 2013;22:953-974.
2. Lundberg M et al. Spine 2011; 36: 1547-1553.
3. Leeuw M et al. Pain, 2008; 15: 198-207.
4. Abbott AD et al. Spine, 2010; 35: 848-857.

Session 2: Psychology research

INFLUENCE OF EMOTIONAL STRESS ON PAIN

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Pain science: Physiotherapy

Introduction: Conditioned pain modulation (CPM) is commonly used as assessment tool for measuring endogenous pain inhibition in chronic pain patients, as CPM-effects are reduced in centrally sensitized patients. Besides the influence of non-modifiable factors as e.g. gender, age, and genetics, modifiable factors of CPM are of great importance for rehabilitation and treatment. The interaction of emotional stress on CPM is currently unclear, therefore, the present study evaluates pain and more specific CPM before and after an emotional stressor in healthy subjects.

Methods**:** One-hundred-and-one healthy pain-free volunteers (51 males and 50 females) underwent pain assessment before and after a modified Trier Social Stress Test (TSST). Pain-assessment existed of an evaluation of pressure pain thresholds (PPTs) and temporal summation (TS) by manual algometry, and CPM evoked via grip exercises followed by upright arm position and ischemic cuff inflation of the upper arm. Statistical analysis was performed with repeated measures anovas.

Limitations and strengths: The strengths of this study are the large sample size with low dropout ratio (3/101) and extended pain assessment. Two limitations of this study are the ischemic conditioning pain stimulus and the individual emotional arousal.

Results: PPTs for M. Trapezius and M. Rectus femoris were significantly higher in males compared to females. PPTs and CPM-effect of the M. Trapezius significantly increased after TSST in males as well as females. Remarkably, an increase of TS after TSST was detected in the M. Rectus Femoris.

Discussion: Healthy volunteers receive endogenous pain inhibition after acute social stress. However, most patients with central sensitization experience chronic stress, i.a. combined with a dysfunctional working HPA-axis. Consequently, acute stress forces these patients in a vicious circle. Therefore, further research investigating the effect of acute stress on pain in patients with central sensitization is recommended.

Process evaluation: In this study mainly young volunteers (20-30 years old) participated, therefore we have to be cautious in generalizing the results.
The degree of emotional arousal was subjectively scored by the participants him/herself, an objective measurement for example heart rate or heart rate variability is recommended. We used a modified TSST, so just for starting their 'presentation', participants underwent the last pain assessment. Hence, not the standardized TSST was used, which made testing more feasible. After testing 10 volunteers we concluded, on basis of the subjective scales, that stress arousal was reached by this modified version.

WHAT TRAIT ANXIETY AND SENSORY PROCESSING PROFILE CHARACTERISTICS TO PATIENTS WITH NON-SPECIFIC CHRONIC LOW BACK PAIN WITH CENTRAL SENSITISATION PAIN HAVE? PILOT STUDY

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Pain Science: Physiotherapy.

Introduction: Patients with non-specific chronic low back pain (NSCLBP) and central sensitisation (CS) have been shown to exhibit central nervous system (CNS) changes including sensory processing alterations and differences in the brain's neural activation networks, including emotional networks (1-4).The concept that the aetiology of CNS alterations found in patients with NSCLBP and CS is related to the patient's own trait sensory processing and anxiety characteristics has not yet been explored. Aims of the study were to undertake a pilot study to a) explore the range of CS scores in NSCLBP patients and the potential relationships between CS scores, patient characteristics of trait anxiety and trait sensory processing profiles, b) refine study methodology and c) establish concept plausibility.

Method: Questionnaires were administered to a cross section of NSCLBP patients (N=21) from physiotherapy outpatient clinics in New Zealand. They were identified as centrally sensitised using selection criteria to the exclusion of predominantly neuropathic or nociceptive pain.

Outcome measures:

1. Central Sensitisation Inventory (CSI) (5)
2. Adolescent/Adult Sensory Profile – identifies four sensory processing quadrant scores per person. "Sensory Sensitive", "Sensory Avoidance", "Low Registration ", "Sensory Seeking".(6)
3. State/Trait Anxiety Inventory (Trait section) with the Marlow Crown Sociable Desirability Questionnaire (7,8) – identifies four quadrants of trait anxiety sub-types. "High Anxious", "High Defensive Anxious", "Low Anxious", "Repressor" .

Descriptive and non-parametric correlation statistics were used to explore the questionnaire data.

Strengths and Limitations: This study is the first to evaluate pre-existing trait characteristics in association with central sensitisation. Medications were not recorded in this study.

Results: 16 NSCLBP patients with CS scored ≥40 on the CSI. Higher levels of CS (≥40 CSI) were associated with 1) abnormal trait sensory processing profiles: Low Registration (N=5), Sensory Sensitive (N=10) and Sensory Avoidance (N=7) high scores; Sensory Seeking (N=5) low scores, 2) High trait anxiety sub-types, High Anxious (N=4) and Defensive High Anxious (N=10) and 3) minimal low trait anxiety: Low Anxious (N=0), Repressor (N=2). *(Correlation results TBC.)*

Discussion: These preliminary results suggest somatosensory hypersensitivity in NSCLBP patients with CS are related to abnormal trait sensory hypersensitivity and trait high anxiety sub-types. A sub-group exhibited trait sensory hyposensitivity which is of interest in light of reports of diminished sensory discrimination and awareness in NSCLBP (e.g.1,9) . This study has provided sufficient concept plausibility and valuable information to inform the design of replication and related extension studies.

Process evaluation:

1. The need for some logistical alterations were established for patient recruitment, including clearer definitions for the health care providers.
2. Deeper exploration using interviews would add context to the data and the larger study will use a mixed methods design.
3. Medication usage and dosage were not recorded and this will be added to the next study.

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DEFENSIVE COPING STYLES IN A CHRONIC MUSCULOSKELETAL PAIN POPULATION

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Introduction: Research, within clinical chronic illness populations, has shown differences in treatment preferences and health outcome (Prasertsri et al., 2011) when both defensiveness and anxiety have been considered (personality type) (Weinberger et al., 1979). However, there is limited research investigating personality type in a chronic musculoskeletal pain population. This study aimed to, (1) to identify the prevalence of the defensive high anxious personality type in a general chronic pain population; and (2) to identify whether different levels of defensiveness affect the relationships between cognitive factors and disability.

Methods: Sixty patients with chronic musculoskeletal pain, who had been referred to a hospital for treatment, completed questionnaires assessing pain intensity, defensiveness, trait-anxiety, disability, depression, catastrophizing, self-efficacy and kinesiophobia. Personality type was assessed based the State Trait Anxiety Inventory (Spielberger et al.,) and the Marlowe Crowne Social Desirability Scale (Strahan & Gerbasi 1972).

Limitations and strengths:
Strengths:
1) This is the first study to investigate personality type in a chronic musculoskeletal pain population.
2) This study drew participants from three hospital settings, providing a diverse and representative sample.

Limitations:
1) There is an element of self-selection bias within this study as patients respond to the information pack only if they are interested.
2) Patients entered the study at different points in their pain journey and will have received different interventions, prior to and during the study period.

Results: Within the defensive high-anxious group, higher levels of self-efficacy, depression and catastrophizing were shown to be predictive of greater disability. Interestingly, the psychological variables did not significantly predict disability for the non-extreme and high-anxious group, however, pain intensity did have a greater effect.

Discussion: The interaction of defensiveness and anxiety plays an important role in determining the progression and outcome of chronic pain. Differentiating the defensive high-anxious group revealed different relationships between cognitive factors and disability. This highlights the necessity of assessing personality characteristics, including defensiveness to identify individuals who may be vulnerable to cognitive factors influencing levels of disability. If personality type is identified as a predictor of poor adjustment, early interventions could be customized to the unique needs of this group.

Process evaluation: One of the main problems we faced within this study was participant recruitment. To limit ethical issues associated with accessing patient records, we were required to recruit by asking clinicians to distribute information packs (containing an information sheet, letter, return envelope and informed consent form). If patients opted to take part they were asked to return the informed consent form along with their details and the first questionnaire would be sent out to them. This made it difficult to recruit more participants into the study and to dictate the point in their pain journey when they entered the study.

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Session 3: Treatment studies

PREVENTION STUDY ON PREVENTING OR REDUCING DISABILITY FROM MUSCULOSKELETAL COMPLAINTS IN CONSERVATORY STUDENTS (PRESTO): PROTOCOL OF A RANDOMISED CONTROLLED TRIAL

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Introduction: Conservatory students are at specific risk for developing musculoskeletal complaints and disabilities. This study aims to evaluate the effectiveness of a biopsychosocial prevention program to prevent or reduce disabilities from instrument playing-related musculoskeletal disorders.

Methods: First or second year conservatory students (n=150) will be asked to participate in a multicenter, single-blinded, parallel-group randomised controlled trial. Students randomised to the intervention group (n=75) will participate in a biopsychosocial prevention program that addresses playing-related health problems and be provided with postural training according to postural exercise therapy method Mensendieck or Cesar, while incorporating aspects from behavioural change theories. A control group (n=75) will participate in a program that stimulates a healthy physical activity level conform international recommendations. Classes will be given throughout one study year. Follow-up duration is two years. Measurements will be performed using questionnaires at 6 different moments (T0 t/m T3 in year one during classes, T4 and T5 at the beginning and end of the third year, respectively). Primary outcome measure is disability, measured with Disability of Arm, Shoulder, Hand questionnaire and Pain Disability Index. Pain, quality of life (Short-Form 36) and health behaviour change are secondary outcome parameters. Pain is measured as average, minimal and maximal pain level in the last week using a Numerical Rating Scale. Participants also indicate on a drawing of a human body were they experience pain. Analysis will be performed using multilevel mixed-effect logistic or linear regression analyses. Potential effect modifiers are: physical activity (Short Questionnaire to Assess Health - Enhancing Physical Activity), hypermobility (5 questions), credibility and expectation (credibility and expectation questionnaire), previous experience of playing-related complaints. Potential effect mediators are: self-efficacy (general self-efficacy scale), coping (brief-COPE), perfectionism (multidimensional perfectionism scale), depression/anxiety/stress (Depression, Anxiety, Stress Scale), pain catastrophizing (Pain Catastrophising Scale). Furthermore, cost-effectiveness and –utility, and feasibility will be analysed.

Limitations and strengths:
Limitations: 1) Pain and other outcomes (e.g. hypermobility) are measured only by questionnaires, no physical measurements. 2) At risk for high numbers of participants lost-

to-follow-up.
Strengths: 1) Moderation and mediation analysis to provide insight in the mechanism of pain in musicians. 2) Differentiation between pain and disability in musicians.

Process evaluation: Challenges concerning study population and design: how to keep students motivated for participation in a research project. How to limit drop out during study and follow-up. Challenges due to including multiple centres (5 Dutch conservatories spread out over a large area participated): how to deal with differences between conservatories. How to stimulate the different program teachers to strictly adhere to the study protocol. How to deal with demands of participating centres in relation to methodological issues/ demands.

STUDY PROTOCOL "BACK ON TRACK"; CHRONIC LOW BACK PAIN REHABILITATION PROGRAM IN PRIMARY CARE

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Introduction: Multidisciplinary biopsychosocial interventions have proven to be effective in patients experiencing chronic low back pain (CLBP) 1, 2. These interventions are however expensive and often deal with long waiting times. It might be interesting to implement a biopsychosocial intervention for patients with low to moderate psychosocial factors influencing daily life functioning in primary care. Because patients with CLBP vary in biopsychosocial profiles, patients might respond differently to interventions3. Therefore, in this project two studies will be performed which will focus on one subgroup specifically. In the first study the (cost-) effectiveness (Δfunctional disability) will be evaluated of a primary care biopsychosocial intervention as compared to usual primary care (physiotherapy) in patients with psychosocial factors having a relatively low influence on daily life functioning. A second study will investigate whether it is feasible and effective to provide a biopsychosocial intervention in primary care for patients with moderately influencing psychosocial factors.

Methods: An RCT (study 1; n=86) and a pre-post test design (study 2; n=30) will be executed. The biopsychosocial Back on Track intervention, provided by trained primary care physiotherapists, is based on the latest scientific evidence and the biopsychosocial approach used in multidisciplinary pain rehabilitation settings. Usual primary care comprises regular physiotherapy. Primary outcome is functional disability (QBPDS) at post- treatment, 3 and 12 months of follow-up. Secondary outcomes are costs (TiC-P) and quality-adjusted life-years (EQ-5D).

Limitations and strengths:
Strengths: Inclusion of subgroups of patients with CLBP, subgrouping and recruitment executed by experienced consultants in rehabilitation medicine, double-blind RCT design (study 1).
Limitations: use of self-reported questionnaires, restricted but not protocolled primary care as usual (comparison intervention study 1), no comparison intervention in study 2.

Discussion: The two studies might provide useful information with regard to physiotherapy interventions in primary care for specific subgroups of patients with CLBP. The results could improve the management of CLBP patients resulting in reduction of waiting lists and a decrease in (medical & societal) costs.

Process evaluation: Most challenging aspects of both studies are the inclusion of enough patients and the organizational structure of a pragmatic multicenter trial taking place in primary as well as in secondary care. This project aims to implement a new biopsychosocial program into an existing health care system and to enhance cooperation and communication between secondary professionals (consultants in rehabilitation medicine)

and primary care physiotherapists. This project therefore requires significant efforts with regard to the coordination and realization of the trial.

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2B ACTIVE: OUTPATIENT REHABILITATION FOR ADOLESCENTS WITH CHRONIC PAIN

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Introduction: Chronic musculoskeletal pain (CMP) in adolescents is a common problem. Living with CMP not only impacts on the adolescent's functioning and well-being, but also has negative consequences for the family and society [1,2,3,4]. According to the Fear Avoidance Model [5] of CMP, fear of movement and pain catastrophizing play an important role in the occurrence and maintenance of chronic pain complaints and functional disability. The intervention, a multimodal rehabilitation program (MRP), aims at decreasing functional disability by reducing fear of movement and pain catastrophizing. It is hypothesized that MRP, compared to care as usual (CAU), is more (cost-) effective in reducing functional disability in fearful CMP-patient, especially in the long term.

Methods: The design of the study is a multicenter randomized controlled trial. Participants are allocated (ratio 1:1, minimization is randomization method) to MRP or CAU. Treatment duration varies between 7 and 16 weeks. Measurements are at baseline and at 2, 4, 10 and 12 months after start of the treatment. 130 Adolescents and their parents will be recruited. Adolescents between 12-21 years with an indication for outpatient rehabilitation treatment are eligible. Four Dutch rehabilitation centers from the regions of Maastricht, Breda, Roermond and Rotterdam participate.

Intervention: MRP is an outpatient individual rehabilitation program, provided by a multidisciplinary rehabilitation team. MRP consists of a 1) Graded Exposure (GE) module (7 weeks) that aims to improve functional ability and reduce pain-related fear, 2) or a Combined training and GE (HMGE) module (15 weeks) for pain patient with hypermobility syndrome that starts with physical training before exposure, and 3) a Parent Module (3 sessions) for assisting parents to support improvement in their adolescents. Control: CAU consists of the care currently provided in Dutch rehabilitation centres, based on a national consensus report for treatment of adolescents with chronic fatigue and pain.

Limitations and strengths:
Strengths: 2B Active is a pragmatic study; therefore the results are directly applicable in practice. Patient will be followed or one year, to generate long term follow-up data.
Limitations: Variable treatment durations and implementing a new treatment in 4 different rehabilitation centers is challenging.

Process evaluation: Implementing a new treatment protocol (MRP) in existing practice is challenging. Appointing a study coordinator, who coordinates the implementation at each study site, is helpful. Data-collection from 3 different sources (adolescents, parents, therapists) requires a well-organized data-collection plan, which is complex in its set-up and needs a lot of attention to manage correctly.

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INVESTIGATING ANALGESIC EFFECTS OF MULTI-SENSORY ILLUSIONS IN HAND OSTEOARTHRITIS

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Introduction: Research has shown no strong association between radiographic hand osteoarthritis (OA) and levels of pain and disability (Haugen et al., 2013; Wajed et al., 2012). This suggests that additional underlying mechanisms are responsible for the pain seen in people with hand OA. It is therefore proposed that pain in OA is associated with changes in both peripheral and central processing (Wajed et al., 2012). Recent research from our lab showed that the illusion of stretching or shrinking the fingers of the hand resulted in a pain reduction by 50% on average in 85% of the participants (Preston & Newport, 2011)This indicates a potential for a strong analgesic effect of multi-sensory illusions in OA.
The immediate aim of this study is to test previously observed analgesic effects of multi-sensory body illusions and their effects on peripheral and/or central pain mechanisms in hand osteoarthritis. Depending on the results of the initial study, future studies will aim to assess whether regular training can make any of these effects long lasting. These results could inform future studies and potentially lead to non-invasive drug-free therapies.

Methods: The study intervention utilises a virtual reality device. This allows for a wide range of multi-sensory illusions using a combination of cameras and mirrors. To test the hypotheses of the involvement of central processes underlying the observed pain relief in hand OA, we will test pain pressure thresholds using Quantitative Sensory testing. We will also use a short questionnaire as a measurement of body perception disturbances and a numerical rating scale as a subjective measurement of pain intensity.

Limitations and strengths:
Limitations:
- Some of the research methods used in this study may cause discomfort or pain and may therefore be experienced as unpleasant.
- At the moment, the use of this virtual reality device is considered costly. We are aiming to develop a system that is more suitable for clinical practice.

Strengths:
- Future studies could potentially lead to non-invasive drug-free therapies
- The various different research methods used in this study, reflect the multifaceted and subjective nature of pain

Process evaluation: The use of various research methods can be very informative but can cause practical issues at well. After the data collection of my first study I experienced the difficulty of statistically analysing some of the data and especially the questionnaire data. It is a challenge to develop a questionnaire that covers the important aspects of pain without being considered as a responded and administrative burden. The ultimate aim is to use a combination of research methods that are easy to administer and cover all the important aspects.

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Session 4: Literature reviews

STRUCTURAL AND FUNCTIONAL BRAIN ABNORMALITIES IN CHRONIC LOW BACK PAIN: A SYSTEMATIC REVIEW

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Pain science: Imaging

Introduction: Chronic low back pain (CLBP) is the most common and important clinical, social, economic, and public health problem of all chronic pain disorders across the world. Due to the increasing evidence of maladaptive neuroplastic changes in CLBP and other chronic pain disorders, analyzing brain properties may be of great value. A systematic review was conducted to summarize the available evidence on structural and functional brain differences in CLBP.

Methods: A search of the online databases Pubmed and Web of Science was conducted. The Newcastle-Ottawa Scale (NOS) was used to determine the methodological quality of individual studies. Each study received a level of evidence according to the 2005 classification system of the Dutch Institute for Healthcare Improvement CBO. After clustering studies with comparable interventions, a level of conclusion was determined.

Limitations and strengths: A limitation is that the included articles showed diverse methods of reporting structural and functional brain properties, having an impact on the comparability of these studies. Also, due to the nature of the NOS, the 'exposure' category did not differentiate much between studies. A strength of this review is, following the primary aim, providing an overview of possible brain abnormalities in CLBP. Furthermore, the current review examines both structural and functional brain properties, enabling the reader to view the correspondence between these domains.

Results: There is conflicting evidence in global gray- and white matter changes. Gray- and white matter changes were demonstrated in specific brain regions. CLBP patients showed increased activation in specific regions, together with a disrupted default mode network. Results of studies assessing brain activity in response to a nociceptive stimulus suggest that patients demonstrated increased activity in pain related regions, and decreased activity in analgesic regions. Overall, there is moderate evidence for regional changes in gray and white matter, together with an altered functional connectivity during rest and increased activity in pain related areas following painful stimulation, evidencing an upregulated pain matrix.

Discussion: Although there was great variability in used brain imaging techniques and study designs, several important results were identified. Further research should focus on combining different imaging techniques. More longitudinal research should be conducted

for a better understanding of the temporal relationship between pain and neuroplastic changes in CLBP.

Process evaluation: Main issue during the review process was comparing the various studies on their respective outcome measures. MRI-imaging involves many processing techniques, negatively influencing the comparability between studies. Another issue of comparing the several outcome measures was the definition of research populations. Although the majority of included studies included non-specific CLBP, some studies included patients with specific pathologies. It may be possible that different pathologies lead to different neuroplastic changes.

UNRAVELING THE DECONDITIONING PARADIGM IN CHRONIC LOW BACK PAIN: A SYSTEMATIC REVIEW

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Introduction: It is hypothesized that patients with Chronic Low Back Pain (CLBP) adapt different movement strategies or even avoid potentially harmful activities. This adapted movement and avoidance may lead to inactivity and therefore to lower physical fitness and physical deconditioning [5]. Although lower physical activity and obesity are found to be associated with low back pain [4], only little evidence for physical deconditioning is found [3; 5]. Until now no systematical evaluation of aerobic capacity, an aspect of physical fitness, has been made. Furthermore, despite of reported importance to discriminate between the measurement of physical capacity and pain related behavior [1], no evaluation of the risk of bias in aerobic capacity testing in CLBP patients is made. The goal of this study is to systematically evaluate whether patients with CLBP have a lower aerobic capacity than healthy subjects and to critically appraise used aerobic capacity testing methods.

Methods: The study will be designed according to the PRISMA statement. Databases will be searched for the words and synonyms of: “low back pain”, “exercise test” and “physical fitness”. Articles will be screened for eligibility, assessed for quality and data will be extracted by two independent researchers. In case of disagreement, a third researcher will be consulted. Articles will be included when the primary outcome is aerobic capacity in adult CLBP patients, the study is an original article and is available in full text in English, Dutch or German language. Risk of bias assessment will be performed using a self-designed checklist for the evaluation of exercise testing methodology in populations as CLBP patients. The checklist is designed based on methodological aspects identified by the authors and exercise testing methodology aspects identified in the literature (e.g.: Midgley et al. [2]).

Limitations and strengths:
Limitations:
No meta-analysis will be performed.
The checklist for the risk of bias assessment is self-designed instead of developed by an international expert panel.
Strengths:
The study will be conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement
Because all articles examining aerobic capacity in adults with nonspecific CLBP are included, a good insight in different measurement methods used can be made.

Process evaluation: Our main objective was to systematically evaluate what is already known about aerobic capacity in patients with chronic low back pain and to evaluate what psychosocial variables are associated with not completing an exercise test. During the process it became clear that for the differentiation between measurement of physiological performance and pain related behaviour a valid determination of physiological maximal

performance is needed, which is subject to discussion. We considered it therefore best to divide the review in two parts were the first (current) part involves the evaluation of aerobic capacity in CLBP patients and testing methodology.

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SENSORIMOTOR INCOGRUENCE AND VISUAL FEEDBACK IN PATIENTS WITH MUSCULOSKELETAL PAIN: A SYSTEMATIC REVIEW

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Introduction: Chronic low back pain (CLBP) has major public health implications, but the theoretical framework remains elusive1. It is hypothesised that sensorimotor incongruence (SMI) might be a cause of long lasting pain sensations in patients with chronic pain2. Research data about experimental SMI triggering pain has been equivocal and evidence regarding SMI in patients with CLBP is lacking. The objective of this paper is to systematically review the available evidence on SMI and congruent visual feedback related to pain and its implications for patients with CLBP.

Methods: PRISMA guidelines were followed. A literature search was performed using several databases, studies published up to march 2014 were included. Risk of bias was assessed using the Dutch CBO checklist for RCT's and level of evidence was judged.

Limitations and strengths: The included cross-over studies had different methodological issues. Due to these methodological issues it was hard to draw firm conclusions. However, this study is the first systematic review on SMI related to pain and because PRISMA guidelines were used, the review has a robust design.

Results: Eight studies met the inclusion criteria. The methodological quality of the studies was judged as level B according to the levels of evidence of the CBO Institute for Healthcare Improvement. In six studies experimental SMI was provoked via a bimanual coordination test Additionally, one study conducted an online video experiment via a webcam and another study conducted a congruent visual feedback experiment. In healthy subjects, pain reports during experimental SMI were very low or did not occur at all, while pain reports were frequent in patient populations. Two studies show that visual feedback has analgesic effects.

Discussion: Based on the current evidence and despite some methodological issues, there is no evidence that experimental SMI triggers pain in healthy individuals, although there is level B evidence that experimental SMI triggers pain in patients with chronic pain. Two studies show that life visual feedback of the back has analgesic effects. Therefore, the relevance of congruent visual feedback of the lower back in patients with CLBP is supported by the current findings. These results may have important implications for the management of CLBP.

Process evaluation: At first, the search was set up to identify studies on SMI and low back pain. Since there was a lack of studies on SMI and low back pain, the search was expanded to musculoskeletal pain. Three studies came out of the search and five studies were found

by hand searching. Given the small number of included studies, varying study designs and heterogeneity of study populations, it was not feasible to perform statistical pooling.

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IS THERE EVIDENCE FOR CENTRAL SENSITIZATION IN NON-SPECIFIC, NON-TRAUMATIC NECK PAIN?

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Pain science: Other

Introduction: Chronic neck pain is a common problem with a poorly understood pathophysiology. Often no underlying structural pathology can be found and radiological imaging findings are more related to age than to a patients' symptoms. Besides its' common occurrence, chronic non-specific neck pain is also very disabling as about 50% of all neck pain patients show moderate disability at long-term follow-up. Central sensitization is defined as "an amplification of neural signaling within the central nervous system that elicits pain hypersensitivity", "increased responsiveness of nociceptive neurons in the central nervous system to their normal or subthreshold afferent input", or "an augmentation of responsiveness of central neurons to input from unimodal and polymodal receptors". There is increasing evidence for involvement of central sensitization and impaired endogenous pain modulation in many chronic pain conditions like fibromyalgia, low back pain, osteoarthritis, rheumatoid arthritis, etc. Within the area of chronic nonspecific neck pain, there is consistent evidence for the presence and clinical importance of central sensitization in patients with traumatic neck pain, or whiplash associated disorders. However, the majority of chronic nonspecific neck pain patients are unrelated to a traumatic (whiplash) injury, and hence are termed chronic idiopathic neck pain. When comparing whiplash with idiopathic neck pain, indications for different underlying mechanisms are found. The goal of this article was to review the existing scientific literature on the role of CS in patients with chronic nonspecific, nontraumatic neck pain.

Methods: Using the PRISMA guidelines a systematic search of existing, relevant literature was performed via the electronic databases Medline, Embase, Web of Science, Cinahl, PubMed and Google Scholar. All titles and abstracts were checked to identify relevant articles. An articles was considered eligible, if it met following inclusion criteria: (1) subjects had to be human adults (>18 years) diagnosed with nonspecific, nontraumatic chronic (present for at least 3 months) neck pain; (2) papers had to have information about central sensitization, (3) had to be published in English, Dutch or German; and (3) articles had to be full-text reports, and not abstracts, case-reports, letters or editorials. The studies not fulfilling one or more of the 3 inclusion criteria were excluded.

Limitations and strengths:
Limitations:
- The literature search was carried out by only one researcher, which implies that some relevant studies might have been excluded or overlooked.

Strengts:
- All selected studies were screened for methodological quality by two independent and blinded researchers.
- The amount of keywords was very large, reducing the possibility of missing an article with

valuable information.
- The odds of missing an article was further diminished by searching literature in six different electronic databases.

Results: Six articles were found eligible after screening the title, abstract and – when necessary – the full text for in- and exclusion criteria. All selected studies were case-control studies. Overall, results regarding the presence of central sensitization were divergent.

Discussion: Literature about central sensitization in patients with chronic nonspecific, nontraumatic neck pain is rare and results from the available studies provides an inconclusive message. Central sensitization is not a characteristic feature of chronic, nonspecific and nontraumatic neck pain, but can be present in a sub group of the population.

Process evaluation:
- There is no clear definition for the target population (chronic nonspecific, nontraumatic neck pain) described in this review, which made it sometimes hard to decide whether or not an article was useful for this review. It should be more defined which patients can be covered under this population, in order to avoid the giving of nonsense diagnoses. There is also need of defining all possible criteria for exclusion. This can lead to more adequate and validated selection of subjects.
- Different methods of evaluating central sensitization made it more complicated to compare results and to make a general conclusion.

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Session5: Psychology & assessment

DESIGN OF AN EXPERIENCE SAMPLING STUDY ON PREDICTORS OF MOOD FLUCTUATIONS IN CHRONIC MIGRAINE PATIENTS

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Introduction: Many patients with Chronic Migraine (CM) experience co-morbid mood problems (e.g. anxiety, depression, anger). The presence of negative mood can worsen migraine symptoms, impair quality of life and complicate treatment. Therefore, negative mood is a potential modifiable risk factor that should be addressed in the treatment of CM. However, more insight into the psychological mechanisms that are responsible for the maintenance and exacerbation of negative mood in patients with CM is needed. The current study will examine psychological predictors of fluctuations in mood in the daily life of patients with CM. First, we will examine the role of within-subjects factors (headache, goal disturbance, rumination) in explaining daily variability in mood within individuals. Second, we will examine the role of more stable factors (history of depression, acceptance/mindfulness, goal adjustment tendency) in explaining differences between individuals in negative mood in the context of CM.

Methods**:** We will use the Experience Sampling Method to sample mood and headache as well as several contextual and cognitive factors at 10 semi-random moments during the day for a period of 7 consecutive days. Stable factors are assessed with a self-report questionnaire at baseline.

Limitations and strengths:
Strengths:
- Because data are collected in the context of daily life, they are more ecologically valid.
- The experience sample method allows one to study processes within individuals.

Limitations:
- Even though it is possible to perform time-lagged analyses, data are still cross-sectional in nature. Therefore it will not be possible to investigate causal relationships.
- The Experience Sampling procedure is more burdensome than traditional methods (e.g. questionnaires). This may result in a selection bias towards patients that are functioning better.

Process evaluation:
Potential problems include:
- Feasibility of diary assessment during a migraine attack
- Ensuring compliance with the diary procedure

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THE VALIDITY AND RELIABILITY OF A BREAST PAIN DIARY FOR WOMEN WITH CYCLIC BREAST PAIN

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Pain science: Assessment

Introduction: Cyclical breast pain occurs in the luteal phase prior to menstruation(1). A breast pain diary can be used prior to treatment to understand baseline breast pain levels in order to diagnose treatments and also to evaluate breast pain post-treatment (1,2,3). When establishing a new measurement tool it is important that it produces valid and reliable results. The aims of this study were to assess the validity and reliability of a new breast pain diary to measure acute changes in breast pain over the menstrual cycle.

Methods: Twenty premenopausal females who self-reported as experiencing breast pain were assessed. The diary was completed once a day using paper, email or mobile formats, over one full menstrual cycle. The pre- and post-menstrual stages were compared to validate the diary, which was a method adapted from Freeman et al.(4) as cyclical breast pain is higher in the days leading up to menstruation. Test-retest reliability was measured once a week.

Limitations and strengths:
Limitations:
-Cyclic breast pain intensity and frequency was self-reported prior to recruitment. This could have implications as participants 'normal' level of breast pain is unknown and may not be classed as purely cyclic.
-Paper diaries could not be monitored for compliance
Strengths:
-The diary was short and quick to complete making it unobtrusive to participants
-Participant choice in the format of the diary promoted adherence (paper, email or mobile)

Results: Preliminary statistical tests indicated the breast pain diary was valid as pain measures were significantly higher ($p < 0.05$) in the pre-menstrual phase compared to the post-menstrual phase ($n = 9$). High test-retest reliability was found ($n = 54$, $r > 0.91$, $p < 0.01$).

Discussion: The initial results indicated that the premenstrual phase was more painful than the post menstrual phase determining that the diary is a valid tool for measuring this type of breast pain. The high test-retest reliability of this breast pain diary demonstrates that the diary is reliable, concurring with previous research(4). In conclusion, the breast pain diary offers a reliable and valid method of measuring daily changes in breast pain and can be used in further studies as a tool to assess the pattern of breast pain.

Process evaluation: As participants were only asked to complete the breast pain diary for the length of one menstrual cycle and most participants adhered to the completion of the diary. Compliance for the retest days was lower, with a lower than anticipated number of

participants able to keep the one hour gap between completions. Additionally with the use of paper diaries adherence and compliance could not be monitored.

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WHAT IS IMPORTANT IN PAIN EDUCATION? THE EXPERIENCE OF PATIENTS WITH CHRONIC PAIN

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Introduction: There is a large number of studies examining the effect of pain neuroscience education (PNE) in chronic pain disorders. However, the thoughts and beliefs of patients regarding PNE are not yet studied. In a treatment that addresses patient's perceptions it is important to know what patient's thoughts and beliefs are. The purpose of this study was to understand how patients experience PNE.

Methods: 15 patients with chronic pain receiving PNE at a transdisciplinary treatment center were interviewed via an interview guide. Two member checks were held. Interviews were transcribed verbatim. Analysis was done according to Grounded Theory and the QUAGOL and a focus group was conducted to improve analysis.

Limitations and strengths: The methods used provide an in depth knowledge of perceptions of patients receiving PNE. This, however, due to the qualitative character of the study cannot be transferred to other (monodisciplinary) settings. This study is top up, clinical based, this is a strength and limitation, as the treatment was patient centered, this however meant that not all patients received the same treatment.

Results: Four interacting concepts emerged. Fundamentals: the primary needs to provide pain neuroscience education; a biopsychosocial intake before the education connects the patient with the healthcare professionals and starts a process of awareness. The interpersonal aspects of healthcare professionals are important. Such as; being friendly, interested, involved, open and being expert in the field of pain. Comprehensibility: the explanation is in understandable plain language. The booklet received with the drawings is clarifying. Especially the fire alarm. Repetition of PNE by booklet, drawings and a PNE session is important. The interaction between healthcare professionals during the PNE improves the comprehensibility. These concepts influence the outcomes: there is an increased awareness by the respondents; they gained insight in their complaints, their perceptions of pain changed, they were more conscious of their behavior and gained more self-control over their symptoms. Some found peace of mind, some did not get reassured, some experienced fewer complaints, others did not. Scepticism: apparent doubt towards sensitization is normal, some respondents rejected the explanation.

Discussion: This study provides insight in the patients' experience with PNE. The intake and interpersonal factors enhances the alliance between patient and healthcare professional. Together with the clear explanation this improves the outcomes of PNE. Further research should focus on studying PNE in different settings.

Process evaluation: Qualitative research is physiotherapy always hard to get published, however this study interviewed patients who received PNE in a transdisciplinary setting. This complicates getting the work published even more.

LIVING WELL WITH CHRONIC PAIN – CLASSICAL GROUNDED THEORY

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Introduction: Chronic pain is often disabling but there are a surprising number of people who cope well and do not continue to seek treatment. There is little theory to explain how these individuals manage their pain, limiting awareness of the ways they cope and whether it could apply to others. This study generated a classical grounded theory to explain how and why some people cope well despite their chronic pain.

Methods: Classical grounded theory is an indicator and concept approach to generating substantive theory often using qualitative data. Interviews and questionnaire data were used. Participants were individuals self-identifying as 'living well".

Limitations and strengths: Its strengths are its utility for hypothesis-generation, and the range of data that can be used. Its weaknesses are the need to be clear about philosophical underpinnings, to adhere closely to the entire methodology throughout the study, and its flexibility.

Results: Living well with chronic pain involves a two-phase process, divided by a turning point. Individuals develop an idiographic model of their pain, and integrate this with their self-concept. Before an individual reaches the turning point s/he must develop (1) a personalised model of pain, (2) accept that hurt does not equal harm, and (3) have the drive to engage in occupation.
The second phase involves flexible persistence. This is a complex, moment-by-moment series of decisions about what is prioritised so valued occupations are maintained. Three forms of coping are identified: (1) mindfulness (2) exercise and (3) “whatever works” from a broad range of strategies.
Occupations are used throughout to (1) express and create self-identity, (2) bridge between the current and future self, and (3) provide feedback about self-identity.

Discussion: A functional contextual perspective of coping, and the value of occupation are supported. These findings generate new research questions about metacognition, values-aligned activity, and identity change.

Process evaluation: This study was conducted during the earthquakes in Canterbury, New Zealand in 2011-1012. Classical grounded theory is a flexible form of analysis, but requires adherence to the entire methodology. The literature review is carried out after data collection, and this can be challenging during PhD Ethics and Review Committee stages.

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Session 6: Pain mechanisms studies

COGNITIVE PERFORMANCE IS RELATED TO CENTRAL SENSITIZATION IN PATIENTS WITH CHRONIC WHIPLASH-ASSOCIATED DISORDERS AND FIBROMYALGIA: A CASE-CONTROL STUDY

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Pain science: Assessment

Introduction: A growing body of research has demonstrated that central sensitization (CS) is a crucial mechanism for the development of persistent pain in patients with chronic whiplash-associated disorders (WAD) and fibromyalgia (FM). Furthermore, there is increasing evidence for cognitive dysfunctions among these patients. Yet, there is limited research concerning the interrelations between cognitive performance and indices of CS in these patients. First, this study aims to examine the presence of cognitive impairment and CS in patients with chronic WAD and FM compared to healthy controls. Second, interrelations between performance-based cognitive functioning and central pain modulation will be examined in these 3 study groups.

Methods: A case-control study was conducted. Fifty-nine subjects (16 chronic WAD patients, 21 FM patients and 22 pain-free volunteers) were included. First, to investigate the presence of CS, 4 critical aspects of central pain modulation were assessed: local and widespread hyperalgesia by means of pressure pain thresholds (PPTs) at symptomatic and remote areas; deep-tissue hyperalgesia by cuff inflation at the arm; temporal summation (TS) of pressure pain to assess bottom-up sensitization; and the efficacy of Conditioned Pain Modulation (CPM) to evaluate endogenous pain inhibition. Second, participants completed a battery of performance-based cognitive tests (Stroop task, psychomotor vigilance task (PVT) and operation span task (OSPAN)).

Limitations and strengths: The current study is innovative because 2 chronic pain populations, characterized by CS, were compared, by using various indices of CS in relation to cognitive performance. When interpreting the results, following study limitations have to be taken into account. Firstly, the methods used to assess pain remain self-reports of induced pain. Secondly, an occlusion cuff was used as conditioning stimulus. Yet, it is not clear which conditioning stimulus is the most adequate to examine the efficacy of CPM.

Results: Significant cognitive impairment and bottom-up sensitization were demonstrated in patients with chronic WAD and FM compared to healthy controls ($p<0.017$). CPM was comparable between the 3 groups. Cognitive performance was significantly related to central pain modulation (deep-tissue hyperalgesia, TS, CPM) ($p<0.05$). Decreased cognitive performance was related to deficient central pain modulation in healthy controls. Remarkably, impaired selective attention and working memory were related to less TS,

whereas impaired sustained attention was correlated with dysfunctional CPM in FM patients.

Discussion: Significant relations between cognitive performance and CS were demonstrated. These results provide preliminary evidence for the clinical importance of objectively measured cognitive deficits in patients with chronic WAD and FM.

Process evaluation: Based on the current cross-sectional study no firm conclusions can be drawn on the causality of the relations. Secondly, only non-parametric statistical analyses were performed because the sample size of the current study was rather small. Consequently, further research is warranted to investigate if CS leads to cognitive impairment or vice versa.

EXERCISE INDUCED ANALGESIA IN PEOPLE WITH OSTEOARTHRITS OF THE KNEE

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Introduction: Altered pain processing has been demonstrated in people with osteoarthritis of the knee[1, 2]. Previous studies have shown a dysfunctional exercise-induced analgesia (EIA) response in chronic pain groups who show signs of altered pain processing[3,4]. Recent evidence suggests normal function of EIA in people with osteoarthritis[5]. The aim of this study was to investigate whether people with osteoarthritis of the knee (OA knee) who have high pain sensitivity demonstrate dysfunctional EIA compared to OA knee participants with low pain sensitivity and healthy controls.

Methods: Pressure pain thresholds (PPTs) and temporal summation (TS) were measured before and after aerobic and isometric exercise in 18 OA knee participants and 8 controls. OA knee participants were divided into high and low pain sensitivity groups based on a median split of average PPTs. Pre/post exercise differences in PPTs and TS between groups were assessed using mixed between-within ANOVAs.

Limitations and strengths: One weakness was that both PPT and TS measurements are psychophysiological measures. The subjective element of the testing regime has to be considered when interpreting results. A further limitation was that the investigator taking the pain measurements was not blinded to the patient/control status, introducing the possibility of bias. One strength was that EIA was assessed in response to both aerobic and isometric exercise, which accounted for potential differences in pain response between different types of exercise. A second strength was the use of two pain sensitivity measures (PPT and TS), allowing for a detailed evaluation of pain sensitivity pre/post exercise.

Results: No significant differences in pre/post exercise measures were found between OA knee participants with high pain sensitivity (n=9) and those with low pain sensitivity (n=9) or healthy controls (n=8) ($p>0.05$). A non-significant trend for decreased PPTs and increased TS post aerobic and isometric exercise in the high pain sensitivity group compared to the other groups was observed.

Discussion: Results from this preliminary study suggest a normal function of EIA in people with OA knee with both high and low pain sensitivity. However, the non-significant trend observed for EIA dysfunction in the high pain sensitivity group warrants further investigation with a larger sample size.

Process evaluation: The small sample size of this study is a limitation, which makes interpretation of the results challenging. While the results indicate no significant differences between groups regarding the presence of exercise-induced analgesia, the small sample size included in this preliminary analysis may or may not contribute to the lack of between-group differences.

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ARE CHANGES IN CENTRAL PAIN PROCESSING INVOLVED IN CHRONICITY OF LOW BACK PAIN: PRELIMINARY RESULTS

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Introduction: The exact causes of chronic low back pain (CLBP) remain unclear as well as the mechanisms behind the transition between recurrent (RLBP) and CLBP. Just as musculoskeletal diseases like fibromyalgia, whiplash disorders and osteoarthritis might be a result of abnormal central pain processing, central sensitization (CS) might be involved in the chronicity of low back pain. The purpose of this case-control study is to determine if patients with CLBP show more signs of CS compared to RLBP and healthy controls (HC).

Methods: Forty-five subjects participated: 17 CLBP, 14 RLBP and 7 HC. Quantitative sensory testing (QST) was used to measure pain detection thresholds (PDT), pain tolerance thresholds (PTT), spatial summation (SS), temporal summation (TS) and conditioned pain modulation (CPM), using a computerized cuff algometer.

Limitations and strengths: The tested population is rather small. 24 subject per group is warranted to be representative. Besides, several factors such as sex, menstrual cycle and psychosocial factors can influence pain measurements. These data were not taken into account in statistical analyses. The current study is unique since a distinction was made between RLBP and CLBP. Using a computerized cuff algometer enables the researchers to control stimulus application. Inter-examiner variability and time-variability when measuring TS, is therefor reduced.

Results: Significant lower PDTs and PTTs were seen in CLBP compared to HC. No differences were found with the RLBP group. Also significant results were seen for SS in the CLBP group, but not in the RLBP an HC groups. Results for TS and CPM were less clear.

Discussion**:** It's tempting to speculate CS is present in CLBP. These intermediate results might direct on changes in central pain processing in CLBP but they cannot fully confirm or deny this assumption. More research in LBP populations is necessary to clarify the involvement of central pain processing in the chronicity of low back pain.

Process evaluation: The compressor could only produce a maximum pressure of 100kPa. Some subjects however were able to withstand a larger amount of pressure. In those subjects the PTT could not be measured. It is difficult to compare the results of the current study with other studies, since most studies applied QST by manual algometers.

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DEVELOPMENT OF A CORE OUTCOME SET FOR CLINICAL TRIALS IN NON-SPECIFIC LOW BACK PAIN

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Introduction: Cochrane systematic reviews identified inconsistent reporting of outcomes in clinical trials for patients with non-specific low back pain (NSLBP). This inconsistency can hinder statistical pooling and reliability of systematic reviews [1]. The development of a core outcome set (COS) is recommended to address this issue [1,2]. In 1998, Deyo et al. suggested a standardized set of outcomes for NSLBP clinical research [3]. This study purported to update this set by determining which outcome domains should be included in a COS for clinical trials in NSLBP.

Methods: An international Steering Committee established the methodology to develop this COS. The OMERACT framework [2] was used to draw a list of potential core domains presented in a Delphi survey. Researchers, clinicians and patients were invited to participate in three Delphi rounds and had to judge importance of domains [4]. Criteria for consensus were established a-*priori* and quantitative responses were analysed in conjunction with arguments provided by Delphi participants [4]. The Steering Committee discussed the Delphi results and made final decisions.

Limitations and strengths: Strengths: 1) well-established methods recommended by COMET and OMERACT initiatives [1,2]; 2) surveying of a multi-stakeholder and multi-disciplinary group of 'experts'; 3) possibility for Delphi participants to always express arguments for their choices, 4) transparency of the process through a rigorous reporting of methods and results [4,5]. Limitations: 1) relatively small number of patients involved in the Delphi; 2) impossibility to ensure that Delphi participants truly understood all questions.

Results: 280 'experts' were invited to participate in the first round; response rates of the three round were 52%, 50% and 45%. Of 41 potential core domains presented in the first round, 13 had sufficient consensus to be presented for rating in the third round. Overall consensus was reached for the inclusion of three domains in this COS: 'physical functioning', 'pain intensity' and 'health-related quality of life'. The Steering Committee decided to include these three domains in the COS, together with the domain 'number of deaths' (5).

Discussion: The next step in the development of this COS will be to determine the measurement instruments that best measure the core domains.

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