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Multimodal Rehabilitation of Patients with Chronic Musculoskeletal Pain, focusing on Primary Care

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To my family

Table of Contents

Abstract.....	iii
Abbreviations.....	v
Sammanfattning på svenska	vii
Original papers	ix
Introduction.....	1
Definitions and descriptions of pain.....	1
Psychosocial factors related to chronic pain	3
Epidemiology of chronic pain	4
Bio-psycho-social model	5
Assessment of chronic pain.....	7
Rehabilitation of chronic pain.....	8
Rehabilitation guarantee.....	9
Swedish Quality Registry for Pain (SQRP)	10
Swedish social insurance and sickness benefit	10
Rationale.....	11
Aims of the thesis	11
Methods	12
Study designs	12
Settings.....	13
Study population.....	15
Study I	15
Study II.....	15
Study III	16
Study IV.....	16
Measures	17
Demographic data.....	17
Pain.....	17
Physical and emotional functioning.....	18
Coping	18
Health.....	19
Work-related factors.....	19
Data analysis.....	20
Qualitative Content analysis.....	20
Statistical analyses.....	20
Ethical considerations.....	21
Results	22
Study I.....	22
Study II.....	23
Study III.....	27
Study IV	30

Discussion.....	33
General discussion.....	33
Methodological considerations.....	40
Conclusions.....	42
Future research.....	43
Acknowledgement.....	44
References	46

Abstract

Background: Chronic pain is a complex condition that has consequences both for individual people and for society. The individual often experiences impact on function, activity and participation. Society is affected by high healthcare and sick leave costs and a loss of workforce. Multimodal rehabilitation programmes (MMRP) have mainly been provided through specialist care but it is now also available through primary care. The overall aim of this thesis was to evaluate the effects of MMRP in patients with chronic musculoskeletal pain and to explore patients' and healthcare professionals' experiences of MMRP.

Study I: Aim: To evaluate the effects of an interdisciplinary team assessment and MMRP for patients with chronic pain in a specialist care setting. *Design:* Longitudinal cohort study. *Method:* Pain intensity, pain dimensions, anxiety and depression were measured at assessment and at the start and end of MMRP. A total of 93 women were evaluated. *Result:* Pain and pain-related measures were significantly improved both after the interdisciplinary assessment and after MMRP.

Study II: Aim: To explore healthcare professionals' experiences of MMRP in primary care. *Design:* Individual interviews, analysed with qualitative content analysis. *Method:* Fourteen healthcare professionals (11 women, 3 men) were interviewed about their work with MMRP. *Result:* Healthcare professionals considered that MMRP was useful but also challenging. It was difficult to select appropriate patients, and health care professionals felt they were torn between following healthcare legislation and the goals of MMRP. They had to deal with ethical dilemmas as well as decide what constitutes good results.

Study III: Aim: To explore patients' experiences of participating in MMRP in primary care. *Design:* Individual interviews, analysed with qualitative content analysis. *Method:* Twelve former patients (7 women and 5 men) were interviewed about their experiences of MMRP in primary care. *Result:* Patients in primary care experienced a complex, ongoing process of accepting chronic pain. Obtaining redress, learning about chronic pain, and experiencing fellowship with others with the same condition contributed to the acceptance process.

Study IV: Aim: To evaluate the effects of MMRP in primary care at one-year follow-up for all patients together and for men and women separately and to identify predictive factors for being employable at follow-up. *Design:* Prospective longitudinal cohort study. *Method:* Pain, physical and emotional functioning, coping, health-related quality of life, work-related factors, sick leave extent and sickness compensation were evaluated prior to and one year after MMRP in 234

patients, 34 men and 200 women. *Result:* All patients improved significantly in most measures at one-year follow-up, and the effect was larger in women. Sick leave decreased while no significant difference was found for total sickness compensation. Patients' self-reported rating of current work ability before MMRP was significantly associated with being employable at follow-up.

General conclusions and implications:

MMRP seems to be effective for patients with chronic musculoskeletal pain, both in specialist care and in primary care. MMRP was more effective for women than for men, and the reasons for this need to be investigated further. An interdisciplinary team assessment could also be beneficial for decreasing pain and pain-related measures. Patients in primary care experience a complex, ongoing process of accepting chronic pain. Healthcare professionals have to deal with conflicting emotions with regard to different commitments from healthcare legislation and the goals of MMRP.

Abbreviations

CPAQ	Chronic Pain Acceptance Questionnaire
CPAQ-AE	Chronic Pain Acceptance Questionnaire-Activity Engagement
CPAQ-PW	Chronic Pain Acceptance Questionnaire-Pain Willingness
ES	Effect size
EQ-5D	The European Quality of Life Instrument
FRI	Functional Rating Index
GP	General Practitioner
HADS	Hospital Anxiety and Depression Scale
HADS-A	Hospital Anxiety and Depression Scale-Anxiety
HADS-D	Hospital Anxiety and Depression Scale-Depression
IASP	International Association for the Study of Pain
ICF	International Classification of Functioning
LiSat	Life Satisfaction Questionnaire
MMRP	Multimodal Rehabilitation Programme
NRS	Numeric Rating Scale
PCS	Pain Catastrophizing Scale
PROM	Patient-Reported Outcome Measurements
SQRP	Swedish Quality Registry for Pain Rehabilitation
WAI	Work Ability Index
VAS	Visual Analog Scale

Sammanfattning på svenska

Kronisk smärta medför konsekvenser både för individen och för samhället. För den enskilde individen innebär kronisk smärta inverkan på funktion, aktivitet och delaktighet. Konsekvenser av kronisk smärta på samhällsnivå, innebär höga kostnader för sjukvård, sjukfrånvaro och förlust av arbetskraft. Multimodal rehabilitering (MMRP) med flerprofessionella team har huvudsakligen bedrivits i programform s.k. multimodala rehabiliteringsprogram (MMRP) inom specialistvård, men är nu också tillgängliga inom primärvård. Det övergripande syftet med denna avhandling var att utvärdera effekter av MMRP hos patienter med kronisk muskuloskeletal smärta samt att undersöka patienters och personals erfarenheter av MMRP.

I Studie I undersöktes effekterna av interdisciplinär team bedömning och MMRP för patienter med kronisk smärta inom specialistvård. Totalt kvinnor deltog 93 i studien. Patienterna förbättrades signifikant både efter bedömning och efter MMRP med minskad smärta och minskad påverkan på dagligt liv. Detta trots att 73 % av deltagarna hade haft smärta mer än 3 år.

I Studie II undersöktes vårdpersonals (11 kvinnor, 3 män) erfarenheter av att arbeta med MMRP i primärvård. Individuella intervjuer analyserades med kvalitativ innehållsanalys. Personalen tyckte att MMRP var en användbar men utmanande rehabiliteringsmetod, eftersom kronisk smärta är ett komplext tillstånd. Att välja vilka patienter som skulle delta i MMRP innebar ibland etiska överväganden, som att beakta hälsovårdslagstiftning (lika vård för alla) och målen för MMR (återgång i arbete).

I Studie III undersöktes 12 patienters (7 kvinnor, 5 män) erfarenheter av att delta i MMRP i primärvård med individuella intervjuer som analyserades med kvalitativ innehållsanalys. Patienterna upplevde att de fått kunskap om kronisk smärta och upprättelse samt att de kände gemenskap med andra med samma tillstånd vilket bidrog till en process av acceptans.

I Studie IV utvärderades effekterna av MMRP i primärvård för 234 patienter, 200 kvinnor och 34 män. Samtliga patienter förbättrades signifikant inom de flesta utvärderingsinstrumenten (smärta, fysisk, psykisk funktion, livskvalitet, smärthantering) vid ett-års uppföljning och effekterna var större hos kvinnor än hos män. Sjukskrivning minskade medan ingen signifikant skillnad sågs beträffande sjukersättning.

Konklusion MMRP kan vara en effektiv rehabiliteringsmetod för patienter med kronisk smärta både inom specialistvård och primärvård. En interdisciplinär

teambedomning kan också vara av värde för att påverka smärtan. Patienter inom primärvård upplevde en pågående process av accepterande av sitt smärttillstånd. Vårdpersonal fick hantera känslomässiga konflikter i arbetet med MMRPs mål och hälsovårdslagstiftning.

Original papers

This thesis is based on the following four papers, which will be referred to in the text by their Roman numerals.

- I. Pietilä Holmner E, Fahlström M, Nordström A: The effects of interdisciplinary team assessment and a rehabilitation programme for patients with chronic pain. *Am J Phys Med Rehabil* 2013; 92:77-83.
- II. Stenberg G, Pietilä Holmner E, Stålnacke B-M, Enthoven P: Healthcare professional experiences with patients who participate in multimodal pain rehabilitation in primary care—a qualitative study. *Disabil Rehabil* 2016; 38:21, 2085-2094,
- III. Pietilä Holmner E, Stålnacke B-M, Enthoven P and Stenberg G: "The acceptance" of living with chronic pain – an ongoing process: A qualitative study of patients experiences of multimodal rehabilitation in primary care, *J Rehabil Med* 2018; 50: 73–79.
- IV. Pietilä Holmner E, Enthoven P, Molander P, Gerdle B, Stålnacke B-M: One-year follow-up of multimodal rehabilitation in primary care for patients with chronic pain. Submitted

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Introduction

Definitions and descriptions of pain

The definition of pain according to the International Association of the Study of Pain (IASP) is: “An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”(1, 2). Hence, pain is a subjective experience that consists of various components e.g. sensory, emotional, cognitive and behavioural components at a given moment. The IASP definition of pain is widely recognised and is the predominant definition in pain research.

This thesis focuses on *chronic musculoskeletal pain* and its management in primary and specialist care in line with the IASP definition: “actual or potential, or described in terms of such damage”. *Chronic pain* is for some associated with definitive states and being incurable. Since chronic pain is the most common term used in research and literature, I have chosen to use it in this thesis. The *bio-psycho-social model* for chronic pain is used as an understanding of chronic pain and its consequences as well as a structure for planning and interpreting the results of the studies in this thesis.

Pain starts with the activation of nociceptors. Nociceptors are peripheral afferent neurons which are sensitive to injuries or pain, usually caused by thermal, chemical and mechanical stimuli (3-6). Two types of nerve fibres are involved in the transmission of nociceptive activity: myelinated A δ -fibres and unmyelinated C-fibres. The A δ -fibres are fast leading fibres resulting in a sharp and well-localised pain sensation. The C-fibres transmit nociceptive activity with a slower speed, leading to a diffuse pain sensation. The activity of nociceptors ends at neurons in the spinal dorsal horn of the spinal cord, from which the nociceptive information rises upwardly in the central nervous system (4, 5). Through synapses, the central nervous system activates different areas of the brain (5). Physiological mechanisms of pain also include descending pathways from the brain, pain-modulating functions and endogenous pain-inhibiting substances such as endocannabinoids (7-9) and endorphins (10). The perception of pain can be described as consisting of three components: the sensory-discriminative, the affective-emotional and the cognitive-evaluating component (11-13). The sensory-discriminative component means our perception of pain intensity, duration and location. The affective-emotional component of pain is interpreted as the unpleasant experience of pain. The third component, the cognitive-evaluating component, is explained as being our previous experiences and thoughts and their significance for how pain is experienced. The areas and networks of neurons in the brain where pain perception occurs is sometimes called the neuro matrix (14). The neuro matrix consists of cortical and subcortical areas in the brain, containing sensory, limbic, associative and motor elements (15,

16). New technologies such as functional magnetic resonance imaging (fMRI) have helped to develop our understanding of how different parts of the brain are involved in the experience of pain (17). The insight that pain occurs after multifaceted processing in different parts of the brain has increased awareness that pain is an emotion that results from the processing of a variety of afferent information in different parts of the brain. Pain can be classified in different ways. A common way of classifying pain is based on the aetiology of pain: nociceptive, neuropathic, idiopathic and psychogenic pain (18). Pain can also be classified with relation to time aspects, usually acute or chronic pain.

Chronic pain is defined as acute pain that persists for more than three to six months (2). Some researchers believe that this time limit is relatively arbitrary because it has little relation to underlying mechanisms (19). Chronic pain is not only pain that remains for three to six months; it is also a complex condition with described changes in the nervous system (20). The majority of patients with chronic pain have pain in the musculoskeletal system (21-23). Chronic pain can be divided into local or widespread chronic pain. Local chronic pain is defined as chronic pain restricted to one or a few body regions e.g. the back, knee or shoulder. In contrast, widespread chronic pain means chronic pain in several body regions. According to the American College of Rheumatology (ACR), chronic widespread pain is defined as pain in the left and right side of the body, as well as above and below the waist plus pain in the axial skeleton (24)

The question of whether chronic pain is a symptom or a disease in itself is a matter of debate among researchers from different disciplines. Those who are of the opinion that chronic pain is a disease argue that structural and functional changes are seen in neuro-imaging methods. Those who believe that chronic pain is not a disease argue that structural and functional changes are not only due to pain but to the consequences of pain and how it is managed (25-28).

Central pain hypersensitivity was described in 1983 as pain hypersensitivity after trauma as a result of the sensory signal amplification in the central nervous system (29). Sensitization is now used in the description of neurophysiological processes in pain and as an umbrella term for several central pain-enhancing mechanisms (1, 30-32). Sensitization can be described as increased sensitivity to nociceptive stimuli in peripheral and/or central neurons. In central sensitization, the secondary pain neuron is more easily affected by nociceptive stimuli. Even the adjacent nociceptive neurons are affected and may decrease directional threshold, which causes more pain signals to be passed, partly from pain stimuli but also from other stimuli that did not previously give pain, for example touch (allodynia). (31, 33, 34). Also, when the adjacent nociceptive neurons are activated, it leads to transmission of pain signals from a larger area than the actual area of injury, which means that the experience of the pain location is more widespread and diffuse (31, 34). The activated adjacent nociceptor neurons that led to the increased pain range are activated only by mechanical stimuli, i.e. they

are unimodal (35). Overall, the pain experience both lasts longer and becomes more intense (34). Wind-up is described as part of central sensitization where repeated tight activation of pain fibres leads to increased pain in the post-synaptic neuron as it becomes a summation of membrane potential (33, 34). In central sensitization, activity decreases in the descending pain-inhibiting systems, while the activity in pain-facilitating systems may increase, affecting nociceptive neuronal transmission of more painful signals (31, 34, 36).

In the case of tissue damage, substances such as prostaglandins, serotonin and bradykinin are released in the area of injury which, among other things, give rise to an inflammatory reaction that sensitizes the nociceptors and the threshold for pain perception is lowered. This is called peripheral sensitization (34).

Early hyperexcitability is often transitory if nociceptive stimulation ceases, but continued or repeated peripheral nociception may cause a residual sensitization. Not only genetic but also cognitive and emotional factors may be important for the development of permanent central sensitization (37).

Psychosocial factors related to chronic pain

Psychological factors such as anxiety, depression, catastrophizing and fear-avoidance are related to the perception of pain. Numerous studies have highlighted the co-morbidity of pain and psychological factors (38, 39). This has been demonstrated in different countries, regardless of culture and socio-economic factors (40). The most commonly occurring forms of psychological co-morbidity are conditions involving anxiety and depression (40-44). Prevalence estimates for depressive and anxiety disorders in pain populations range between 2-65% and 1-65% respectively (42). In a study in primary care, it was found that more severe pain, greater disability and impaired quality of life were associated with depression and anxiety (45). A Swedish study on specialist care for chronic pain found that 40 % of the patients had anxiety and/or depression (46). Variations in the reported incidence of emotional co-morbidity may be due to differences in assessment methods, study patterns, test sizes, pain populations, or diagnostic criteria, but may also depend on whether the focus was on symptoms or diagnoses of depression or anxiety (47). However, it is generally recognized that individuals with chronic pain have a greatly increased risk of developing psychological problems compared with the general population (41).

Pain-related fear is an important mediator, in combination with catastrophizing thoughts, which has been suggested to negatively influence the outcome of rehabilitation (48, 49). Pain-related fear incorporates several definitions, such as fear-avoidance beliefs, fear of movement, and kinesiophobia (50, 51). The prevalence of kinesiophobia in patients with chronic pain varies between 50% and 70% (50) with men reporting a higher prevalence than women (52).

A life with chronic pain sometimes limits the chances of working and gaining a stable income, which causes stress (53). When interviewed, patients with chronic pain described effects on their participation in work and leisure activities and on relationships with other people (54). Other experiences expressed were feelings of being dependent because of having to rely on other people and ask for help (55). Furthermore, changed family roles were described when responsibilities were transferred to someone else in the family (55-57).

Epidemiology of chronic pain

About 20% of the Swedish population suffer from moderate to severe chronic pain (21, 22, 58, 59). Studies have shown that more women than men suffer from chronic pain (21, 22, 59-61). In a study by Wijnhoven et al (60), women reported a higher prevalence of chronic pain, more pain sites and longer duration of pain than men. In a recent study, Rovner et al (62) found that when men and women experienced the same pain severity, women reported significantly higher levels of activity, pain acceptance and social support while men reported higher kinesiophobia, mood disorders and lower activity levels (62).

In Scandinavia, 20-40% of primary care visits are linked to problems with pain (63-65). Various studies report different data on the incidence of chronic pain (66-71). A recent international review and meta-analysis including 86 studies showed an average incidence of 31% of chronic widespread pain (72). Major variations in epidemiological studies are discussed based on inconsistent measurement methods and unclear diagnosis (72). Initiatives have been taken to improve the diagnosis of pain (73). According to Years Lived with Disability (YLDs), a measure of non-fatal health outcomes, pain conditions caused 21% of all YLDs globally, ahead of 287 other conditions (74). The five leading conditions of YLDs in Sweden were low back pain, major depressive disorder, falls, neck pain, and other musculoskeletal disorders.

Like in other European countries, chronic pain is one of the most common and costly health problems in Sweden (59, 75). The cost of chronic pain in healthcare costs, lost income and welfare benefits exceeds SEK 87.5 billion annually (76) .

Bio-psycho-social model

The bio-psycho-social model is a model that is commonly used in the assessment and treatment of chronic pain, Figure 1 (77-79). Chronic pain is perceived as a whole in which body, mind and society interact. Since each individual's perception of pain is unique, and a range of psychological and social factors can interact with physical pathology, a broad view of pain is needed (80, 81). Therefore, the bio-psycho-social approach is suitable for the rehabilitation of persons with chronic pain (77-79, 82, 83). Clinically, all the dimensions of the bio-psycho-social model should be taken into consideration for patients with chronic pain (84). If one or more of these domains are ignored, it will probably lead to less favourable outcomes of the rehabilitation (83).

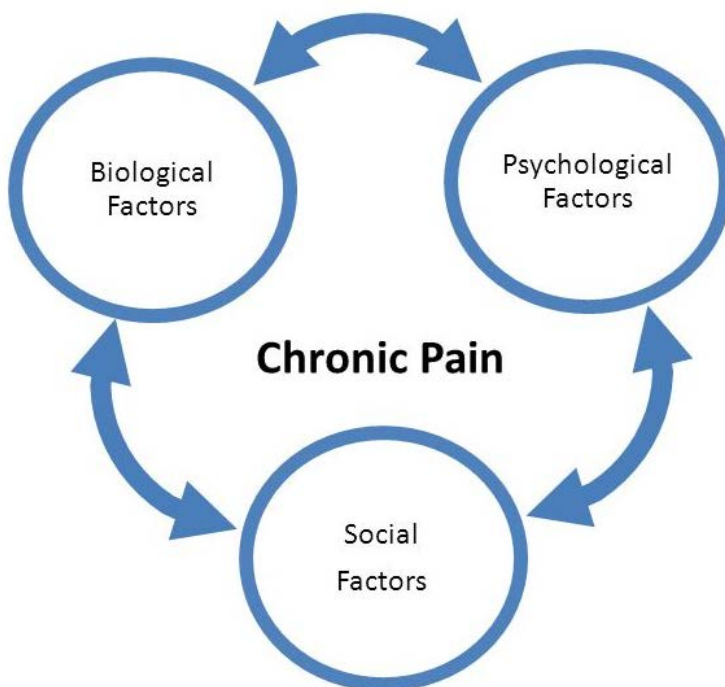


Figure 1 The Epidemic of Chronic Pain: Translational Challenges & Opportunities, Roger B Fillingim, PhD Professor, UF College of Dentistry Director, PRICE

Recently, a development of the bio-psycho-social model has been discussed and suggested, pointing to the importance of a model called the "Diathesis model", which specifically aims to better understand why some people develop a chronic pain condition while others do not (85, 86). The Diathesis-Stress model means that a genetic predisposition (diathesis) interacts with environmental factors (stress), Figure 2.

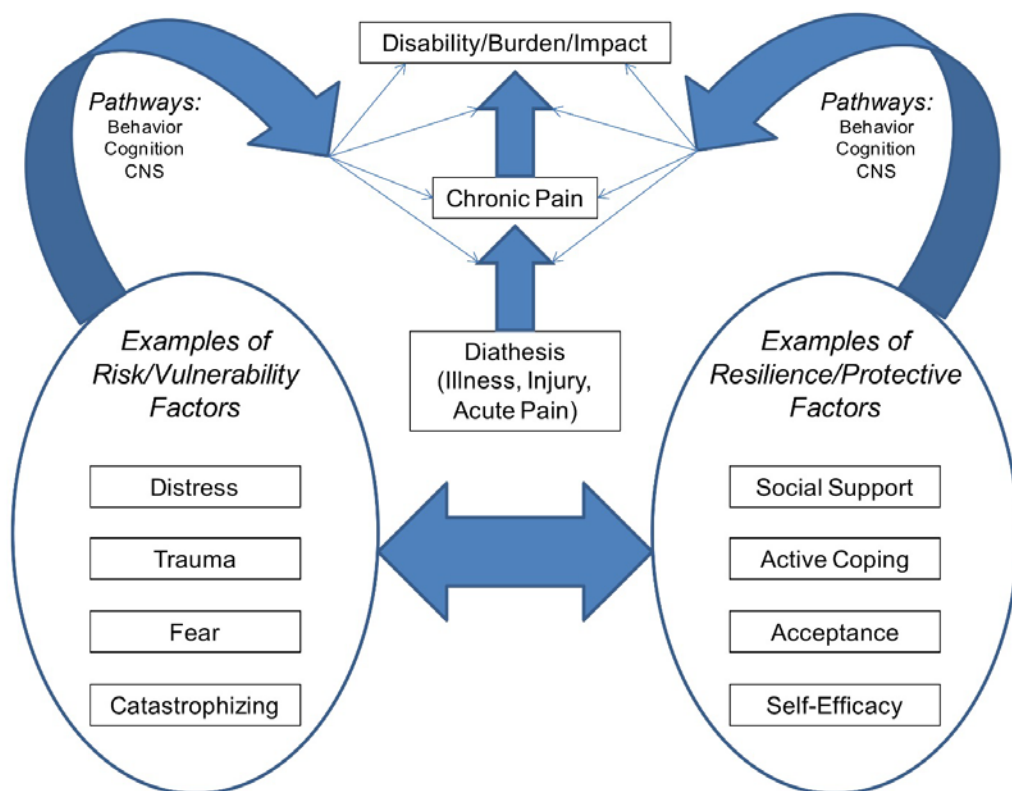


Figure 2 the Role of Psychosocial Processes in the Development and Maintenance of Chronic Pain.
Robert F R Edwards, Robert H. Dworkin, Mark D Sullivan, Dennis C. Turk, Ajay D. Wasan

To apply a bio-psycho-social perspective is also to see the individual through her/his life course, and the everyday context of relationships with the environment and the surrounding society. People's health is influenced by a variety of intersecting factors such as age, work, class, economy, ethnicity, and access to care (87, 88). Furthermore, all these factors are gendered. This is because socially and culturally gendered ideals, expectations, norms and attitudes do not only impact the individual through her/his life course, but also the organization of work and care. Thus, the meaning of gender is an ongoing process that varies with time and different social and cultural contexts. Differences between women and men with chronic pain have been described, for example, that women report higher pain intensity than men (89). Other studies have concluded that more women than men seek medical care (90) and are on sick leave because of chronic pain (91). The difference in pain descriptions between women and men is likely to be a complex interaction between biological, socio-cultural and psychological aspects. In a theoretical model developed by Risberg et al (92), an analysis of gender bias in medicine is described, based on the similarity and equality of women and men. They describe how gender bias can occur if you see differences between women and men where they are not and when you disregard differences where they exist (92). Knowledge of these conditions is important for understanding the person suffering from chronic pain, pain management and for planning rehabilitation interventions.

Assessment of chronic pain

Chronic pain assessment is commonly based on the bio-psycho-social model that includes somatic, psychological, environmental and personality aspects (79, 93, 94), and is therefore conducted by a team of professionals with expertise in these areas (95). The professions included in the assessment team are usually a physician, psychologist, occupational therapist, physiotherapist and social worker. Before a patient participates in multimodal rehabilitation programmes (MMRP), it is important that a systematic assessment is done. This means that a structured, comprehensive medical history and clinical examination is conducted and that other diseases that may cause chronic pain are excluded (93, 95). Screening for psychological or social risk factors, identifying the patient's expectations and readiness for change, and an activity investigation are other areas that are included in the assessment (96). When assessing pain, it is important to take into account the consequences of the pain which can both affect the pain and maintain it (93).

Rehabilitation of chronic pain

Team models

In the rehabilitation of people with chronic pain and in research, a variety of definitions are used to describe different approaches and forms of teamwork. In 2017, IASP approved new definitions aimed at clarifying terminology for different treatment approaches, following the recommendations of a Presidential Task Force on Multimodal Pain Treatment. The definitions are unimodal treatment, multimodal treatment, multidisciplinary treatment and interdisciplinary treatment, Table 1 (97) . In the definition, wherever the term “treatment” is used, it can be understood as “rehabilitation”.

Table 1 International Association of Pain (IASP) terminology for the treatment of patients with chronic pain (97).

Nomenclature	Definition
Unimodal treatment	A single therapeutic intervention directed at a specific pain mechanism or pain diagnosis.
Multimodal treatment	The concurrent use of separate therapeutic interventions with different mechanisms.
Multidisciplinary treatment	Multimodal treatment provided by practitioners from different disciplines. The professions work separately with their own therapeutic aim for the patient and do not necessarily communicate with each other.
Interdisciplinary treatment	Multimodal treatment provided by a multidisciplinary team collaborating in assessment and treatment using a shared bio-psycho-social model and goals.

Multimodal rehabilitation programmes (MMRP)

In the research literature, there are a number of terms used for MMRP, such as multidisciplinary programmes, interdisciplinary programmes, pain programmes, and team-based rehabilitation programmes. These terms are often used synonymously. A multimodal rehabilitation approach is often recommended for patients with chronic pain (96). The rehabilitation is based on a bio-psycho-social model of chronic pain (79, 93, 94). The approach is often interdisciplinary which means that a team works together in an integrated fashion and the patient is an active member of the team. MMRP is goal-oriented and the patients are encouraged to formulate individual goals for their rehabilitation. Most MMRP are a combination of cognitive behavioural approach and physical exercise/activity. Other common components of MMRP are education, training in simulated environments, coping and work-related efforts. These components can act independently and result in a combination of effects explained by known and

unknown mechanisms and these effects are intended to be greater than the sum of the components (98).

There is growing evidence about the efficacy of MMRP for patients with chronic pain. Systematic reviews show moderate to strong evidence regarding overall effects of MMR for patients with chronic pain (76, 93, 99, 100). The review of the Swedish Council of Health Technology (SBU) also concluded that when compared with less extensive treatment or no treatment at all, MMRP improved the potential for a patient to return to work (76). The SBU report showed no difference in pain intensity between MMRP and less extensive treatment (76). Pain was not defined as a result in all the reviewed studies; some studies focused primarily on long-term effects such as sick leave while others focused on coping with life. Since the focus is usually on behavioural change, this is probably the reason why pain cannot always be a relevant measurement method.

Since a rehabilitation guarantee was introduced in Sweden, there has been an increased number of patients receiving MMRP for their chronic pain. Rehabilitation is usually offered in one of two possible settings: either at primary care level or at specialist level. The main difference between these two levels of rehabilitation, based on National guidelines, is that a specialist setting is intended to handle patients with very complex chronic pain while a primary care setting handles patients with complex chronic pain (96). Patients with very complex chronic pain includes patients who often not only suffer from a more severe pain condition but also have a greater degree of comorbid psychological condition (96).

Rehabilitation guarantee

A rehabilitation guarantee was introduced by the Swedish government in 2008 to provide financial support for evidence-based rehabilitation. The rehabilitation guarantee included patients with chronic pain in the back, neck, shoulders and mild or moderate depression, various types of anxiety and stress. The primary goal of the rehabilitation guarantee was to increase return to work or prevent sick leave for men and women of working age through evidence-based medical treatment and rehabilitation efforts. Prior to rehabilitation, the healthcare system performed a medical assessment and examination and then determined if the patient would be recommended MMRP. The healthcare facilities that conducted MMRP received financial compensation from the Swedish government (skl.se).

In conjunction with the rehabilitation guarantee the National guidelines were published to support assessment of patients with chronic pain; they offered selection criteria to enhance MMRP at the appropriate level (specialist vs. primary healthcare) (96).

Swedish Quality Registry for Pain Rehabilitation

The effects of MMRP for chronic pain in clinical practice are evaluated in the Swedish Quality Registry for Pain Rehabilitation (101). The SQPR for MMRP in specialist care started in 1998 and is authorised and supported financially by the Swedish Association of Local Authorities and Regions (SALAR). The purpose of the registry is to allow participating departments to follow up the healthcare given, develop and secure healthcare quality, and compare group level results between different participating units. Standardised questionnaires cover demographic data, educational level, work status and future confidence, pain intensity, psychological factors, measure of activity/participation, and health-related quality of life. Data can be grouped in terms of function and activity/participation according to the International Classification of Functioning, Disability and Health (ICF) model (102). Patients fill in questionnaires at the assessment/baseline, immediately after the completion of rehabilitation, and at follow-up one year after rehabilitation. Demographic data are only collected on the first occasion. Around 40 clinical departments at specialist level are included which is almost all clinical departments of pain rehabilitation at specialist level in Sweden(101). In 2016, a corresponding registry for MMRP in primary care was set up.

Swedish social insurance and sickness benefits

People with a medical condition that contributes to a decreased ability to work are entitled to sickness benefit from the Swedish social insurance system (103). Depending on residual work capacity, the extent of sick leave/ sickness benefit can be obtained for a full, three-quarter, half or a quarter of a day. There is a time frame of a maximum of 364 days during a 450-day period for sickness benefit (80% of work income). If work capacity remains reduced after that time, extended sickness benefit (75% of work income) can be applied for up to 550 days. Furthermore, persons with more long-term diseases can be granted temporary or permanent sickness compensation (formerly, a disability pension) from full to one quarter of the full rate (103).

Rationale

MMRP has a long tradition in pain rehabilitation in Sweden in specialist care settings for patients with chronic pain. Although patients undergo an assessment prior to MMRP, this procedure has been insufficiently described and evaluated. There is limited knowledge of the significance of the assessment and therefore further study is needed. Since the Swedish rehabilitation guarantee for evidence-based rehabilitation was implemented in 2009, MMRP has also been performed in primary healthcare for patients with complex chronic pain. The rehabilitation guarantee was an initiative by the government to reduce sick leave. However, there is limited knowledge regarding the effects of MMRP in primary care and whether the effects are the same for women and men. Moreover, knowledge is lacking regarding factors that could be associated with being employable after MMRP. Since MMRP is a new intervention in primary care and there is limited knowledge about the effects of the rehabilitation and patients' and healthcare professionals' experiences of MMRP, it needs to be investigated. It is important that the rehabilitation resources that are available at primary and specialist levels are used optimally for the benefit of both the individual patient and society.

Aims of the thesis

The overall aim of the studies presented in this thesis was to study the effects of interdisciplinary assessment and MMRP and to investigate patients' and healthcare professionals' experiences of MMRP.

The specific aims were:

To evaluate the effects of interdisciplinary team assessment (Study I).

To evaluate the effects of a 4-week MMRP for chronic pain patients in a specialist care setting (Study I).

To study experiences among healthcare professionals when working with chronic pain patients in MMRP in primary care (Study II).

To investigate patients' experiences of participating in MMRP in primary care (Study III).

To evaluate the effects of MMRP in primary care at follow-up after one year, both for the whole group of patients and for men and women separately (Study IV).

To identify predictive factors for employable at follow-up one year after MMRP (Study IV).

Methods

Study designs

This thesis includes four studies. Studies I and IV have a quantitative approach while Studies II and III have a qualitative approach, Table 2.

Table 2 Overview of design, setting, study population, data collection, data analysis, ethical approval

Study	I	II	III	IV
Design	Longitudinal cohort study	Qualitative study	Qualitative study	Prospective longitudinal cohort study, with one-year follow up
Setting	Specialist care Umeå University Hospital, Västerbotten county council	Primary care 5 Primary healthcare centres in Västerbotten county council 6 Primary healthcare centres in Östergötland county council		
Study population	Patients n=93	Healthcare professionals n=14	Patients n=12	Patients n=234
Inclusion criteria	18-65 years of age Chronic pain Need for developing coping strategies Medically stable Benefit from group rehabilitation Be in work or assessed to be able to return to work. No drug addiction or complicated somatic/psychiatric disorder, illness or disturbance that would render participation impossible.	Healthcare professionals working with MMRP in primary care	18-65 years of age Chronic pain Willingness for a life change No other disabling disease Sick leave/risk for sick leave	
Data collection	Patient reported outcome measurement Part of 2007 and part of 2008	Interview-August 2013-January 2014	Interview-April 2014-December 2014	Patient reported outcome measurement August 2012-December 2015

Settings

The studies was carried out in specialist and primary care, Table 2.

Assessment and MMRP in specialist care

Patients in the study were referred to the pain clinic from primary care physicians. They all underwent an interdisciplinary assessment for 2 days, see Figure 3. The interdisciplinary team who conducted the assessment consisted of a physician, physiotherapist, psychologist, occupational therapist and social worker. If the patients were deemed to benefit from participating in a 4-week MMRP and met the inclusion criteria, they were invited to participate in the programme. The inclusion criteria for the programme were; chronic musculoskeletal pain, 18-65 years of age, medically stable, need for developing coping strategies, be in work or assessed to be able to return to work and benefit from group rehabilitation, no drug addiction or complicated somatic/psychiatric disorder, illness or disturbance that would render participation impossible. The average time between assessment and start of the MMRP was 16 weeks.

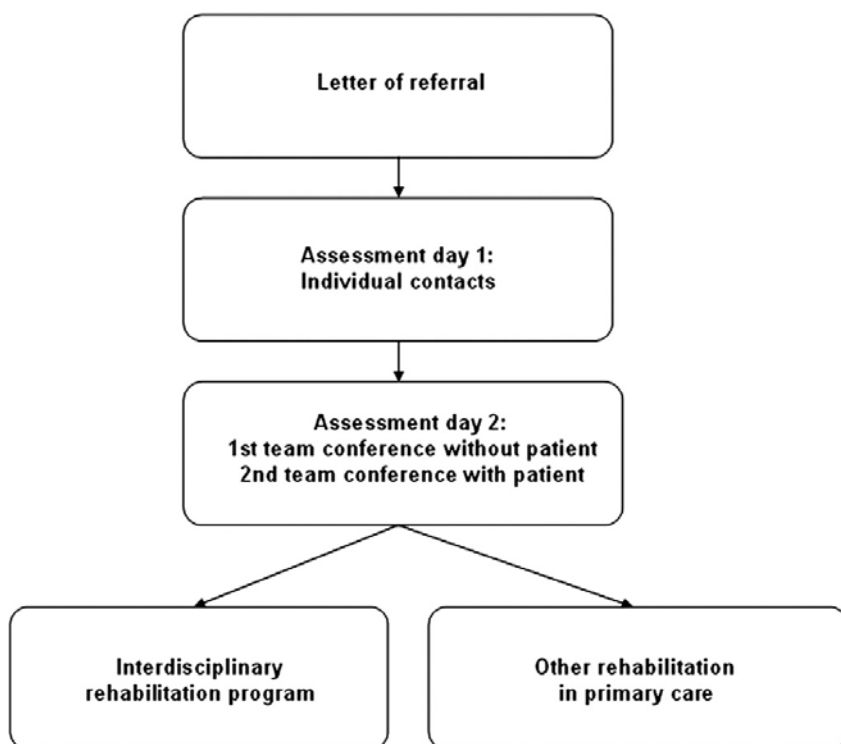


Figure 3 Team assessment process

The MMRP focused on education about pain, bodily and psychological reactions to pain, and pain management. Most interventions were group based; however each patient had an individual plan, schedule, and individual contacts according to their individual goal. Group interventions consisted of interventions such as coping strategies, relaxation techniques and body awareness training. The programme consisted of 34 hours of physiotherapy sessions, 11½ occupational therapy sessions, 15 hours of psychology sessions and 2 hours of lectures from a physician who was a specialist in rehabilitation medicine. The interdisciplinary programme team members represented the same professions as in the assessment team.

Those who were not selected to participate in MMRP returned to primary care with suggestions for interventions in a rehabilitation plan.

MMRP in primary care in two county councils

Patients participating in MMRP were referred from primary healthcare centres and the teams working with MMRP assessed the patients and selected patients appropriate for rehabilitation.

The MMRP was based on a bio-psychosocial approach, guided by an interdisciplinary team, and the patient was an active team member. MMRP was conducted as a group intervention, or as a combination of a group intervention and individual components. The programmes lasted 6-10 weeks and included physical activities, relaxation, training in coping strategies, and education in pain management. The team composition varied at the various health centres. The professions that the team could consist of were general practitioner, social worker, psychologist, registered nurse, registered dietician, physiotherapist and occupational therapist in varying combinations and degrees, Table 3. Their participation varied in different teams. At least one of the team members was trained in cognitive behavioural therapy.

Inclusion criteria for participating in MMRP were: age 18-65 years, chronic pain, potential for an active life change, and no other disease or other state that precluded programme participation. Patients needed to be on sick leave, or experiencing major interference in daily life due to chronic pain and thus at risk of sick leave.

Study population

Study I

The study consisted of women participating in a 4-week MMRP in specialist care. They were all assessed by an interdisciplinary team before MMRP. Data were collected during part of 2007 and part of 2008. During that period, only a few men attended the rehabilitation programme and they were therefore excluded from the study. There were ninety three (n=93) women, aged 42.2 ± 9.5 years, with chronic pain with a median duration of 8 years (range 175 days-10,300 days/28.2 years). Of the patients, 96 % had pain lasting for more than 1 year and 73% reported pain duration of more than 3 years. The main localization of the pain was neck (45%), trunk and back (22%), head (4%), upper extremities (3%), and lower extremities (3%), whereas 24% had generalized pain syndromes.

Study II

All healthcare professionals who worked with MMRP in the two county councils were informed about the study by email or telephone and invited to participate. The initial invitation resulted in five participants. After that, a purposive sampling was conducted to provide variability in age, profession, extent of experience, team size and patient catchment area. Fourteen healthcare professionals (11 women and three men) from 10 of 11 MMRP teams volunteered, Table 3. The professions represented were physiotherapist, occupational therapist, physicians/general practitioner, registered nurse, registered dietician and social worker. Their experiences of working with MMRP ranged between 8 months – 17 years. Settings in both rural and urban areas were represented.

Table 3 Background data for the interviewed professionals

Profession	Professional experience, years	Experience of working with MMR, years	Sex
Occupational therapist	27	3.5	Woman
General practitioner	1	0.7	Woman
Occupational therapist	21	3	Woman
Physiotherapist	30	4	Woman
Physiotherapist	19	3-4	Woman
Physiotherapist	7	1	Woman
Registered nurse	12	4	Woman
Occupational therapist	33	17	Woman
Physiotherapist	42	7	Woman
Registered dietician	15	2	Woman
General practitioner	26	1.5	Man
Physiotherapist	6	1	Man
Physiotherapist	22	5	Man
Social worker	8	3	Woman

Study III

This study consisted of twelve former patients (7 women and 5 men) in MMRP in primary care. Rehabilitation coordinators at twelve healthcare units in the two county councils were contacted and given written information about the study's purpose and approach. Coordinators from seven healthcare units responded and patients from those units were recruited. In order to obtain relevant and comprehensive information, we used purposive sampling. Patients with different perspectives were selected, both positive and negative opinions about MMRP, women and men, from both urban and rural areas, and of different ages. The age range was between 29-63 years. Some of the patients were on part-time sick leave and some were in vocational training. The pain duration periods ranged between 3 years and > 15 years.

Study IV

This study included 234 patients in MMRP in primary care. The majority of the participants were women (women n=200, 85.5%, men n = 34, 14.5%). The number of years with chronic pain ranged between 1-40 years; 47.4% had a pain duration between 1-5 years and 52.6% had had chronic pain for 6 years or more. All patients were assessed before participation, and deemed if they met the inclusion criteria to participate in MMRP. See the flowchart in Figure 4.

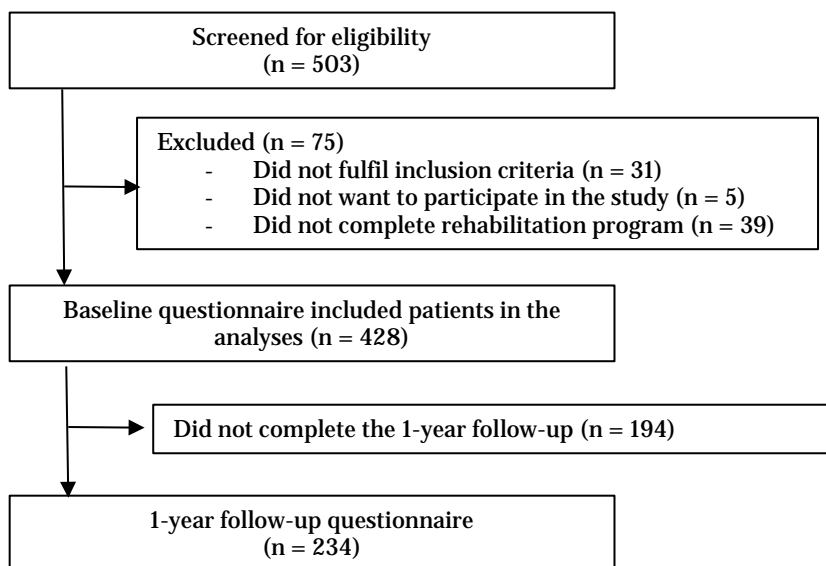


Figure 4 Flowchart for patients included in Study 4

Measures

The areas studied were demographic characteristics, pain, physical and emotional functioning, coping, health, and work-related factors.

Demographic data

Age: mean (standard deviation (SD)) age in years.

Sex: women, men.

Education: Level of education was reported on 4 levels (compulsory school, upper secondary/vocational school, university/college, or other) and used as a 3-level variable after re-coding “other” as missing. Education: Compulsory; Upper secondary; University/college.

Country of birth: Reported in 4 categories (Sweden, Nordic country outside Sweden, European but non-Nordic country, or non-European country) and recoded into 3 categories (Swedish, European, or non-European).

Working status: Reported as employed, student, jobseeker, not gainfully employed (e.g. managing household, retired, income support recipient not seeking work), or missing.

Sick leave: Reported (full-time or part-time, 25-75 %).

Sickness benefit: Reported temporary sickness benefit (full-time or part-time) and permanent sickness benefit (full-time or part-time).

Pain:

The *Visual Analog Scale (VAS)* was used to measure the amount of pain (*pain now* and *average pain last week*) registered on a 100-mm long pain scale, where no pain was recorded as 0 and worst pain imaginable was recorded as 100 (104).

The *Numerical Rating Scale (NRS)* was used to measure pain intensity for the previous 7 days. It consists of a single item wherein the patient rates the intensity of their pain over the past week on an 11-point scale (0 = no pain; 10 = worst possible pain) (105).

Pain duration was measured with the question “When did you first feel the pain that you now suffer from (year and if possible month)”?. This variable was converted to number of days.

Pain variation was measured with the question “Is your pain constant or varied”?

Number of pain locations was measured using 36 predefined anatomical areas (18 on the front and 18 on the back of the body). The subjects marked where they experienced pain: 1) head/face, 2) neck, 3) shoulder, 4) upper arm, 5) elbow, 6) forearm, 7) hand, 8) anterior aspect of chest, 9) lateral aspect of chest, 10) belly, 11) sexual organs, 12) upper back, 13) low back, 14) hip/gluteal area, 15) thigh, 16) knee, 17) shank, and 18) foot. The number of areas associated with pain were counted (between 0 and 36).

Physical and emotional functioning:

The *Hospital Anxiety and Depression Scale (HADS)* is a measurement of anxiety and depression (106). The instrument consists of 7 items for anxiety and 7 items for depression. Each item can be rated from 0 to 3, to which the respondents indicate how much it applies to them during the last week. The total scale, for both anxiety and depression, ranges between 0 and 21 and a higher score indicates a worse condition. A high score indicates the need for clinical assessment for anxiety/depression. The values can be divided in three groups, where a score of 7 or lower indicates no anxiety/depression, a score of 8 to 10 a mild disorder, and a score of 11 or higher is the cutoff for a clinically significant disorder (106, 107). HADS is also validated in its Swedish translation (108).

The *Multidimensional Pain Inventory (MPI)* is a self-report instrument developed for a comprehensive assessment of individuals with chronic pain containing one psychosocial section and two behavioral sections (Ref). All scales include a 7-point numerical scale (0-6), where a high score indicates more of the characteristics in question. The Swedish version of the MPI (MPI-S) has good validity and reliability (109).

The *Functional Rating Index (FRI)* is a questionnaire that measures activity and participation in relation to International Classification of Functioning (ICF) (110, 111). FRI consists of 10 questions graded on a 5-point scale. The points from the 10 questions are counted together. The sum is converted to a percentage where 100% means that the patient does not perceive any function at all, while 0% means full self-rated function (110).

Coping

The *Chronic Pain Acceptance Questionnaire (CPAQ)* consists of 20 questions rated on a 7-point scale from 0 (never true) to 6 (always true). These items can be compiled into 2 subscales: Activity Engagement (AE) consisting of 11 items (0 min-77max), and Pain Willingness (PW) consisting of 9 items (0 min-63 max) (112). Activity Engagement is the degree to which the person engages in activities with pain present while Pain Willingness is the degree to which the person refrains from attempts to avoid or control painful experiences. The items on the CPAQ are rated on a 7-point scale from 0 (never true) to 6 (always true).

The *Pain Catastrophizing Scale (PCS)* consists of 13 items describing different thoughts and feelings when experiencing pain. The PCS instructions ask participants to reflect on painful experiences on a 5-point scale from 0 (not at all) to 4 (all the time). In this study PCS was reported with total score from 0 - 52, in which 52 signifies maximal catastrophizing (113).

Health

The *Life Satisfaction Questionnaire (LiSat-11)* captures the patient's estimations of satisfaction with life as a whole (LISAT-life) as well as satisfaction in 10 specific domains (114, 115). In this study, 2 variables were selected: Satisfaction with 1) life as a whole (LISAT-life) and 2) with vocation (LISAT-vocation). Each item has 6 possible answers: 1= very dissatisfying; 2=dissatisfying; 3 = fairly dissatisfying; 4= fairly satisfying; 5=satisfying; and 6= very satisfying (114, 115).

The *EQ-5D European Quality of Life* instrument measures health-related quality of life (116, 117). The instrument consists of two parts: one part that measures health status in five dimensions (5D) mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each of the five partial questions is rated with a three-dimensional scale 1-3. The five questions are compiled into an index according to a mathematical formula validated against the general population in a number of countries. The EQ5D also consists of a part where the respondents evaluate their overall health status using a Visual Analog Scale (EQ-VAS). In this study EQ-VAS was used.

Work-related factors

One question about current work ability was taken from the Work Ability Index (WAI): "*We assume that your work ability, at its best, is valued by ten points. What score would you give your current work ability?*" Score: 0 (completely unable to work) to 10 (best work ability) (118-120).

An additional *work-related question* was posed to those patients who either already had a job or expected to find work within the next 6 months. "*How likely is it that you will be working within the next 6 months?*" Eight alternative responses were given: 1=Extremely likely, 2=Very likely, 3=Quite likely, 4=Neither likely nor unlikely, 5=Quite unlikely, 6=Very unlikely, 7=Extremely unlikely, 8=Not applicable for me (this answer was excluded from the statistical analyses).

Data analysis

Qualitative Content analysis

Qualitative content analysis was used to explore patients' experiences of participating in MMR and personnel's experiences of working with MMR (121, 122). This method is used to describe variations by identifying differences and similarities in textual content. In content analysis, differences and similarities are expressed in categories (121). The analyses started with reading interviews to get an overview of the entire text. Next, the coding process began with division of the text into meaning units. Each meaning unit was labelled with a code. The coding process was done with Open Code 4.0 Umea software (123). The first author coded the entire material and three authors each coded three interviews for triangulation. The codes were sorted, abstracted and grouped into subcategories and categories during discussion and negotiation among all authors. During the analysis, the first author made field notes of reflection and interpretations. To enhance reflexivity and trustworthiness, the results were presented and discussed in seminars with other researchers from other research fields, than pain and with different healthcare professionals.

Statistical analyses

In Study I, in order to compare the period after the interdisciplinary assessment with the rehabilitation programme period, differences in numerical data were analysed with Wilcoxon's signed ranks test. When data were categorical, the chi-2 test was used for comparison over time. Bonferroni adjustment for multiple comparisons was made before interpreting the P values. P values <0.05 were considered to be statistically significant. In Study IV, differences in patient characteristics between men and women were investigated with unpaired t-test, chi-2 test, or Mann-Whitney test. The changes between baseline and one-year follow-up were tested with paired t-test and McNemar's test. P-values <0.05 were considered to be statistically significant. Bonferroni adjustment for multiple comparisons was made before interpreting the p-values. Effect sizes (ES) for differences between women and men at baseline and from baseline to one-year follow up of MMRP were calculated. Univariate logistic regression analyses were employed to analyse the association between "Being employable at one-year follow-up", and the following (independent) variables at baseline; age, gender, education level, self-rated ability to work (the question from WAI and the question about the likelihood of working within 6 months), pain intensity in the previous week, HAD-A, HAD-D, PCS, FRI, CPAQ and Lisat-11 (two items), and EQ-5D. Variables that had a p-value of <0.1 in the univariate regression analyses were then included in a model with multiple regression analysis. The results of the logistic regression analyses are presented as an odds ratio (OR). The reliability of the OR is expressed as 95% confidence interval (CI). Statistical significance was set at $p < 0.05$.

Ethical considerations

All participants took part voluntarily and were informed about the studies and the possibility to withdraw at any time without giving a reason. All participants gave their written consent. The studies were approved by the Regional Ethical Review Board in Umea, Medical Faculty of Umea University (Dnr 06-154 M and Dnr 2013-192-31-M) and were carried out according to the Declaration of Helsinki.

Results

Study I: Team assessment and MMRP in specialist care

The period of time between interdisciplinary team assessment and start of MMRP showed significantly improved results in pain now and average pain (VAS), pain severity (MPI-S), and interference with everyday life (MPI-S). This was despite the fact that 73 % of the patients had been in pain for more than 3 years. The results are shown in Table 4. In order to study any changes during the period between assessment and start of MMRP, participants were divided into four groups depending on whether they received any intervention or not during the waiting period prior to commencing the programme. The interventions were: no intervention (n=28), adjustment of medication (n=21), adjustment of medication and therapeutic interventions (n=21), and therapeutic interventions (n=23). In 42 cases, the intervention was adjustment or withdrawal of medication and/or addition of low-dose tricyclic antidepressants on pain indication (the latter only being given in a few cases). No patient was given supplementary analgesics such as opioids. Therapeutic interventions consisted of advice to the patient about how to increase physical activity. Twenty-eight cases had no intervention during the waiting time from assessment to start of MMRP.

Table 4 Result of interdisciplinary assessment in specialist care

Outcome measures	Assessment Mean \pm SD	Start of MMRP Mean \pm SD	p-value
VAS			
Current pain intensity	60.8 \pm 18.6	55.2 \pm 18.6	0.016
Average pain last week	65.7 \pm 19.4	58.9 \pm 19.0	0.005
MPI-S			
Pain severity	4.2 \pm 0.8	4.0 \pm 0.8	0.005
Interference	4.5 \pm 0.9	4.3 \pm 0.9	0.001

VAS: Visual Analog Scale. MPI-S: Multidimensional Pain Inventory, Swedish version.

From assessment to the end of MMRP there were significant changes in pain severity, interference of daily living, self-control, negative mood and support (MPI-S) as well as anxiety and depression (HAD-A and HAD-D). There were no effects on pain (VAS) during MMRP, Table 5.

Table 5 Result of MMRP in specialist care (start and end of MMRP)

Outcome measures	Start of MMRP Mean \pm SD	End of MMRP Mean \pm SD	p-value
VAS			
Current pain intensity	55.2 \pm 18.6	50.2 \pm 20.8	0.086
Average pain last week	58.9 \pm 19.0	55.8 \pm 19.3	0.437
MPI-S			
Pain severity	4.0 \pm 0.8	3.6 \pm 0.9	<0.001
Interference	4.3 \pm 0.9	3.9 \pm 1.0	<0.001
Self-control	3.0 \pm 1.0	3.5 \pm 1.0	0.003
Negative mood	3.1 \pm 1.1	2.4 \pm 1.3	<0.001
Support	4.1 \pm 1.4	3.8 \pm 1.4	<0.001

VAS; Visual Analog Scale, MPI-S; Multidimensional Pain Inventory, Swedish version

Study II: Healthcare professionals' experiences of working with MMRP in primary care

The analysis resulted in four categories: select patients for success, a multilevel challenge, ethical dilemmas, and considering what a good result is. The 14 interviewed healthcare professionals described the pros and cons of MMRP and also the challenges of working with patients with chronic pain in this way. The categories are described in more detail below.

Select patients for success

It was a challenge to select which patients should be included in MMRP. The healthcare professionals based their decisions on different preunderstandings and preconceptions. Some used their earlier experience to decide which patients they thought would succeed in MMRP, while others used tools as diagnoses and questionnaires to select appropriate patients for MMRP. In some teams, identifying appropriate patients according to the guidelines was considered to be a difficult task. Other teams had to include all referred patients in order to have enough participants to form a group.

Individualisation, that is, deciding whether the patient would participate in a group or be treated individually, was based on the individual's considerations and wishes, and on the experiences of the personnel. The healthcare professionals estimated that more women than men were selected and referred to MMRP group treatment. The professionals thought that this was because those who referred, viewed women and men differently. Men were more often perceived to have real

pain with clear causes, and therefore it was easier to assess the men and refer them to specialists.

It is. . .few men who have generalized pain like fibromyalgia, etc. It may be more common among men to have back pain, hip pain, osteoarthritis of the knees and so on, and be waiting for orthopedic consultations etc., and they're supposed to have completed investigations(to participate in MMR). So those who come (for care), they might be, for example, those who have residual symptoms with headache or something similar. . .perhaps many years after a traffic accident. They manage themselves pretty well, but still need to learn to deal with (pain). It might also be that they have had pretty tough jobs, which caused them to function inadequately.

Women and men were thought to express themselves in different ways. The way healthcare professionals interpreted the patients were supposed to result in fewer men being given the opportunity to participate in MMRP.

.....I think that patients (women and men) express themselves differently when seeking care. And the person who receives those words chooses differently based on that.

According to the professionals, more men than women were hesitant about joining the programmes when they were invited. However, when men participated, they were often satisfied.

Immigrants were often offered only individual MMRP or no MMRP at all. This was due to the need for interpreters and preconceptions among some professionals about pain knowledge in different cultures. These factors were considered to have a negative impact on the MMRP group process.

Some felt that patients with chronic pain and those who had frequent visits to healthcare were difficult to rehabilitate and guide for return to work. They also expressed they sometimes were surprised when patients whom they thought were impossible to rehabilitate started to make changes in their lives.

What we noticed . . . is that we can't say beforehand who actually manages to motivate her/himself and recover, because sometimes we . . . have a feeling that (for) some people this might not work. But sometimes it does.

A multilevel challenge

The health care professionals experienced MMRP treatment of chronic pain patient as a challenge on several levels.

Challenges on patient level concerned for example dealing with chronic pain patients and their expectations of getting a diagnosis and being cured. This was sometimes related to difficulty setting limits and stopping an investigation because of fear of missing a serious illness. Immigrants with chronic pain were viewed as being especially challenging, sometimes because of language difficulty and sometimes because of their traumatic experiences.

Challenges on an organizational level were about balancing gender awareness in MMRP treatment and could involve gender stereotype discussions in the MMRP groups when only women were represented. In mixed groups where men were also present, women were sometimes less open during discussions and took on other roles, e.g. paying more attention to and acting in a caring way towards the men.

Challenges on a professional level could also be positive. Working against the odds and trying to find individual solutions was stimulating.

.....I think there must be an interest (for the MMRP team member) in working with something that is complex. I think so. To help those people who others (healthcare professionals) do not bother to help or do not want to help. I think someone has to help them (patients). I want to be the one who helps those who are most 'in the shit', if one may say so. . . . I like when it's difficult.

In the light of these challenges, interviewees had positive experiences from working with MMRP that they thought could be very helpful.

.....For me, it is primarily a nice way to work with this group of patients. They are difficult patients who are complicated, and it is very hard to work alone with these complex problems.

Ethical dilemmas

The healthcare professionals described that they experienced a conflict between healthcare legislation and the purpose of National guidelines if they could not offer MMRP to all patients with chronic pain. This conflict arose because the rehabilitation guarantee is intended to keep patients with chronic pain at work or facilitate return to work after sick leave, while healthcare legislation is intended to take into account aspects of equal care for all patients. Patients with the greatest need for rehabilitation – e.g. individuals who did not speak Swedish, or

elderly persons who did not fit the inclusion criteria used for returning to work, were those most affected.

(By offering this treatment), we have said to people what their life should be about; (we) say that to have (good) quality of life, one should work. For me it's incredibly frustrating because somehow we go into some kind of judgmental, inflexible attitude toward the patient that makes it much harder to meet them where they are, and they have already been. . .rejected by many healthcare providers. And we start by telling them what their life should be about. For me it would be much better if the rehab guarantee was about improving quality of life (not just returning to work).

Some interviewees disregarded the rules and offered rehabilitation to patients who would have been excluded because of the requirement to return to work, e.g. patients on long-term sick leave.

Considering what is a good result

Professionals had ambivalent feelings about how MMRP should be evaluated. Some discussed results in relation to the costs and effort they had put into the treatments as well as difficulties in knowing who could be a successful patient.

It (MMRP) takes a lot of time, lots of resources, (of) energy. Sometimes you might think, well what benefit do you have in the end, really? Because there's a lot that we can't have an effect on.

However, teamwork was reported to make MMRP effective and most interviewees thought that patients were satisfied with and benefited from MMRP. For example, less healthcare consumption, better coping with pain and patients returned to work or started to study. Interviewees thought that, at least from the patient's point of view, there are other factors and different ways to evaluate MMRP than by the proportion of patients that return to work. Study of health-related quality of life and lower healthcare consumption were two suggested factors.

A problem is that we only look at each individual organization. But if we look at both the patient's suffering, and that the patient gets a better quality of life, this ought to be the main reason why we treat in this way. We can also look in a longer perspective, which is to say if people actually manage to work again, we have a tremendous profit. If we only get one person back to work. . .then it's a tremendous profit. I think many times we forget to look at the long run. In addition, we also may have persons who do not seek care for long(er) periods because they can handle this better themselves (after MMRP). So there are several parts of this, like a societal perspective and a person's suffering. There is much to gain.

Study: III Patients' experiences of MMRP in primary care

The analysis of patients interviews resulted in four categories: from discredited towards obtaining redress, from uncertainty towards knowledge, from loneliness towards togetherness, and "the acceptance of pain" – an ongoing process, Table 6. The categories are described in more detail below.

Table 6 Experience of multimodal rehabilitation in primary care: qualitative analysis categories and subcategories

Category	Subcategory
From discredited towards obtaining redress	Before MMRP, I met disbelief Afraid of not being taken seriously Everyone believes that the pain can be fixed MMRP gave redress Staff role and importance
From uncertainty towards knowledge	Want to find out what is wrong Explanations about pain give security Reduced fear and anxiety after MMRP MMRP provided knowledge
From loneliness towards togetherness	Share experiences and perceptions Security and togetherness in the group Group provides nothing for me
"Acceptance" of pain an ongoing process	Do not allow pain to control my life Allow myself to have pain Insight about own limitations Changed behaviour after MMRP Setting boundaries to obtain balance in life Found strategies Difficult to reconcile with constant pain I want to be healed

MMRP: multimodal rehabilitation program

From discredited towards obtaining redress

MMRP gave patients redress and a feeling of being seen and confirmed. Many years of experience of seeking healthcare for chronic pain had affected their expectations as regards participating in MMRP.

Before MMRP, those with positive experiences were optimistic, hopeful, and wished to obtain treatment other than medication. One of the patients wanted to prevent sick leave by engaging in MMRP. Those who had had negative experiences had a fear of not being listened to, and that the healthcare service would not see them as whole human beings.

I feel that it is difficult.... that you will not be trusted when you come here (healthcare in general) and say something. The doctors do not really believe it. And because I have been on strong medications, they think I'm looking for drugs more than any other (treatment).

Some patients had experiences from earlier contacts with healthcare and rehabilitation, that their pain problems had been trivialised, and that they had not been allowed to have pain.

Everyone says that it should be fine. Yes, everyone has a solution....do this, you know, try this. Eat rosehip powder....

Such simplifications and to be discredited were compared with the relief they felt when MMRP professionals verified what the patients already knew—that the pain cannot be fixed.

.... All the previous treatments dealt with taking away the pain. This is the first time one gets a treatment that focuses on acceptance of the pain, and you really understand that this is chronic pain that will never disappear; it's the first time one has received the message from this angle."

The staff's professional approach and their way of asking questions stimulated the patients to reflect on their own thoughts and behaviour. They thought this encouraged them to initiate behavioural changes.

From uncertainty towards knowledge

By learning more about pain and its consequences, the patients said their fear and anxiety decreased. Understanding that pain was something not just going on in their minds was valuable

..... In the past, I have encountered a lot of strange things. And you wonder, 'what the heck is so wrong?' But now you have been given an explanation for it. So, you don't get as frightened (as before).

MMRP also led to insights about the complexity of chronic pain, such as what can affect how a person perceives pain and what may have contributed to the development of chronic pain.

.... There is a lot you carry with you. I have learned that now. All that has happened in life until now, I sort of carry with me, and it influences me physically. Although, it is in here, or the pain...it comes from the inside obviously, (and) I had not thought about that before. But then you think, well, maybe, maybe I carry a lot of baggage in some ways.....

In MMRP, the patients found new ways of looking at their chronic pain, with a new understanding of important factors for the onset of pain, and knowledge that pain persisted despite the fact that an injury had healed. Setting individual goals for rehabilitation in MMRP had helped them understand better how pain affected their lives and how they should focus on what was important to them.

From loneliness towards togetherness

Being in a group with other people with similar chronic pain gave a sense of security and togetherness.

.....To meet people who suffered from more pain than me, led to an awakening, and gave distance to my own problem..... in other words, I am still fortunate. You know there are those who experience tremendous pain day and night every day. So, it is also very useful to see that yes, but I am actually quite lucky.

However, there were also some negative expectations and experiences of participating in group sessions. This was due to fear that one's pain might be reinforced if they listened to other people's pain descriptions. Someone even felt provoked when participating in group sessions where negative experiences were discussed.

.... Should one keep on talking about one's pain? I felt it became.... or I was afraid that it would become, some sort of self-fulfilling prophecy.

Some thought that they had more to give to the group than they would get out of participation. They did not think they had anything to learn from the group sessions, and that they already knew all about rehabilitation.

.... But I have learned so much myself in my journey (earlier rehabilitation), that I thought I had done all of that several times. So therefore, I did not think it gave me so much, but...I already knew ... what you have to do and not (do)....

“The acceptance of pain” – an ongoing process

The patients used terms such as “to accept” or “had started to learn one must accept pain”. Some found it difficult to reconcile themselves to living with chronic pain, and they “did not accept” the pain.

“To accept” pain was not allowing pain to take control over their life, and adjustment to the current pain. They explained that it could take a long time to understand and totally accept that their pain would remain.

Some explained that MMRP was the start of them accepting their pain and the fact that they could no longer do what they had been able to do before.

...Somehow you have to accept that you have the pain you have, and some things you can't do because then you get a backlash if you do. And it (MMR) has, well, somehow, it has helped a little bit to realize that you can't do everything you want.

For the patients who said they did not accept their pain, the goal of becoming pain-free was the most important. They wanted to be cured and found it difficult to reconcile themselves to a life with chronic pain. There were some patients who still did not feel they had been given a complete medical investigation, and they were waiting for specialist assessments after MMRP. Finding out what was “wrong” and getting a medical diagnosis and a cure were important. They were expecting a specialist doctor to decide further investigations and treatments, and these were essential for whether or not they could assimilate what they learned in MMRP

.....I need an evaluation (medical).... It is the hospital that must make the evaluation, if I should have surgery or not.

Accepting or not accepting to live with chronic pain can be expressed as an ongoing process. The analyses showed that acceptance is not a static condition. Some patients could sometimes describe themselves as accepting the pain but then a moment later, they could talk about searching for a cure.

Study IV: Long-term effects of multimodal rehabilitation in primary care for patients with chronic pain

In Study IV, the effects of MMRP in primary care were evaluated by Patient-Reported Outcome Measurements (PROM) at one-year follow-up regarding pain, physical and emotional functioning, coping, and health-related quality of life in patients with chronic pain, and in women and men separately (200 women and 34 men). Significant improvements were found in all PROMS, except for LiSat-vocation in all participants taken together. The effect sizes (ES) for all outcomes were small (0.24-0.34) The largest effect sizes were found for coping aspects on CPAC followed by catastrophizing on PCS. When evaluating women and men separately, it was found that women improved significantly on all PROM domains, while men only improved on function, see Table 6.

Table 2. Change in patient-reported outcome measures between baseline and 1-year follow-up for all patients, and for women and men separately.

	All (Baseline n = 220-233, 1 year n = 197-232)					Women (Baseline n = 188-199, 1 year n = 167-198)					Men (Baseline n = 32-34, 1 year n = 30-34)				
	Baseline Mean (SD)	1 year Mean (SD)	p-value	Effect size	Effect size CI 95%	Baseline Mean (SD)	1 year Mean (SD)	p-value	Effect size	Effect size CI 95%	Baseline Mean (SD)	1 year Mean (SD)	p-value	Effect size	Effect size CI 95%
Pain intensity last week	6.5 (1.8)	6.1 (2.2)	0.002	-0.24	-0.43--0.05	6.5 (1.8)	6.0 (2.3)	0.003	-0.25	-0.46--0.05	6.7 (1.5)	6.4 (1.7)	0.444	-0.15	-0.63--0.33
HADS-A	9.1 (4.7)	7.8 (4.7)	<0.001	-0.32	-0.51--0.14	9.1 (4.8)	7.8 (4.7)	<0.001	-0.34	-0.54--0.15	8.8 (4.4)	8.0 (4.8)	0.240	-0.22	-0.70--0.27
HADS-D	6.7 (4.3)	5.6 (4.4)	<0.001	-0.30	-0.49--0.12	6.7 (4.4)	5.6 (4.4)	<0.001	-0.49	-0.69--0.28	6.8 (3.9)	5.2 (4.1)	0.072	-0.34	-0.84--0.16
FRI	57.8 (16.1)	53.9 (18.3)	<0.001	-0.35	-0.54--0.17	57.4 (16.4)	53.1 (20.4)	<0.001	-0.32	-0.52--0.12	60.2 (13.7)	53.5 (15.4)	0.005	-0.56	-1.05--0.07
CPAQ-AE	29.0 (11.4)	34.3 (12.8)	<0.001	0.46	0.26--0.65	29.4 (11.5)	35.0 (12.9)	<0.001	0.48	0.27--0.70	28.2 (11.1)	30.8 (12.0)	0.146	0.29	-0.22--0.78
CPAQ-PW	23.4 (8.8)	26.8 (8.2)	<0.001	0.39	0.18--0.59	23.4 (8.7)	27.0 (8.1)	<0.001	0.41	0.19--0.63	23.1 (9.4)	25.3 (8.9)	0.195	0.24	-0.27--0.74
PCS	23.1 (10.9)	19.0 (11.4)	<0.001	-0.46	-0.65--0.26	23.6 (10.9)	18.7 (11.6)	<0.001	-0.51	-0.72--0.30	21.3 (9.9)	20.2 (9.4)	0.463	-0.13	-0.62--0.36
LiSat-life	3.6 (1.3)	3.9 (1.3)	0.037*	0.13	-0.06--0.32	3.7 (1.3)	3.9 (1.2)	0.023	0.17	-0.04--0.37	3.6 (1.2)	3.6 (1.4)	0.915	-0.02	-0.50--0.46
LiSat-vocation	2.9 (1.5)	3.4 (4.0)	0.060*	0.26	0.07--0.45	2.9 (1.5)	3.6 (4.4)	0.050	0.34	0.13--0.55	3.2 (1.6)	2.8 (1.8)	0.259	-0.21	-0.69--0.27
EQ5D-Index	0.34 (0.32)	0.45 (0.32)	<0.001	0.34	0.13--0.54	0.35 (0.33)	0.45 (0.32)	<0.001	0.34	0.13--0.56	0.35 (0.32)	0.44 (0.30)	0.160	0.29	-0.28--0.86
EQ5D-VAS	46.1 (19.3)	53.1 (22.8)	<0.001	0.34	0.16--0.53	46.3 (19.6)	54.2 (23.4)	<0.001	0.38	0.18--0.58	44.6 (18.7)	46.2 (19.2)	0.641	0.08	-0.40--0.57

* = Wilcoxon test; HADS-A and HADS-D, Hospital Anxiety and Depression Scale - Anxiety and -Depression; FRI, Functional Rating Index; CPAQ-AE and CPAQ-PW, Chronic Pain Acceptance Questionnaire - Activity Engagement and Pain Willingness; PCS, Pain Catastrophizing Scale; LiSat-life and -vocation, Life Satisfaction Questionnaire, Life as a whole and vocation; EQ5D, European Quality of Life instrument; VAS, visual analogue scale.

At baseline, 39.7% of the patients (n=93) were on sick leave (full-time and part time). At follow-up, the proportion of patients on sick leave had significantly decreased ($p=0.027$) to 31.6% (n=74). Before MMRP, 13.2% (n=31) had temporary or permanent sickness compensation (full-time and part time) At one-year follow-up, the proportion of patients on sickness compensation was 17.5% (n = 41).

In the univariate logistic regression analysis using `being employable` at one-year follow-up as a dependent variable, variables that had a p-value <0.1 in the univariate regression analysis (pain intensity, FRI, self-rated work ability from WAI, LiSat-vocation and “likely to be working within the next 6 months” were included in a multiple regression analysis. In the multiple logistic regression, only ‘self-rated work ability’ from WAI was associated with `being employable` at one-year follow-up (OR=1.193, CI: 1.209-1.059, $p=0.005$).

Discussion

General discussion

A two-day team-assessment and MMRP in specialist care had positive effects on pain and pain-related measurements in patients with chronic musculoskeletal pain. At one-year follow-up after MMRP in primary care, improvements were found in pain, emotional and physical functioning, coping and health-related quality of life. Health care professionals in primary care found that working with MMRP was challenging because of the complexity of patients with chronic pain, for example, when selecting patients for MMRP. MMRP was seen as being a helpful method for treating patients with chronic pain. Patients described how MMRP had given them a sense of acknowledgement and confirmation, both regarding their experiences of pain and their knowledge about pain and its consequences. Accepting life with chronic pain seems to be an ongoing dynamic process.

Assessment

When evaluating the effects of a 2-day interdisciplinary team assessment for patients with chronic pain in Study I, the results were significantly improved between the assessment and the start of the MMRP. This was despite the fact that patients had had an average pain duration of 8 years. A possible explanation could be that the patients were assessed by several experienced healthcare professionals during the course of two days, including both individual examinations and meetings with a professional from each vocation, and a team conference (not attended by the patients) to reach an interdisciplinary conclusion. In addition, on the second day, the patient received a review of the team's assessment, and recommendations of rehabilitation at a final team conference, which the patient's referring general practitioner (GP) was invited to attend. These findings support that a comprehensive bio-psycho-social assessment can be seen as a treatment in itself and a possibility to differentiate rehabilitation interventions for patients with chronic musculoskeletal pain.

Although the understanding of chronic pain has developed over the last decades, there is no straightforward or well-defined way to assess a patient suffering from chronic pain. However, the significance of a comprehensive assessment that deals with biomedical, psychosocial and behavioral areas, each contributing to chronic pain and related disabilities is acknowledged in the literature (124, 125) .

Moreover, there is limited knowledge about the effects of assessment and what the assessment consists of. Some previous studies have evaluated team assessment for patients with chronic pain (126-129). In the studies by Merrick et.al. from the same department in specialist care as in Study I, it was shown that a two-day interdisciplinary assessment together with a rehabilitation plan to

follow up in primary care had positive long-term results on individual pain experiences and return to work (126, 127).

In most countries, the overwhelming majority of people experiencing chronic pain are managed by their GP, while only 0,5-2 % are referred to specialist care for pain management (59). Patients with chronic pain visit their GP twice as often as patients without chronic pain(130). They also have a higher level of unscheduled care than patients without chronic pain (131). The primary care physician meets patients with chronic pain whom they often assess, diagnose and manage in the time frame of a short appointment. This may risk making a care plan dictated by short-term decisions rather than a comprehensive oversight of the patients' pain from a bio-psycho-social perspective (132). Irrespective of whether the patient is treated in primary or specialist care, it is important to embrace the patient's entire life situation.

Since patients with chronic pain are a heterogenous group (133) some may benefit from a bio-psycho-social assessment while others may need more extensive rehabilitation such as MMRP (96). For the health care system, it is important to provide suitable interventions and to determine the correct level of care for each patient. The National guidelines for selection to MMRP emphasize that MMRP is designed for patients with large and complex needs for rehabilitation (96). The guidelines provide support for selection to the appropriate care level, be it primary or specialist level.

Selection to MMRP

How patients were selected for MMRP was described differently by the health care professionals in primary care (Study II). The rehabilitation guarantee was intended to keep patients with chronic pain at work or facilitate return to work after sick leave. According to Sweden's healthcare legislation, all patients are entitled to equal treatment. Health care professionals experienced a conflict of interest when having to take both health care legislation and the rehabilitation guarantee into account when selecting patients to MMRP. This affected especially patients who did not speak Swedish or people who did not fit the rehabilitation guarantee intention about return to work. Healthcare professionals' opinion was that improved quality of life after MMRP could be of great importance for all patients, even if their goal with MMRP was not to return to work (Study II). The professionals also experienced similar difficulties in managing work ability and return to work after MMRP as reported from other primary care units in Sweden (134).

The majority of the participants in MMRP in primary care (Study IV), were women. This is in agreement with previous studies performed in specialist care (62, 135-137) and with annual reports of the Swedish quality registry of pain rehabilitation (101). The higher proportion of women participating in MMRP

could be explained by the fact that women have a higher prevalence of chronic pain than men (60, 138). There could also partly be a gendered selection bias since not all patients who undergo assessment are selected for MMRP. Previous studies have shown that women were more often selected for MMRP than men (135, 137). This could be because the selection is influenced by healthcare professionals' preconceptions about gender, and that professionals believe that MMRP is more appropriate for women than men, a view that was shown in Study II (139).

Perceptions about differences between women and men were found in different areas. Healthcare professionals thought that patients' way of presenting their pain differed between women and men and that that might influence the selection of patients to MMRP (Study II). It is known from previous research that women and men with similar symptoms present themselves in different ways (140, 141). Ahlsén et al argue that there is a risk that healthcare professionals do not perceive the real needs that are hidden behind gender stereotypes (142). Healthcare professionals had views on the significance of gender when it came to group treatment (Study III). Typically, women was viewed as more likely to participate in group treatment, more accustomed to talking and working in groups, and it is more acceptable for women to talk about feelings. A study by Ahlsén et al found that healthcare professionals felt reluctant to ask men about their social and emotional experiences (142). If healthcare professionals do not feel comfortable asking men about feelings, there is a risk that these questions will never be asked.

In Study IV, we found that a larger proportion of women than men had a university education. In a previous study in specialist care, at the same clinical department as in Study I, it was found that women with a low-level of education were less often selected to MMRP than highly educated women. No significant differences were found between men with a high level of education and low level respectively (143). In a study by Lehti et al healthcare professionals in primary and specialist care stated that patients with higher educational levels and who were similar to the professionals themselves were easier to interact with (144).

Implementing a new way of working with MMRP in primary care

The rehabilitation guarantee made it easier to initiate and develop MMRP for patients with chronic pain in primary care (96). Through financial compensation, MMRP was made available in primary care settings to people with chronic pain. In addition, the financial compensation was a way for the healthcare units to receive money and thereby force the professionals to offer patients MMRP.

Stenberg et al investigated healthcare professionals' perspectives on how to start up and work with MMRP in the same primary care settings as in Studies II-IV

(145). The study described the difficulties experienced when implementing MMRP, one reason for this possibly being that primary care is usually directed towards emergency care. Healthcare professionals felt that patients with chronic pain have low status among staff at their workplace, and that may complicate the implementation of the new intervention (145). In a previous qualitative study conducted in primary and specialist care, it was stated that both healthcare professionals and patients perceived chronic pain to be a low status disease (144).

Nevertheless, health care professionals thought MMRP was a useful method for treating patients with chronic pain in primary care (Study II). Working with MMRP with a bio-psycho-social approach involves collaboration between different health care professionals in the team (93, 96). Creating good team work requires negotiations and consensus on rehabilitation and responsibility from each team member. It is an advantage if someone takes more responsibility at start of MMRP, even if the team has a shared responsibility for the implementation (145).

Effects of MMRP

When evaluating the patients from before to after an MMRP in specialist care (Study I) we found significant effects in pain severity, interference with daily-life, life-control, mood, support, anxiety and depression. These results are in accordance with systematic reviews from specialist care that have reported that MMRP is effective for patients with chronic pain (76, 99, 100) for both physical and psychological outcomes and could be seen as the state of the art of the management of complex chronic pain (99). Although the aim of the programme in Study I was not pain relief per se, positive changes were seen when measuring pain severity on MPI-S after the MMRP. The same positive effect was not seen when measuring pain intensity with VAS. A possible reason of the discrepancy may be that in MPI-S, the patients were asked to score both the pain and how much suffering the pain causes. The positive effects on consequences related to pain e.g. life-control and mood, may indicate that the programme was successful as regards the aim of helping patients to better cope with their pain. Some important parts in the MMRP were pain education, coping, and goal setting. In previous research, these measures have given positive results together with physical activity (99, 146). It is therefore reasonable to assume that they contributed to the outcomes in Study I.

Although MMRP is a fairly new intervention in primary care, we found that patients in primary care in the two county councils improved significantly between before MMRP and at one-year follow-up regarding pain, physical and emotional functioning, coping, health-related quality of life and sick leave (Study IV). These findings are in agreement with some previous Swedish studies that likewise have shown positive long term results after MMRP in primary care. In a study from a single primary care unit, improvements were shown for depression,

social activity, physical activity and healthcare utilization after one year(147). Another study reported of improvements in perceived health, quality of life and psychosomatic symptoms that were maintained between one and five years follow up (148). At one year follow-up women improved significantly in all PROMs, while men only improved significantly on function (FRI) (Study IV). In men the MMRP had hardly any effect on pain intensity, catastrophizing and health related quality of life. Since other studies have also shown that women presented better effects after MMRP than men, it has been questioned whether MMRP may be more suitable for women than for men (149, 150). However, in contrast to this, studies by Pieh et al and Keogh et al found that men improved significantly after an MMRP(149, 151). Possible explanations for the contradicting results could be differences in sample size, the content and length of the programmes, outcomes or the time-point of measurement (directly after MMRP or at one-year follow-up).

The proportion of patients on sick leave decreased at follow up after one year (Study IV) while no difference was found regarding the proportion of patients on temporary or permanent sickness compensation. Similar findings of sick leave one year after MMRP were reported by Stein et al (147) in a study of patients with chronic pain in primary care in another part of Sweden. The intention of the rehabilitation guarantee, is to reduce sick leave in patients with chronic pain in working age. Since previous studies have shown positive effects on sick leave in specialist care (152-154). The rehabilitation guarantee was recently evaluated (155) in a study based on national data from the Swedish Social Insurance Agency. That study showed that compared with controls, sickness absence in patients with chronic pain was not reduced after participating in MMRP, but the risk of future disability pension was decreased after MMRP. Even though Study IV was conducted after the study by Busch et al (155), MMRPs were still in the phase of implementation in primary care in the two county councils included in the study during this time. As has been shown in previous studies (126, 156, 157) patients' positive attitude regarding work ability before MMRP was a predictive factor for being employable at follow up. Work-directed interventions have been viewed as being an important factor for return to work (158). Since the data collection period, work-directed interventions have been added to MMRPs in the two county council. The findings of the patients' own expectations point out the importance of including and interacting with the individual actively in the process of return to work after MMRP.

Patients' experiences of MMRP in primary care

Patients' expectations of MMRP

Most patients in our study had long experience of contact with healthcare, which affected their expectations before MMRP in different ways (Study III). Those who had positive experiences saw an opportunity to receive treatment other than

medication, prevent sick leave etc. While those who had negative experiences of contact with health care before MMRP described that they had been worried that they once again would experience not to be believed and listened to. Some felt they were suspected of wanting strong pain medication. In previous studies it has been described that patients experienced that healthcare professionals neither listened nor confirmed their pain, but instead were suspicious about the patients' intentions for the care visit (159-162). Furthermore in earlier studies, patients described that healthcare professionals did not believe in their pain experience, and that they thought that the patients were only seeking drugs (163, 164). Previous research has shown that patients' perceptions and management of their pain were affected by their experience of treatment regimes (165), their interactions with health care providers(166-169) and their beliefs about the nature and causes of pain (170-173).

Patients' experiences of MMRP and health care professionals role

Regardless of the expectations before MMRP, most patients in study III were satisfied with MMRP. They experienced that MMRP led to confirmation and that they were believed, which was of great value. However some expressed that they needed an assessment (after MMRP) by a specialist to try to find out what caused their pain, and to find a cure. The importance for patients with chronic pain, to find out what is wrong, and to receive a diagnosis is described in previous research (173, 174). Getting a diagnosis has been found to legitimize pain (173, 175). Health care professionals experienced patients' desire to get a diagnosis and to be cured from pain as challenging (study II). At times, they felt that it was difficult to stop investigations because of fear of missing a serious illness (study II). To get a diagnosis also establishes patient's credibility, not only towards the physician, but also towards family, significant others, employers, co-workers and friends (174). Danise and Turk highlight the challenge of insufficient explanations for patients with no identified organic pathology who report severe pain, and individuals that experience no pain but have significant objective pathology (176). When the diagnosis remains unconfirmed patients experience that there is no longer hope for a better future (161, 174). As the interdisciplinary assessment in study I included information and explanation of pain this may have had a positive effect on the results (Study I).

The patients' overall experience of participating in MMRP was positive (Study III). Some explained how the healthcare professionals' way of acting professionally helped them to reach an understanding. MMRP generally focuses on behavioral change, where health care professionals usually work with cognitive behavioral therapy (CBT) as a method to support their approach. The patients in our study found that health care professional's way of communicating with open questions in accordance with CBT allowed them to reflect on their thoughts and behaviors. A randomized controlled study demonstrated that a 2-day training course allowed health care professionals to deliver a CBT based intervention in primary care settings to patients with low back pain. Participants

who received CBT had improved measures of disability, reduced pain intensity, reduced depression and better quality of life 1-year after the intervention compared to those receiving standard care (177).

Patients 'experiences of group treatment

The patients in study III experienced that being in a group with others with similar pain conditions who understood how it was to live with chronic pain, was helpful in that they felt fellowship (Study III). These results are consistent with previous studies and demonstrate that patients can benefit from group rehabilitation in the form of social support and contribute to increased well-being (178-181) (182, 183). However, in study III, there were also patients with negative experiences of participating in group sessions. This was explained as fear that their pain might be reinforced if they listened to other people's pain descriptions. Someone even felt provoked when participating in group sessions where negative experiences were discussed. Some felt they had nothing more to learn, since they had experiences from earlier rehabilitation. Previous studies have shown that negative attitudes in a group sometimes influences the group (181, 183). It is therefore important that health care professionals are aware of the group process during the MMRP.

The patient with chronic pain in a social context

In interviews with the patients (Study III) they described frustrating experiences of all advises about how to get rid of their pain (Study III). It made them feel that their pain problems were simplified, and that they were not allowed to have pain. Medical staff, social insurance, and closely related parties (relatives, friends, and co-workers) sometimes believed that their pain could be fixed. Their recommendations for action were described as frustrating by the patients. Some patients expressed feelings of not being good enough at home or work. Having to ask for help, or needing the spouse to do things that they had previously done were other examples that led to feelings of worthlessness. Worries could also be about future ability to work. La Chapelle et.al states that lack of support and acceptance from related persons including health care professionals is a barrier to acceptance of pain (184). Chronic pain affects not only the individual patient, also his or her significant others (partners, relatives, children), and relations in the society (medical staff, social insurance, employers and employees and friends), is of great importance (185) (186).

The process of accepting chronic pain

Patients in our study expressed "accepting pain" in different ways (Study III). To accept pain was by some described as "not letting pain take control of my life", and that they adapted to the current pain. While others expressed they "had started to learn that one must accept pain". Additionally others found it difficult to reconcile themselves to live with chronic pain, and they did "not accept" the pain. Accepting to live with chronic pain seems to be an ongoing, dynamic

process. Some patients described themselves as accepting the pain in one moment, but in the next, they talked about searching for a cure. Others described how they had changed their behavior and way of thinking about their pain (Study III). Current pain practice generally encourages acceptance of chronic pain, as opposed to an ongoing search for a cure (174). Dewar et al found that if the emphasis was on acceptance as the patient's responsibility it could create an additional barrier between patients and physicians (174). Previous research has indicated that health care professionals should be cautious when discussing acceptance as a goal for patients living with a chronic condition (187). Since there are several definitions of acceptance (188, 189) it is important that the term and its meaning are carefully communicated between patient and physician (174). In one study exploring how the word "acceptance" was understood, most participants explained the term as "giving in" or "giving up" to their pain (184). However, the participants described situations that are in line with what McCracken et.al suggests as the marks to accept pain (112).

Methodological considerations, strengths and limitations

Chronic pain and related consequences are complex and there is a need to investigate with different methods. This thesis consists of studies conducted with qualitative and quantitative methods to broaden the understanding of rehabilitation for patients with chronic pain. MMRP within primary care has a short history, and research in the field is limited.

Study II-IV were conducted in two county councils, one in southern Sweden and the other in northern Sweden, which included urban and rural areas. This provided a range of different settings, small primary care clinics and primary healthcare centres. Although data collection was limited to these two counties, the results are transferable to similar settings in primary care.

The questionnaires included instruments that are widely used and have shown good validity (Study I and Study IV). However, we used self-reported assessments of sick-leave benefits (Study IV), which might have impacted the validity of the sick-leave information.

Not all participants answered the one-year follow-up (Study IV), which lowers the generalizability of the results. On the other hand, at baseline there were no differences between those who did or did not answer the follow-up, except that those who completed the one-year follow-up reported somewhat lower pain catastrophizing, and Northern primary care units achieved a higher follow-up rate than Southern units.

When collecting data in Study I, the patients filled in the questionnaires at the clinic in connection with start and end of MMRP, which helped to get responses from all participants.

No control group was included (Study I and Study IV). In study IV, the changes between baseline and one-year follow-up can be caused by the effects of MMRP or depend on other factors, such as the natural course. However, patients with chronic pain often have had their condition under a long period of time, which may reduce the effect of natural course

A limitation in Study I was that only a very few men were assessed and selected to participate in MMRP in specialist care (Study I) therefore they were excluded from the statistical analyses. The number of men included in Study IV was relatively low, which may have influenced identification of differences between sexes. Therefore, besides statistical significance p-values even effect sizes with CI 95% were presented.

The patients and health care professionals that were interviewed, were chosen through purposeful sampling to enhance rich variation in data and to gain credibility(190-192). In Study II, health care professionals had different ages, professions, length of experience, team size, patient catchment areas and both genders were interviewed. Interview of more male healthcare professionals would have been preferable, but most staff who work with MMR are women. This may have influenced the results. However, answers from the three men in our study did not differ from other answers. The strategic sample of patients, in study III, varied in ages and sex, and they lived in both rural and urban areas, that is a strength. When doing interview studies, there is a risk that only interested and positive individuals participate. A strength in our study is that both positive and negative opinions about participating in MMRP were presented (Study III).

A shortcoming may be that the interviews in Study III were conducted up to one year after MMRP, and it may have been difficult for patients to remember their expectations before rehabilitation. On the other hand, MMRP deals with lifestyle changes that are long-term processes. In order to obtain sufficient perspective, some distance is important.

Patients had a great need to talk about their previous experiences (Study III). At times, this was a limitation during the interviews, since some patients needed to talk about the past rather than focusing on MMRP experiences. Nevertheless, this also provided valuable background knowledge for the current analysis.

One shortcoming of Study II and Study III was that the interviewed patients and health care professionals were not given the opportunity to reflect on the findings. We could have involved interviewees in the research process to further strengthen the work.

In Study II and Study III the research group consisted of men and women with different professions, and included clinicians and academics, working in primary and specialist care. This was a strength during the study analyses. The approach may strengthen the credibility of the results, through the opportunity to supplement and challenge one another's views. We could have involved other professions in the research group to further strengthen the work. Instead, colleagues from other professions and a group of qualitative researchers were asked to reflect on the findings during different stages of the analysis. The input from their comments was considered in the interpretation.

Conclusions:

The main conclusions of the thesis are as follows:

- A 4-week multimodal rehabilitation programme in specialist care showed positive effects on pain and pain-related measures (Study I).
- Healthcare professionals in primary care may experience ethical conflicts in the selection of patients for MMRP (Study II).
- Healthcare professionals in primary care perceive MMRP as a helpful method for the rehabilitation of chronic pain patients (Study II).
- Preconceptions can influence selection for, and work with, MMRP (Study II).
- Patients in primary care MMRP experienced a complex, ongoing process of accepting chronic pain. This was facilitated by experiences of obtaining redress, knowledge about pain, and togetherness in the MMRP (Study III).
- Patient with chronic pain showed improvements in pain, emotional and physical functioning and health-related quality of life and sick leave 1-year after multimodal rehabilitation in primary care (Study IV).
- The patient's perceived current work-ability before MMRP was associated with being employable 1 year after MMRP in primary care (Study IV).

Future research

In order to improve the rehabilitation of individuals with chronic musculoskeletal pain there are factors of importance that need to be addressed in future research.

- Research to identify what factors can support assessment and rehabilitation is crucial for successful individual treatment as well as for the cost-efficiency of healthcare.
- It is proposed that further research is needed to identify the most optimal form of MMMP, whether as an individually customised programme, a group-based programme or a combination of group and individual sessions.
- Further research is also needed to establish whether MMRP should be based on diagnosis or on sub-categories of patients that have been identified in some other way.
- Since chronic pain is associated with sick leave and absence from work, there is a need to study what factors can predict return to work.
- Since the completion of this thesis, work-directed interventions have been added to MMRP. Further studies are needed to study the impact of employer's role in rehabilitation.
- Patients with chronic pain describe feelings of frustration and worthlessness with regard to their families, the healthcare services and places of work and therefore the significance of the patient's role at home and in other social contexts needs to be investigated in order to develop MMRP.

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