Individually Tailored Treatment in the Management of Musculoskeletal Pain

Development and Evaluation of a Behavioural Medicine Intervention in Primary Health Care

PERNILLA ÅSENLOF
Dissertation presented at Uppsala University to be publicly examined in Sal X, Universitetshuset, Uppsala, Friday, May 20, 2005 at 13:15 for the degree of Doctor of Philosophy (Faculty of Medicine). The examination will be conducted in Swedish.

Abstract

This thesis deals with clinical pain intervention research from a behavioural medicine perspective. The general aim was to develop and evaluate an individually tailored treatment protocol focused on pain management in everyday life in people who experience persistent musculoskeletal pain. Another aim was to develop and incorporate an idiographic outcome measure for behavioural goal assessment in the formal evaluation of the clinical significance of treatment outcomes.

The studies were conducted in a primary health care setting demonstrating a contribution from physical therapists in the field of behavioural medicine. Two separate samples of patients with musculoskeletal pain with a duration exceeding one month, n = 197 (Study I, descriptive and correlational design), and n = 97/82 (Study III/IV, randomized group-study) were included. In addition, four women were recruited for a series of experimental single-case studies (Study II).

The treatment protocol that was individually tailored to each participant’s behavioural treatment goals and assumed determinants of pain-related disability was more effective in reducing pain-related disability, pain intensity, fear-avoidance, and in increasing pain control when compared to an intervention including physical exercises. The individually tailored treatment was generally more beneficial for resumption of everyday life activity, increasing satisfaction, fulfilling pre-treatment expectations, and in preparing individuals for self-management of pain. The Patient Goal Priority Questionnaire that was elaborated over the course of the project can be used to a) identify and assess behavioural treatment goals, b) elaborate individual functional behavioural analyses relevant for everyday life functioning, and c) determine the clinical significance of treatment outcomes – that is, whether interventions produce outcomes of relevance for each individual’s everyday life. The inclusion of idiographic outcome measures in clinical pain intervention research is necessary and improves the ecological validity of the evaluation of clinical significance.

Keywords: behavioural medicine, goal assessment, tailored treatment, chronic pain, physical therapy, primary health care

Pernilla Åsenlöf, Department of Public Health and Caring Sciences, Uppsala Science Park, Uppsala University, SE-75183 Uppsala, Sweden

© Pernilla Åsenlöf 2005

ISSN 1651-6206
ISBN 91-554-6240-5
urn:nbn:se:uu:diva-5781 (http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-5781)
To Axel and August

“There are no shortcuts to any place worth going”

The Beverly Sills Quote
List of papers included in the thesis

This thesis is based on the following papers, which are referred to in the text by their Roman numerals:


Reprints were made with the kind permission from the publishers.
Contents

Introduction...................................................................................................11
About the thesis........................................................................................11
Musculoskeletal pain – a public health challenge ....................................12
The definition of pain...............................................................................13
The pain experience .................................................................................13
Classifications of pain..............................................................................14
   Biomedical systems.............................................................................14
   Multi-axial systems..............................................................................14
Prevention of pain ....................................................................................15
Pain interference with everyday life.........................................................15
   Psychosocial risk factors..................................................................16
   Promotive factors..............................................................................17
Adaptation to chronic pain .......................................................................17
   Coping .............................................................................................17
   The issue of control ..........................................................................18
   Acceptance........................................................................................18
Goal mechanisms and goal setting .........................................................19
   Behavioural goals in pain management.........................................20
   Goal setting.......................................................................................20
Theoretical perspectives on health behaviour and pain management ....21
   Operant learning theory ..................................................................21
   Cognitive-behavioural theory .........................................................22
   Social cognitive theory ....................................................................22
Assessment and functional behavioural analysis ....................................24
Pain management interventions...............................................................25
   Tailored interventions.....................................................................26
Pain management in the primary health care setting..............................27
   The putative contribution from physical therapists........................27
   The clinical significance of outcomes..........................................28
Aims..........................................................................................................31
Methods ....................................................................................................33
   Designs.............................................................................................33
Setting, participants, and procedures......................................................33
Study I. Behavioural goal assessment in patients with persistent musculoskeletal pain ................................................................. 33
Study II. Individually tailored treatment targeting motor behaviour, cognitions, and disability: a series of experimental single-case studies ............................................................................. 36
Study III. Individually tailored treatment targeting activity, motor behaviour, and cognitions reduces pain-related disability: a randomized controlled trial .......................................................... 36
Study IV. Idiographic outcome analyses of the clinical significance of two interventions for patients with musculoskeletal pain .......... 37
The individually tailored behavioural medicine treatment protocol ........................................................................................................ 38
Origin and development .................................................................. 38
Content .......................................................................................... 38
Training of physical therapists ......................................................... 43
The physical exercise intervention ...................................................... 45
Measures .......................................................................................... 46
Patients’ priorities of behavioural treatment goals .......................... 47
Self-rated disability related to the individual’s prioritised behavioural goals ......................................................................................... 48
Pain-related disability ........................................................................ 49
Life satisfaction ................................................................................ 49
Pain .................................................................................................. 49
Self-efficacy in performing common everyday life activities ........... 50
Fear of movement/(re)injury ............................................................... 50
Physical performance ......................................................................... 50
Participant global ratings of improvements and treatment satisfaction ............................................................................................. 51
Data analysis .................................................................................... 52
Results ............................................................................................... 54
Behavioural goal assessment ............................................................. 54
Study I ............................................................................................. 54
Study IV ......................................................................................... 55
Individually tailored behavioural medicine treatment ..................... 56
Study II: description and evaluation of effects using the experimental single-case format ................................................................. 56
Study III: effects of the individually tailored treatment protocol when compared to a physical exercise intervention .................. 56
Clinical significance .......................................................................... 62
Study III: the benefit of treatment outcomes .................................... 62
Study IV: idiographic outcome analysis of the clinical significance of treatment outcomes ................................................................. 62
Study IV: concurrent validity of the classification of outcomes ....... 64
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion</td>
<td>65</td>
</tr>
<tr>
<td>Behavioural goal assessment</td>
<td>65</td>
</tr>
<tr>
<td>Participants’ priorities</td>
<td>65</td>
</tr>
<tr>
<td>Goal setting – a treatment component by its own merits</td>
<td>66</td>
</tr>
<tr>
<td>Elaboration of methods</td>
<td>67</td>
</tr>
<tr>
<td>Tailored treatment protocols</td>
<td>67</td>
</tr>
<tr>
<td>Principal outcomes</td>
<td>67</td>
</tr>
<tr>
<td>Clinical significance</td>
<td>70</td>
</tr>
<tr>
<td>Elaboration of outcome analyses</td>
<td>70</td>
</tr>
<tr>
<td>The meanings of measurement</td>
<td>72</td>
</tr>
<tr>
<td>Methodological considerations</td>
<td>73</td>
</tr>
<tr>
<td>Measures</td>
<td>73</td>
</tr>
<tr>
<td>Internal validity</td>
<td>74</td>
</tr>
<tr>
<td>External validity</td>
<td>75</td>
</tr>
<tr>
<td>General Conclusions and Future Directions</td>
<td>77</td>
</tr>
<tr>
<td>Implications</td>
<td>77</td>
</tr>
<tr>
<td>Suggestions for future studies</td>
<td>79</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>80</td>
</tr>
<tr>
<td>References</td>
<td>83</td>
</tr>
</tbody>
</table>
Abbreviations

MSP  Musculoskeletal pain
PHC  Primary health care
MPI  The Multidimensional Pain Inventory
SCT  Social cognitive theory
CBT  Cognitive-behaviour therapy
BT   Behaviour therapy
RCI  Reliable change index
PGPQ The Patient Goal Priority Questionnaire
PDI  The Pain Disability Index
Prio1, 2, 3 Highest ranked behavioural goal, second ranked
      behavioural goal, and third ranked behavioural goal
NRS  Numerical rating scale
QOLS The Quality of Life Scale
SES  The Self-Efficacy Scale
TSK  The Tampa Scale of Kinesiophobia
ROM  Range of movement
ITT  Intention-to-treat analysis
ANOVA Analysis of variance
MANOVA Multivariate analysis of variance
Introduction

About the thesis

The current state of knowledge suggests that pain must be viewed as a complex phenomenon that incorporates physical, psychosocial, and behavioural factors. Consequently, an explanatory bio-psycho-social model of pain is necessary for the understanding of the experiences and consequences of pain, and for development and implementation of pain management interventions (Turk & Flor, 1999). This thesis makes the bio-psycho-social model of pain as a starting-point dealing with clinical pain intervention research from a behavioural medicine perspective. The interdisciplinary field of behavioural medicine focuses on the development and integration of socio-cultural, psychosocial, behavioural, and biomedical knowledge relevant to health and illness. A particular hallmark of the integrated perspective is to apply this knowledge to health promotion, disease prevention, and rehabilitation (International Society of Behavioural Medicine, 2005).

The general aim of this thesis was to develop and evaluate an individually tailored treatment programme focusing on people who experience persistent musculoskeletal pain (MSP), i.e. pain with duration of more than four weeks. The new programme is intended for pain management in primary health care (PHC) settings demonstrating a contribution from physical therapists in the field of behavioural medicine.

Initially, the research area is comprehensively outlined. The significance of psychological and psychosocial factors in the development and adaptation to persistent MSP are particularly emphasised. A theoretical basis for behaviour change and an overview of the current empirical research supporting an integration of behavioural and physical pain management interventions are also provided. The perspective of the individual is emphasised throughout the four studies included in the thesis, which cover behavioural goal assessment, description, and evaluation of the individually tailored behavioural medicine treatment protocol, and idiographic outcome analyses of the clinical significance of effects.
Musculoskeletal pain – a public health challenge

Musculoskeletal pain affects a large part of the population, and is one of the most common reasons for medical consultations in industrialised countries (Linton, 1999). On the average, 22% (range 5.5%–33%) of the visits across PHC centres worldwide concern chronic MSP (Gureje, von Korff, Simon, & Gater, 1998). Referring to a European study, the prevalence figures for any musculoskeletal pain complaints during the past year was 74%. Forty-four percent reported that pain was chronic, i.e. had persisted for three months or more. Recurrent pain was more common than continuous pain, and few affected had experienced pain on only one single occasion (Picavet & Schouten, 2003). A recent Swedish study found the overall point prevalence of pain being 49%. Recurrent pain during the previous three months was reported by 61% of the participants, and the prevalence of chronic pain was 54% (Gerdle, Björk, Henriksson, & Bengtsson, 2004). There are considerable differences in prevalence estimates between studies and methodological heterogeneity render difficulties in data comparisons. For example, the prevalence of chronic widespread pain in Western countries has been reported to range from 2% to 45% (Elliott, Smith, Penny, Smith, & Clambers, 1999; McBeth & Macfarlane, 2002; Veerhaak, Kerssens, Dekker, Sorbi, & Bensing, 1998). There is a higher prevalence of chronic pain among women (Bingefors & Isacsson, 2004; Croft, Rigby, Boswell, Schollum, & Silman, 1993; Gerdle et al., 2004; Gureje et al., 1998; Picavet & Schouten, 2003). Whether the prevalence of chronic pain is increased by age is unclear, whereas the extent of pain interference in everyday life is supposed to be greatest among the oldest (Bingefors & Isacsson, 2004; Gerdle et al., 2004; Thomas, Peat, Harris, Wilkie, & Croft, 2004).

The most common specific sites of MSP are located to the spine or to the shoulders (McBeth & Macfarlane, 2002). For Sweden, the 1-year prevalence of spinal pain in an age group between 35 and 45 years was 66% (Linton, Hellsing, & Halldén, 1998). In Uppsala county of Sweden, the point prevalence has been estimated to 23% for spinal pain and 21% for shoulder pain (Bingefors & Isacsson, 2004), which is well in concordance with point prevalences reported from the Netherlands (Picavet & Schouten, 2003). However, about two thirds of patients with MSP report pain in more than one site (Gureje et. al., 1998; Thomas et al., 2004), and pain interference with everyday life increases with the number of pain sites (Thomas et al., 2004; Urwin et al., 1998).

It has been suggested that the prevalence of pain symptoms is increasing, but hitherto this is not confirmed in epidemiological studies (McBeth & Macfarlane, 2002). On the other hand, studies concerning economic aspects of MSP points to immense and increasing costs (Goossens, 2002). In the Netherlands, 7% of the costs for spinal pain were spent on medical care, whereas 93% were related to indirect costs such as compensation and
production loss (van Tulder, Koes, & Bouted, 1995). Thus, direct costs for medical care and pain rehabilitation only took a minor part of the costs. Besides, the direct costs were mainly spent on specialised diagnostic procedures, and only a small amount financed PHC-interventions (van Tulder et al., 1995). Consequently, few economical measures are taken to stimulate secondary prevention and self-management of pain with the purpose of preventing indirect costs to escalate further (Goossens, 2002).

Overall, the current body of knowledge from epidemiological studies indicates that non-malignant MSP should be regarded as an urgent public health concern, which challenges the development of early and effective interventions in PHC.

The definition of pain

The accepted definition of pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" stems from the International Association for the Study of Pain (IASP; Merskey & Bogduk, 1994). It certainly avoids tying pain to a patho-physiological stimulus underscoring that pain is experienced at both a sensory level and an affective level. However, the definition expresses the biomedical view in its association to actual, potential or referred tissue damage, and does not explicitly refer to the complex and dynamic interactions of physiological, psychological, and social factors that provoke or maintain pain and pain-related disability.

The pain experience

The current view is that no causal relationship exists among patho-physiology or tissue damage, nociception, and pain report (Turk & Flor, 1999). Pain usually affects the physical functioning of a person but also debilitates emotional, social, and occupational functioning. It is essential for our understanding of the pain experience to consider the mechanisms of: 1) pain procession or nociception, 2) pain perception, i.e. the factors that interact with processes of the central nervous-system to shape the individual’s perception of the pain stimuli, 3) pain behaviours, i.e. overt learned expressions that communicate pain and distress to the social environment, and 4) individual suffering, which refers to the perception of serious threat or damage to the self caused by the pain and its consequences (Chapman & Gavrin, 1999; Loeser & Melzack, 1999). The multidimensionality of the pain experience stresses a conceptualisation where physical, behavioural, and psychosocial factors and the bi-directional relationships between these factors are incorporated (Turk & Flor, 1999).
a consequence of these complex and dynamic interactions, the experience of pain is unique to each individual.

Classifications of pain
Biomedical systems
The biomedical perspective is reflected in some of the most common classification systems for pain. Some are organised according to the assumed origin of pain, i.e. nociceptive pain, neurogenic pain, psychogenic pain, and idiopathic pain (Merskey & Bogduk, 1994), or to duration of pain; acute, subacute, and chronic pain (Nachemson & Jonsson, 2000) or a combination of origin and duration (Turk & Melzack, 1992). Classification systems based on pain diagnosis are also available (Turk & Melzack, 1992) as are more specific systems intended for use within physical therapy that are based on physical impairments and spinal dysfunction in spinal pain patients (e.g. Binkley, Finch, Hall, & Gowland, 1993; DeRosa & Porterfield, 1992; Delitto, Erhard, & Bowling, 1992; McKenzie, 1981). The use of classification systems possibly improves pain assessment, treatment, design of research protocols, and the generalisation of research findings through their ordering of patients into homogenous subgroups. However, an important deficiency with these mainly biomedical classification systems is that they ignore the multidimensionality of the pain experience by focusing on diagnoses, the physiological origin of pain, the physical impairments due to pain, or the duration of pain. Individuals, homogenous in these respects, may not respond to the pain in a similar way and certainly not interact with similar contextual factors making their experiences and reported consequences completely different.

Multi-axial systems
Since psychological factors, e.g. cognitions, emotions, behaviours, and psycho-social factors are related to both the onset and development of spinal pain and disability (Linton, 2000) these ought to be reflected in a comprehensive classification system of pain. Turk & Rudy (1988) developed an empirically derived multivariate classification system, the Multiaxial Assessment of Pain, including physical, psychosocial, and behavioural factors that are integrated to identify subgroups based on these variables. The West Haven-Yale Multidimensional Pain Inventory (MPI; Kerns, Turk, & Rudy, 1985) measures these variables, and based on MPI-scores three different subgroups have been identified and replicated in different samples in tertiary care (Bergström, Bodin, Jensen, Linton, & Nygren, 2001a; Bergström, Jensen, Bodin, Linton, & Nygren, 2001b; Gatchel et al., 2002;
Talo, Forssell, Heikkonen, & Puukka, 2001; Turk & Rudy, 1990; Turk & Rudy, 1988), and in PHC (Johansson & Lindberg, 2000). The subgroups are labelled dysfunctional, adaptive copers, and interpersonally distressed, and differ in levels of pain severity, life interference due to pain, psychological distress and perceived life control, and activity levels. The interpersonally distressed also differ from the other two groups with respect to lower levels of perceived support from family and significant others.

The advantage of a multi-axial classification system is that patients’ subjective evaluations of the impact of pain on their lives are included. It highlights similarities among patients irrespective of diagnosis as well as differences in adjustment to pain by reflecting differences in physical, psychosocial, and behavioural dimensions across the subgroups (Rudy, Turk, Zaki, & Curtin, 1989). Differential treatment responses across the subgroups have been reported (Rudy, Turk, Kubinski, & Zaki, 1995; Talo et al., 2001; Turk, Okifuju, Sinclair, & Startz, 1998) and although conflicted by the findings from Bergström et al. (2001a;b) and Gatchel et al. (2002), they indicate that “the assumption of pain-patient homogeneity in terms of response to treatment” must be avoided (Gatchel, 2001, p. 192).

The research concerning multi-axial classification indicates the relevance of assessing factors along the physical, behavioural, and psychosocial axes, and of developing tailored pain management interventions based on individual profiles. Such interventions are requested (Linton, 2000) but hitherto sparse in the literature.

Prevention of pain

Generally, knowledge about factors that buffer against pain is sparse. Acute pain is primarily protective for injury, which makes it hazardous to direct efforts towards primary prevention. Besides, primary prevention interventions are not yet convincing regarding their capacities to prevent pain (Main, 2002). It therefore seems more urgent to focus on prevention of pain interference in everyday life, or pain-related disability. Such secondary prevention strategies that are intended for those who have already experienced pain, preferably stages early in the developmental course of pain to prevent long-term disability, individual suffering, work absenteeism, and immense societal costs (Linton, Hellsing, & Andersson, 1993; Linton & Ryberg, 2001; Turk & Okifuji, 1999).

Pain interference with everyday life

Limitations in performance of everyday life activities that are usually seen in chronic pain patients are not, although appealing, merely a function of pain
severity. There is generally low correlation between pain severity and disability (Crombez, Vlaeyen, Heuts, & Lysens, 1999; Denison, Åsenlöf, & Lindberg, 2004), at least for pain intensity levels estimated to less than 5 on 11-grade scales (Turner et al., 2004). Other potentially important variables that are consistent with the bio-psycho-social perspective of pain must therefore be considered to understand the mechanisms by which acute pain become persistent and disabling.

Psychosocial risk factors

Psychosocial risk factors are evidently stronger predictors of persistent and disabling pain than biomedical and biomechanical factors (Linton, 1999; Sullivan, Thorn, Rodgers, & Ward, 2004). Significant psychological risk factors include stress, distress or anxiety, mood and depression, pain beliefs, particularly fear-avoidance beliefs, and catastrophizing. Self-perceived poor health and job dissatisfaction are also of concern. Passive coping strategies are associated with poor outcome and high degree of pain behaviours, as well as to dysfunction and recurrence of back pain (Linton, 1999, 2000; Weiser & Cedraschi, 1992). The availability, structure and function of social networks and the influence of socio-cultural factors are linked to pain interference with daily activities (Peat, Thomas, Handy, & Croft, 2004), but their relationships to the pain experience and pain-related disability are still not completely understood.

Fear-avoidance beliefs and the fear-avoidance model

Negative pain beliefs, negative appraisals, and emotions related to pain have got particular attention in the fear-avoidance model that supports the idea that fear of pain and (re)injury may be more disabling than the pain itself (Crombez et al., 1999; Vlaeyen & Linton, 2000). The model explains how negative pain beliefs, fear, and catastrophic misinterpretations in particular, can lead to a vicious circle of exacerbated fear, avoidance of movements and activities, disuse, distress, and disability (Vlaeyen & Linton, 2000). According to the model, avoidance appears as a function of the anticipation of pain, or the harm and (re)injury the pain might indicate, rather than as a response of pain (Crombez et al., 1999; Vlaeyen & Linton, 2000). These inappropriate beliefs subsequently lead to fewer opportunities of activity confrontation, which in turn, impede corrections of the misinterpretations. Consequently, the vicious circle is very difficult to break off.

Empirical research supports the relationship between fear-avoidance beliefs and disability both in the acute, subacute, and chronic phases of MSP (Crombez et al., 1999; Vlaeyen & Linton, 2000; Ayre & Tyson, 2001; Denison et al., 2004; Grotle, Völlestad, Veierød, & Brox, 2005). Besides, fear-avoidance beliefs may predict pain episodes in pain-free individuals.
(Linton, Buer, Vlaeyen, & Hellsing, 2000), and ability to perform everyday life activities in population-based samples (Buer & Linton, 2002).

According to the fear-avoidance model, individuals who confront daily activities challenge their predictions of movement-related fear, which in turn reduce fear. Catastrophic misinterpretations are thus not further reinforced, and the confrontation strategy subsequently increase activity and thereby recovery (Vlaeyen & Linton, 2002).

Promotive factors

Factors that promote activity draw attention to individual’s strengths and health behaviours that enhance activity despite pain. Less is known about promotive factors than about risk factors, but physical activity and physical exercises are generally considered to promote physical functioning, activity and self-management of pain. This is probably due to the well-documented benefits following physical activity and exercises in individuals with chronic pain (Liddle, Baxter, & Gracey, 2004; Linton, 1999; SBU, 2000b). Whether physical activity is preventive, or buffering for chronic disabling pain is less clear, but deserves attention and well-designed controlled studies (Faas, 1996; Lahad, Malter, Berg, & Deyo, 1994; Linton, 1999). Another potential promotive factor is self-efficacy that refers to a person’s confidence in his/her ability to engage in a particular behaviour or activity (Bandura, 1997). The self-efficacy construct will be more elucidated further on in the introduction section.

Adaptation to chronic pain

Not all individuals with persistent pain experience disability. Others suffer from pain-related disability but do not perceive their health as poor. In other words, some seem to adjust fairly well whereas others suffer from great disability, anxiety, depression and poor quality of life (Jensen, Turner, Romano, & Karoly, 1991). The reasons to why some individuals adjust well to the chronic condition, whereas others do not, may be explained by concepts of stress and coping, control beliefs, and acceptance of the chronic condition (Jensen et al., 1991; Jensen & Karoly, 1991; Lazarus, 1993; McCracken, Carson, Eccleston, & Keefe, 2004; McCracken & Eccleston, 2003).

Coping

Simply stated, coping represents purposeful ongoing cognitive and behavioural efforts to manage the negative impact of stress (Lazarus, 1993). From a process perspective, coping efforts change over time and vary
according to specific stressors and the situational context in which they occur. This perspective implicates that there may be neither generally positive, adaptive, nor generally negative, maladaptive coping with pain. The efficacy of coping must rather be understood in relation to the particular individual (especially the individual’s appraisals of the specific stressor and available coping resources), the time-frame, the context, and the coping outcome in focus (Lazarus, 1993). In the study of coping with pain it is urgent to identify coping behaviours that promote positive adjustment to pain an vice versa. The synthesising of research is challenging due to the many indiscriminate conceptualizations and operationalizations, as well as the idiographic nature of the construct. It is thus important to define the specific nature of the stressors (Sommerfield, 1997), which might not be related to the stress of experiencing pain in general (Heijmans et al., 2004). A wide repertoire of coping strategies may then be required to manage pain, from which individuals need to select situation-specific strategies.

The issue of control

Jensen et al. (1991) suggest that there is a relationship between the two general attributional styles of internal and external locus of control and adaptation to persistent pain. Internal locus of control refers to the belief that reinforcement is contingent upon one’s behaviour, whereas external locus of control refers to the belief that consequences of behaviour are contingent upon factors external, and thereby out of control, to the individual, e.g. fate, luck, powerful others, caregivers, uncontrollable life circumstances (Buckelew et al., 1990). Studies have confirmed the relationship between internal locus of control, use of active coping strategies and positive adaptation to pain (Jensen & Karoly, 1991).

It is of particular interest to understand the relationship between pain-specific control appraisals and adjustment to persistent pain since most interventions aim to reduce or control pain. Studies confirm that perceived control over pain is associated with psychological and physical functioning albeit controlling for pain severity (Jensen et al., 1991; Jensen & Karoly, 1991). However, pain control efforts can be maladaptive if not successful enough, and in cases where pain control efforts impede activity, and/or quality of life (McCracken et al., 2004). Perceived control over the effects of pain on activity and role-functioning (i.e. control over the situation) would therefore be more adaptive than control over the pain itself (Tan, Jensen, Robinson-Whelen, Thornby, & Monga, 2002).

Acceptance

A third approach to the positive adjustment to persistent pain is acceptance or “the active willingness to engage in meaningful activities in life regardless
of pain-related sensations, thoughts, and other related feelings that might otherwise hinder that engagement” (McCracken et al., 2004, p.7). Acceptance is not about a cognitive restructuring of pain as a positive or manageable experience, likewise it is not a struggling for pain control but rather a reconciliation with the pain experience (McCracken et al., 2004). Acceptance is associated with low levels of pain, less attention to pain, engagement in daily activities, depression and pain-related anxiety, higher daily uptime, and better work status among patients with chronic pain (McCracken & Eccleston, 2003; Viane, Crombez, Eccleston, Devulder, & De Corte, 2004).

Goal mechanisms and goal setting

Goal assessment and goal setting strategies are central since if applied systematically, they constitute effective intervention components in themselves (Gallagher, 1999; Siegert & Taylor, 2004). According to Goal Setting Theory (Locke & Latham, 1990), goal setting affects performance by directing attention and efforts toward goal-relevant activities, and concurrently, directing attention away from goal-irrelevant activities. Goal setting enhances persistence and concentration on goal-directed tasks. Individuals use automated skills or skills they have previously acquired in a related context to achieve the goals. They also engage in problem-solving to find new strategies that will lead to goal achievement (Locke & Latham, 2002). This in turn, is positively associated with enhanced self-efficacy and satisfaction with performance (Stock & Cervone, 1990). High goals lead to higher efforts than low goals. A positive cycle of enhanced self-efficacy, more challenging goals, high performance, even higher self-efficacy then possibly arise as a result of systematic goal setting (Strecher et al., 1995).

A prerequisite for goals to instil motivation for goal directed task-performance is that goals are important and not in conflict with other goals (Locke & Latham, 1984). Hence, the relationship between goal and performance is assumed to be the strongest when individuals are committed to the goals (Locke & Latham, 2002; Locke & Latham, 1990). However, extensive empirical research stemming from industrial-organisational settings, has not shown that personal participation in goal setting have more beneficial effects on performance than assigned goals when goal difficulty level is controlled for (Latham, Winters, & Locke, 1994; Locke & Latham, 2002). Extrapolating the theoretical predictions of goal commitment and task performance to the field of physical performance and rehabilitation one would still assume that goals need to be important and meaningful to the individual, involving behaviours that are intrinsically motivated (Randall & McEwen, 2000; Siegert & Taylor, 2004). Smith, Hauenstein, & Buchanan (1996) found that participants with high goal commitments and several
personal goals had the highest improvement rates related to exercise performance. Further, patient-therapist negotiated exercise goals have been found superior to pre-determined therapist-set goals in operant graded activity training for patients with persistent back pain (Linton, Jannert, & Overmeer, 1999).

Behavioural goals in pain management

There is a prevailing consensus that control over pain, resumed activity in daily life, and maintenance of social relationships are important rehabilitation goals for patients with persistent MSP (Ashburn & Staats, 1999). However, there has been a tendency to focus on physical outcomes and goals including pain intensity reduction (Turk, Rudy, & Sorkin, 1993) rather than behavioural outcomes. Kaplan (1990) contends that behaviour is the most important outcome following health care interventions in general, and that other outcomes should be approached only if these are related to behaviour. Biological and environmental factors are important only by their mediation of behaviour. Thus, if factors are not considered mediators of behaviours, they should not be targeted due to their limited ecological validity (George, Batterham, & Sullivan, 2000). A strong incentive for focusing on behavioural goals in pain management interventions is that such are directly controlled by the individual and more strongly related to efforts, endurance, and concentration of goal attainment than patho-physiological and physical impairment goals (Strecher et al., 1995).

Goal setting

The SMART acronym is accepted as a guideline for goal setting meaning that goals should be Specific, Measurable, Activity-Related, and Time-specified (Siegert & Taylor, 2004). There are some examples of systematic goal setting strategies in the rehabilitation literature adhering to most of these criteria (e.g. Arnetz, Almin, Bergström, Franzén, & Nilsson, 2004; Cott & Finch, 1990; Gage, 1994; Kiresuk & Sherman, 1968; Payton, Nelson, & Ozer, 1990; Pollock, 1993). However, a further move towards activity-related or behavioural goals is warranted (Randall & McEwen, 2000), and the individual patient’s perspective on goal setting has not hitherto been incorporated to a sufficient extent in patient consultations (Baker, Marshak, Rice, & Zimmerman, 2001; Payton & Nelson, 1996; Payton, Nelson, & St. Clair Hobbs, 1998).
Theoretical perspectives on health behaviour and pain management

Behavioural goals in the management of pain require a theoretical understanding of human behaviour and individuals’ incentives for health behaviour change. In a comprehensive review, Jensen, Nielsen, & Kerns (2003) point to the relevance of using concepts stemming from behaviourism (Fordyce, 1976), cognitive-behavioural theories and expectancy-value theories (Bandura, 1986; Mahoney, 1974; Meichenbaum, 1977), and more clinically derived models, e.g. The Transtheoretical Model (Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Norcross, 1992), and Motivational Interviewing (Miller & Rollnick, 2002), to enhance self-management of pain. An outline of the three most important theoretical perspectives in current behavioural pain management interventions is given below.

Operant learning theory

Fordyce (1976) introduced a new way of thinking about pain and challenged the biomedical model by contending the role of operant factors in chronic pain. Behavioural expressions of pain, rather than the initial cause of pain and the pain per se, were emphasised. The operant learning theory attempted to explain how maladaptive pain behaviours and adaptive, positive behaviours are acquired and maintained in the face of persistent pain. The theory describes how operant learning mechanisms as well as respondent learning mechanisms are involved. Behaviours are influenced by their positive or negative consequences determining the likelihood of future occurrence of behaviours. Behaviours yielding positive consequences more likely occur in the future and vice versa. A positive reinforcement of behaviour means that behaviour occurs more frequently because it is followed by positive consequences (e.g. praise, self-satisfaction, well-being). Negative reinforcement means that an increase in behaviour occurs because it is followed by the omission of anticipated aversive events, e.g. anxiety, pain, complaints (Hawton, Salkovskis, Kirk, & Clark, 1995). By adoption of operant principles in pain treatment one can reduce the frequency of maladaptive behaviours and increase the frequency of positive behaviours by changing the consequences (Keefe & Lefebvre, 1993). The original operant learning theory explained how the environment controls behaviour, without accounting the role of the individual’s regulation of own behaviour. To circumvent this limitation, self-regulatory models of behaviour (e.g. Kanfer & Schefft, 1988) viewing the individual as an active agent, possible to self-monitor, evaluate and reinforce own behaviours has been incorporated in recent behavioural theories (Keefe & Lefebvre, 1993).
Cognitive-behavioural theory

Cognitive-behavioural theories of pain were first introduced by Turk, Meichenbaum, & Genest (1983). Individuals' beliefs about the possibility to control pain, the ability to cope, expectations about coping outcomes, and erroneous, negative beliefs about the pain and pain-related disability were added to the understanding of mechanisms that control behaviours. Treatments originating from cognitive-behavioural theories thus directly target individuals’ appraisals and interpretations of pain, as well as pain-eliciting situations (Sharp, 2001).

Turk & Okifuji (1993) emphasise the importance of differentiation between the cognitive-behavioural perspective and cognitive-behavioural treatment. The perspective is based on the following five assumptions:

1. Individuals process information actively and are not passive reactors to environmental contingencies
2. Thoughts (e.g. appraisals, expectancies, beliefs) can elicit and influence mood, affect physiological processes, and have social consequences, and can influence behaviours. Conversely, behaviour, mood and physiological processes can influence cognitive processes
3. Behaviour is reciprocally determined by both the individual and environmental factors
4. Individuals can learn more adaptive ways of thinking, feeling, and acting
5. Individuals should be active, collaborative agents in changing their maladaptive thoughts, feeling and behaviours

These assumptions can be applied in any treatment of persistent pain, irrespective of professional provider (Turk & Okifuji, 1993), whereas cognitive-behavioural treatment should be regarded as a psychological treatment with its own merits.

Social cognitive theory

Social cognitive theory (SCT; Bandura, 1977; Bandura, 1986) comprehensively incorporates behavioural, self-regulatory, cognitive-behavioural, and self-control principles to describe how the environment, the person, and the person’s behaviour continually interact in the process of behaviour change. Behaviour change is not seen in isolation but rather as a consequence of the interplay between these factors. According to SCT, behaviour is determined by reinforcers, likewise in operant learning theory, but in SCT it is the belief about the consequences that impact behaviour, not the actual positive or negative consequences in themselves (Jensen et al.,
Understanding individuals’ expectancies and values is therefore particularly relevant. Further, to enhance self-management of pain, beliefs that one’s behaviour will result in a favourable outcome (outcome expectancies) and beliefs that one is able to perform specific behaviours leading to this outcome (self-efficacy expectancies) would be crucial (Jensen et al., 2003). The importance of self-control, or that health behaviour is under the control of the individual is also emphasised (Baranowski, Perry, & parcel, 2002). The self-efficacy construct will here be further illuminated since it captures the essence of the SCT, often criticised to be too comprehensive (Baranowski et al., 2002). Self-efficacy is also included as a vital part in all the aforementioned theories of behaviour change.

**Self-efficacy**

Self-efficacy is a cognitive, personal belief about one’s ability to perform a particular activity or behaviour in a given situation. It is a belief of what one can do with one’s personal skills, but it is not a measure of the actual skills or the actual performance. Self-efficacy is proposed to be a mediator of behaviour (Bandura, 1997; Marks, 2001), and a person can perform differently under different tasks and situations depending on variations in self-efficacy beliefs (Bandura, 1997). Efficacy expectations vary along dimensions of magnitude (the ordering of tasks by difficulty level), strength (the judgement of how confident one is of one’s ability to perform a specific task), and generality (the extent to which efficacy expectations about a specific situation generalise to other behaviours and situations; Bandura, 1997; Strecher, McEvoy De Vellis, Becker, & Rosenstock, 1986). According to SCT there are three distinct processes of personal change: the adoption of new behaviours, generalisation of behaviours to different situations, and maintenance over time (Bandura, 1986). Self-efficacy beliefs are important in each of these processes through its suggested implications on a) outcome expectations, b) expectancies (values of the outcomes), c) the strength of self-efficacy expectations for a given behaviour, d) the confidence in one’s ability to mobilise motivation for a goal directed behaviour, e) how much effort that will be expended on a task, and, f) for how long time one will make efforts in the face of obstacles (Bandura, 1997; Baranowski et al., 2002; Marks, 2001).

Self-efficacy is viewed as a state that is possible to influence, and not as a personal characteristic or a trait that is independent of contextual factors (Strecher et al., 1986). The way expectations are generated, i.e. the sources of self-efficacy are 1) previous experience of successful performance in similar situations, 2) observation of others performing similar behaviours in similar contexts, 3) personal, verbal persuasion, and 4) physiological and affective response to performance of behaviour (Bandura, 1997).

Empirical research has shown that self-efficacy is a mediator of pain-related disability (Arnstein, 2000; Arnstein, Caudill, Mandle, Noris, &
Beasley, 1999). Further, self-efficacy has predictive value for physical performance (Council, Ahern, Follick, & Kline, 1988; Lackner & Carosellas, 1999), disability (Asghari & Nicholas, 2001; Ayre & Tyson, 2001; Barry, Zhenchao, Kerns, Duong, & Carrington Reid, 2003; Denison et al., 2004), pain tolerance (Litt, 1988), pain severity (Anderson, Dowds, Pelletz, Edwards, & Peeters-Asourian, 1995), use of pain coping strategies (Jensen, Turner, & Romano, 1991; Soderlund & Lindberg, 2001), and return to work (Robbins, Moody, Hahn, & Weaver, 1996) in patients with MSP. These findings point to that low self-efficacy expectations partly explain why persons with MSP become disabled, and vice versa, strong self-efficacy beliefs may also explain why some people confront daily activities in the face of obstacles such as pain (Denison et al., 2004). Self-efficacy may be an important factor to self-management of pain, and thus a “promotive factor” possible to address by systematic interventions. An integration of the self-efficacy construct in the development of pain management interventions is therefore worthwhile.

Assessment and functional behavioural analysis

Clinical assessment strategies need to be comprehensive, and reflect the extent of physical impairments and nociception, the magnitude of disability and suffering, and contextual interactions (Turk & Okifuji, 1999). Leaning on cognitive-behavioural principles, the primary aims of assessment are to identify target problems and treatment goals in concordance with the patient, and to collect and analyse sufficient information about patient’s assets and needs to design a tailored treatment plan. A central principle is that behaviour is determined by immediate situations and individuals’ interpretations of these situations (Kirk, 1995). The time-frame is therefore prospective with use of behavioural interviewing, observations, and time-series measurement strategies as opposed to retrospective pain history and single-point measures (Haynes, 2000). Active patient participation is crucial, and the patient’s possibility of change to achieve desirable goals is emphasised rather than dwelling on problems (Kirk, 1995).

Assessment data need to be synthesised to understand how problems are maintained, how they interfere with daily life, and whether they serve any particular purpose for the individual. The analysis is supposed to integrate nomothetic empirical research findings with idiographic hypotheses about problems, causes, correlates, consequences and goals (Haynes, Leisen, & Blaine, 1997). The hypotheses are introduced and discussed with the patient, subsequently guiding the treatment plan. Several terms have been used to describe this synthesis of data but the term “functional behavioural analysis” captures its essence per definition as “identification of important, controllable, causal functional relationships applicable to a specified set of
target behaviours for an individual client” (Haynes & H., 1990, p.650). Two approaches are commonly described in the literature: (1) the A-B-C format (Antecedents, Behaviours and Beliefs, and Consequences) that originates from operant learning principles (Sturmey, 1996), and (2) the S-I-R-C format, described as a clinical analysis of the context or situation in which the problem arise (S), intra-personal factors and capabilities which modulate the problem (I), behavioural responses (R), and short- and long-term consequences of the problem (C) (Kirk, 1995). The functional behavioural analysis is developed, evaluated, and modified during the course of treatment, thus fulfilling multiple assessment purposes of (a) description of problems and goals, (b) prediction of outcome, (c) and verification of hypotheses (Cone, 1997).

In recent years, there has been a declining trend in research covering behavioural assessment. However, much work remains to develop and refine pain assessment techniques in order to accurately tailor and study effects of pain management interventions (Asmundson, 2002; Haynes et al., 1997; Taylor, 1999).

Pain management interventions

Patients with MSP usually are allotted a passive role in traditional medical settings. They often rely on medical or surgical procedures provided by medical experts to eliminate a suggested underlying pathology of the pain (Turk & Okifuji, 1998). Available treatments address multiple components of the pain experience and may include pharmacological treatment, nerve blocks, surgery, physical modalities, educational approaches, exercise therapies, behavioural or cognitive-behavioural therapies, and vocational training (Ashburn & Staats, 1999).

Pharmacological treatment has limited effects on pain and mobility in chronic back pain (SBU, 2000b). Surgical interventions are effective for herniated lumbar discs with high levels of nerve root pain, but not for corresponding neck problems. There is no evidence for spinal fusion surgery in chronic spinal pain (SBU, 2000b). Further, there is strong evidence that physical modalities not are efficient for durable control of pain (Feine & Lund, 1997; Hanada, 2003; McQuay, Moore, Eccleston, Morley, & Williams, 1999). Educational interventions do not show convincing results (SBU, 2000b; Turner, 1996).

On the other hand, physical activity and exercise therapies promote activity and return to work in patients with chronic spinal pain (Liddle et al., 2004; SBU, 2000b; van Tulder, Malmivaara, Esmail, & Koes, 2003a). Systematic reviews and meta-analyses of randomized controlled trials dealing with chronic pain, provide evidence of the effectiveness of cognitive-behaviour therapy (CBT) and behaviour therapy (BT) in changing
pain perception, functional disability, cognitive coping and appraisal, as well as reductions of pain behaviours (Compas, Haaga, Keefe, Leitenberg, & Williams, 1999; Morley, Eccleston, & Williams, 1999; Turner, 1996; van Tulder et al., 2003b). When different experimental conditions are compared, CBT and BT are superior to waiting-list control conditions, but not to other active treatments such as relaxation training and exercise therapies (Turner, 1996; van Tulder et al., 2003b).

Since no single treatment modality seems to be sufficient to manage pain, multidisciplinary pain clinics offering multiple treatment modalities by different specialised professionals have been important for the advances in pain rehabilitation during the past two decades (Ashburn & Staats, 1999; Turk & Okifuji, 1998). A substantial part of the clinical pain intervention research is executed in such pain clinics. The literature suggests that multidisciplinary pain clinics are efficacious, and inpatient programmes have hitherto been superior to outpatient programmes (Becker, Sjögren, Bech, Kornelius Olsen, & Eriksen, 2000; Williams, Nicholas, Richardson, Pither, & Fernandes, 1999; Haldorsen Håland et al., 2002; Turk & Okifuji, 1998; Williams et al., 1996). However, Turk and colleagues raised some significant criticism concerning the representativeness of pain clinic samples to the vast majority of persons with persistent MSP (Turk, 1990; Turk & Rudy, 1990). Multidisciplinary pain clinics are usually a final attempt for those where other modes of treatment have failed. Patients in pain clinics therefore have longer duration of pain, report more constant pain, show higher levels of disability and psychological distress than persons with persistent MSP in the community who are not referred to multidisciplinary pain clinics (Crook, Weir, & Tunks, 1989). Consequently, it may be inappropriate to generalise results from pain clinic samples to non-pain clinic samples and vice versa (Turk & Okifuji, 1998; Turk & Rudy, 1990), which calls to the need of clinical intervention studies in PHC settings. Another concern from Turk and colleagues (Turk, 1990; Turk & Okifuji, 1998) is that multimodal treatment may not be effective just because it is multimodal, or in other words, although many different modalities are available it is not sure that every individual patient benefit from all modalities that usually are applied in the rehabilitation programmes. Such a “blunderbuss approach” ignores individual differences in rehabilitation goals, physical and psychological capabilities, and the social context that should guide the selection of interventions in each case.

Tailored interventions

One solution to the dilemma with unspecific, multimodal treatment strategies is to provide tailored treatments, which have been suggested as an important new field for research in the area of pain interventions (Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Linton, 2000). Treatment
protocols tailored to homogenous subgroups of patients sharing particular psychosocial needs have shown beneficial effects for patients with temporomandibular disorders (Dworkin et al., 2002a;b; Turk, Rudy, Kubinski, Zaki, & Greco, 1996), and rheumatoid arthritis (Evers, Kraaimaat, van Riel, & de Jong, 2002). In the study by Evers et al. (2002) on patients with rheumatoid arthritis and a psychosocial risk profile, treatment was tailored according to patients’ priorities and choices of standardized cognitive-behavioural treatment modules. This tailored approach resulted in significant short- and long-term benefits when compared to patients treated with standard medical care. Interestingly, Broderick, Junghaenel, & Turk (2004) found that individuals change their adaptational style towards pain over time, indicating that an adjustment to changing individual needs during the course of therapy would render more effective interventions than treatment tailored to pre-defined subgroup characteristics. Further, patients could benefit from tailoring of a broad range of factors relevant for adjustment and coping with pain (Keefe et al., 2004). Preferably, these are neither psychosocial, nor entirely physical, but rather a combination of psychological, contextual, and physical factors identified to determine behaviours and everyday life activities in the particular individual. A behavioural medicine focus on tailoring would, in consequence, adopt individually tailored intervention strategies, i.e. strategies “intended to reach one specific person, based on characteristics that are unique to that person, related to the outcome of interest, and have been derived from an individual assessment” (Kreuter & Skinner, 2000, p. 1).

Pain management in the primary health care setting

According to the Swedish public health care system, the PHC has the main societal responsibility for provision of care to those in the population who experience MSP. The general practitioners have the medical responsibility (SBU, 2000a) in co-operation with physical therapists, occupational therapists, and medical social workers who usually provide medical services and treatments. Clinical psychologists are still not represented in any large extent and multidisciplinary teams are sparse. Interventions addressing psychological and psychosocial factors are therefore not routinely available, neither in Swedish nor international PHC settings (Deyo & Phillips, 1996), despite the knowledge of their significance in pain management.

The putative contribution from physical therapists

Physical therapy interventions are usually aimed at restoration of physical functioning including alleviation of physical impairments and functional limitations. Health promotion and disability prevention considering physical,
psychological, and social factors are also within the scope of the physical therapy profession (European Region of the WCPT, 2003). Hence, there is an explicit objective to affect activity and participation in everyday life with physical therapy treatment.

The contribution of physical therapists in pain management interventions commonly include assessments focused on the musculoskeletal system, physical strength, flexibility, endurance and functional ability of locomotion, manipulation, balance, and co-ordination of movements. Treatments usually emphasise physical modalities (e.g. thermal agents, manipulation, stretching, soft tissue mobilization, TENS, acupuncture) and physical exercises. Relearning of adequate motor behaviour, education in coping skills, and management of the physical rehabilitation process may also be included (Ashburn & Staats, 1999; Feine & Lund, 1997).

Although physical therapy interventions aimed at persons with MSP are widespread in PHC, the effectiveness is questioned and can be improved (Beckerman, Bouter, Van Der Heijden, De Bie, & Koes, 1993; Carlsson, Jonsson, Norlander, & Rundcrantz, 1999; Feine & Lund, 1997; Harms-Ringdahl, Holmström, Jonsson, & Lindström, 1999; McQuay et al., 1999; SBU, 2000a).

The positive effects from CBT and BT in the area of psychological treatment, and physical activity and exercise therapies in the physical domain, offer interesting options for integration of principles. Nicholas, Wilson, & Goyen (1991) have shown that a combination of psychological treatment and physical therapy treatment is more effective than physical therapy alone. Further, there is evidence that physical conditioning programmes, including cognitive-behavioural principles, can reduce the number of sick-listed days for patients with subacute, and chronic neck and back pain (Schonstein, Kenny, & Koes, 2003). The development of treatment programmes integrating physical activity restoration and cognitive-behavioural principles could therefore be worthwhile, but are hitherto sparse (e.g. George, Fritz, Bialosky, & Donald, 2003; Harding & Williams, 1998; Johansson & Lindberg, 2001; Lindström et al., 1992; Söderlund & Lindberg, 2001; Von Korff et al., 2005), and the different perspectives must be more integrated to enhance behaviour change, self-management, and maintenance of adaptive strategies. Of special interest is also to proceed with the design of treatment programmes allowed to be tailored to individual patient characteristics (Linton, 2002; Linton, 2000).

The clinical significance of outcomes

The Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT) recently recommended six outcome domains that should be considered in the design of clinical trials. The outcome domains
recommended are: 1) pain, 2) physical functioning, 3) emotional
functioning, 4) participant ratings of improvement and satisfaction with
treatment, 5) symptoms and aversive effects, and 6) participant disposition
(Turk et al., 2003). These outcomes represent complementing dimensions of
the bio-psycho-social model of pain. However, what constitutes a successful
treatment outcome depends on whom is asked (Turk et al., 1993). Further,
the standard conventional methods of statistical evaluation including
inferential methods for comparisons of group means, within- and between
group variability, probability testing, and estimates of effect sizes are
continuously questioned (Wise, 2004). These methods provide valuable, but
not sufficient information, since they do not necessarily reflect the clinical
significance of the findings – that is, whether interventions have positive
impact on individuals’ everyday lives (Kazdin, 2001).

Methods for evaluation of the clinical significance of therapy outcomes
stem from behavioural psychology. Jacobson, Follette and Revenstorf
introduced the most widespread method in 1984. It has been frequently
debated (e.g. Hageman & Arrindell, 1993; Hsu, 1996; Speer, 1992; Tingey,
Lambert, Burlingame, & Hansen, 1996) but after minor modifications
(Jacobson & Truax, 1991), it is still the method favoured and recommended
for effectiveness studies (Bauer, Lambert, & Nielsen, 2004; Wise, 2004).

Jacobson and Truax (1991) suggest two criteria for the operationalization
of clinically significant effects. First, the magnitude of change between
scores on pre- and post-treatment measures must be statistically reliable. For
this purpose, a reliable change index (RCI) is calculated to ensure that the
degree of change exceeds the margin of measurement error. Second, patients
should move from a dysfunctional to a functional level during the course of
therapy. A clinical cut-off point for recovery that is based on normative data
for either a dysfunctional or a functional population would therefore be
determined according to one of three suggested clinical cut-off alternatives
(Jacobson & Truax, 1991). Based on these two criteria, the Jacobson and
Truax method classifies individuals as “Recovered” (passed both clinical
cut-off and RCI criteria), “Improved” (passed the RCI criterion but not the
clinical cut-off), “Unchanged” (passed neither of the criteria), and
“Deterioriated” (passed the RCI criterion but worsened; Bauer et al., 2004;

However, Kazdin (2001) recently questioned current ways of
operationalizing clinical significance, contending that a majority of available
outcome measures hardly reflect the original construct of important
therapeutic changes in everyday life. Measures of symptom remissions are
the most commonly applied, and measures based on patient’s views of what
constitutes a successful outcome has not been used. Instead mathematical
issues and strives for standardized derivations seem to have got the most
attention.
This thesis is based on the need to adopt the perspective of the individual in clinical pain intervention research. The assumptions are that effective interventions require an integration of bio-psycho-social factors that are related to pain interference in everyday life and positive adaptation to pain, evidence-based principles for treatment provision, and an idiographic approach to assessment, treatment, and scientific evaluation.
Aims

The general aim of this thesis was to develop, describe and evaluate an individually tailored behavioural medicine treatment protocol focused on everyday life activity and assumed determinants of pain-related disability. The intervention was intended for the PHC setting including individuals with persistent musculoskeletal pain, i.e. pain with duration of more than four weeks, who seek consultation by physical therapists. A further aim was to develop and incorporate an idiographic outcome measure for behavioural goal assessment in the evaluation of the clinical significance of treatment outcomes.

Specific aims for the separate studies:
1. To explore and describe individuals’ priorities of behavioural goals for physical therapy, using the Patient Goal Priority Questionnaire (PGPQ) in two samples of patients with persistent musculoskeletal pain in PHC (Study I, IV)
2. To study the concurrent validity of the PGPQ in relation to a generic outcome measure of pain-related disability, i.e. the Pain Disability Index (PDI; Study I)
3. To describe and develop an individually tailored behavioural medicine treatment protocol with special emphasis on goal assessment, functional behavioural analysis and the tailoring of treatment strategies to individuals with persistent musculoskeletal pain (Study II)
4. To study and describe the effects of an individually tailored behavioural medicine intervention on self-reported disability, pain control, and pain intensity in experimental single-case studies (Study II)
5. To study the short-term effects of the individually tailored behavioural medicine intervention (at post-treatment, and at 3-month follow-ups), when compared to a physical exercise intervention, using pain-related disability as the main outcome measure. It was hypothesized that both interventions would reduce disability, but the individually tailored behavioural medicine intervention was assumed more effective in comparison to physical exercises. Effects on pain, life satisfaction, fear-avoidance, self-efficacy in performance of common everyday life activities, and physical performance were also investigated (Study III)
6. To compare the clinical significance of the outcomes of the individually tailored behavioural medicine intervention and the physical exercise intervention at three months post-treatment (Study III, IV)

7. To study the concurrent validity of the idiographic outcome variables; behavioural performance; satisfaction with behavioural performance; fulfilled pre-treatment expectations, applying the Jacobson and Truax classification of clinical significance of treatment outcomes at three months post-treatment (Study IV)
Methods

Designs

The project was initiated in year 2000 and was completed in 2004, except for follow-ups that will continue until 2006. It comprises two separate samples and four individual participants with persistent MSP. All participants consulted physical therapists in a Swedish PHC setting. The local ethics committee at the Faculty of Medicine, Uppsala University approved the project. An overview of the designs of the included studies is presented in Figure 1. The designs are further detailed in the corresponding papers.

Setting, participants, and procedures

A university town with 190,000 inhabitants and three urban communities with 50,000 inhabitants in the county council of Uppsala, Sweden, provided the setting for the studies. To be eligible for the project, participants had to be aged between 18 and 65, have experienced persistent MSP, i.e. recurrent or continuous pain for more than four weeks. They also had to be literate in Swedish. Subjects with recent traumas (e.g. whiplash associated disorders), rheumatic, neurological, or malignant diseases were not considered. Demographic and background characteristics of the included samples are described in Table 1.

Study I. Behavioural goal assessment in patients with persistent musculoskeletal pain

Study I provided data about individual patients’ priorities of behavioural goals for physical therapy, as elicited by the new instrument – The Patient Goal Priority Questionnaire (PGPQ). The concurrent validity of the PGPQ in relation to a generic measure of pain-related disability, The Pain Disability Index (PDI) was also examined. Physical therapists at 10 clinics in the PHC-organisation in Uppsala county council recruited patients consecutively during 10 months (March–December 2000). The final sample consisted of 197 participants.
**Study I (2000)**
*Focus:* description and elaboration of methods  
*Design:* descriptive and correlational  
*Setting:* 10 physical therapy clinics in primary health care  
*Subjects:* 197 patients with persistent musculoskeletal pain (> 4 weeks)  
*Point of measurement:* pre-treatment

**Study II (2001–2003)**
*Focus:* description, elaboration of methods, evaluation of individual effects  
*Design:* 4 experimental single-case studies with multiple baselines  
*Setting:* 1 physical therapy clinic in primary health care  
*Subject 1:* 49-year-old woman  
*Subject 2:* 49-year-old woman  
*Subject 3:* 22-year-old woman  
*Subject 4:* 46-year-old woman  
*Points of measurement:* pre-treatment, during interventions, and at 1-, 4-, 6-, 12-month follow-ups

**Study III (2003–2004)**
*Focus:* evaluation of group effects  
*Design:* randomized controlled group study  
*Setting:* 3 physical therapy clinics in primary health care  
*Subjects:* 97 patients with persistent musculoskeletal pain (> 4 weeks)  
*Points of measurement:* pre-, post-treatment, 3-month follow-up

**Study IV (2003–2004)**
*Focus:* idiographic analyses of clinical significance  
*Design:* randomized controlled group study  
*Setting:* 3 physical therapy clinics in primary health care  
*Subjects:* 82 patients with persistent musculoskeletal pain (> 4 weeks)  
*Points of measurement:* pre-treatment and 3-month follow-up

---

**Figure 1.** Overview of the studies included in the thesis  
*Note:* Studies III and IV were conducted on the same main sample
## Table 1. Background characteristics of the included samples

<table>
<thead>
<tr>
<th></th>
<th>Sample I (Study 1, n = 197)</th>
<th>Sample II* (Studies III, IV (n = 97/82b)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean age (SD)</strong></td>
<td>44.8 (12.7)</td>
<td>42.6 (11.6)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>female/male</td>
<td>149 (76%)</td>
<td>75 (77%)</td>
</tr>
<tr>
<td>male</td>
<td>48 (24%)</td>
<td>22 (23%)</td>
</tr>
<tr>
<td><strong>Civic status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>married, cohabiting</td>
<td>147 (74%)</td>
<td>73 (75%)</td>
</tr>
<tr>
<td>single</td>
<td>47 (24%)</td>
<td>22 (23%)</td>
</tr>
<tr>
<td>living with parents</td>
<td>3 (2%)</td>
<td>2 (2%)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swedish</td>
<td>178 (90%)</td>
<td>88 (91%)</td>
</tr>
<tr>
<td>Other</td>
<td>18 (9%)</td>
<td>7 (7%)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nine-year compulsory school</td>
<td>72 (35%)</td>
<td>27 (28%)</td>
</tr>
<tr>
<td>upper secondary-school</td>
<td>72 (37%)</td>
<td>35 (36%)</td>
</tr>
<tr>
<td>university</td>
<td>51 (26%)</td>
<td>34 (35%)</td>
</tr>
<tr>
<td><strong>Working status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>working</td>
<td>79 (40%)</td>
<td>74 (76%)</td>
</tr>
<tr>
<td>unemployed</td>
<td>10 (5%)</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>sick-listed</td>
<td>73 (37%)</td>
<td>20 (21%)</td>
</tr>
<tr>
<td>student</td>
<td>15 (8%)</td>
<td>12 (12%)</td>
</tr>
<tr>
<td>compensation</td>
<td>13 (7%)</td>
<td>2 (2%)</td>
</tr>
<tr>
<td><strong>Pain location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>low back</td>
<td>48 (24%)</td>
<td>25 (26%)</td>
</tr>
<tr>
<td>neck</td>
<td>9 (5%)</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>shoulder, arm, hand</td>
<td>25 (13%)</td>
<td>10 (10%)</td>
</tr>
<tr>
<td>hip, knee, foot</td>
<td>2 (1%)</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>Other (e.g. head)</td>
<td>2 (1%)</td>
<td>5 (5%)</td>
</tr>
<tr>
<td>&gt; 2 pain sites</td>
<td>94 (48%)</td>
<td>52 (54%)</td>
</tr>
<tr>
<td><strong>Pain duration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>median year (25th, 75th percentile)</td>
<td>1 (0.33, 4)</td>
<td>2.3 (0.75, 7)</td>
</tr>
<tr>
<td><strong>Recurrence of pain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>136 (69%)</td>
<td>74 (76%)</td>
</tr>
<tr>
<td>no</td>
<td>61 (31%)</td>
<td>20 (24%)</td>
</tr>
<tr>
<td><strong>Pain medication</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>123 (62%)</td>
<td>57 (59%)</td>
</tr>
<tr>
<td>no</td>
<td>74 (33%)</td>
<td>40 (41%)</td>
</tr>
</tbody>
</table>

*Studies III and IV were conducted on the same main sample.

*b Study IV included 82 participants with available data for the 3-month follow-up. These participants were not significantly different from the 97 participants in Study III regarding background characteristics.

Note: when numbers in columns do not add to n or 100%, there is an internal drop-out in background data.
Data for Study I were collected using self-report questionnaires pre-treatment (i.e. after the first visit at the physical therapy clinic). Participants answered the questionnaires at home and returned them by regular mail.

Study II. Individually tailored treatment targeting motor behaviour, cognitions, and disability: a series of experimental single-case studies

This study concerned development and description of the individually tailored behavioural medicine treatment protocol. The protocol was developed in a series of four experimental single-subject studies. The participants were recruited from one physical therapy clinic in PHC. Each participant was studied using a multiple-baseline across situations design (Kazdin, 1982).

Participant 1 was a 49-year-old woman with a three-year history of low back and sciatic pain that gradually had generalised to chronic widespread and disabling pain. She was sick-listed at the entry to the project.

Participant 2 was a 49-year-old woman with recurrent shoulder pain due to a trauma five years ago when she fell and landed on her left arm and shoulder. She worked full-time at the entry to the project, but reported that pain interfered with her occupational tasks as a personal assistant.

Participant 3 was a 22-year-old woman with tension neck- and headache since three months. She was sick-listed at the entry to the project, and reported high stress-levels in connection to her work.

Participant 4 was a 46-year-old woman with neck, shoulder, and thoracic pain since 1 year. She worked for two different companies and ran a household with four small children.

Data were collected with self-report questionnaires pre-treatment, post-treatment, and 1, 4, 6, and 12 months post-treatment. A continuous assessment of subjective disability was performed daily for three weeks at baseline, over the course of the intervention until the 1-month follow-up, and daily for two weeks in connection to the three remaining follow-ups. Participant 1 and 2 were chosen for presentation in paper II due to their complete data sets for all follow-ups.

Study III. Individually tailored treatment targeting activity, motor behaviour, and cognitions reduces pain-related disability: a randomized controlled trial

This randomized controlled trial evaluated the effects of the individually tailored treatment protocol in comparison to a physical exercise intervention, using pain-related disability as the main outcome measure. From February 2003 to February 2004, 122 participants were recruited among persons
seeking care at three physical therapy clinics in PHC. Ninety-seven completed treatments. In addition to the general inclusion and exclusion criteria for the project as a whole, patients who had attended physical therapy treatment during the past six months were not eligible for the study. Participants were also excluded if they had ongoing medical or psychological treatment for depression.

Participants were recruited by three administrative assistants at the physical therapy clinics, who also gave oral information about the study according to a standardized procedure. Patients who agreed participating in the study received written information together with self-report questionnaires for collection of the baseline data. After receiving the filled-out questionnaires, participants were randomly allocated to the two conditions in blocks of ten for each clinic by use of a random digit table. The participants were blind with regard to which condition they belonged to until they met the therapist at the first treatment session. There were no significant differences between the two groups in demographic and background data at baseline, thus indicating a successful randomization.

Questionnaires were collected immediately post-treatment and at the 3-month follow-up by regular mail. Physical performance tests were employed at the first and last scheduled treatment session.

Study IV. Idiographic outcome analyses of the clinical significance of two interventions for patients with musculoskeletal pain

This study evaluated the effectiveness of the individually tailored behavioural medicine treatment and the physical exercise intervention by employing the PGPQ and the Jacobson and Truax methodology for the study of clinical significance (Jacobson & Truax, 1991). The concurrent validity of the included outcome variables was also examined. The study included data from 82 of the patients with persistent MSP participating in the randomized controlled trial (Study III). To be eligible for study IV, participants had to complete questionnaires at baseline (before randomization), and at the 3-month follow-up.
The individually tailored behavioural medicine treatment protocol

Origin and development

The individually tailored behavioural medicine treatment protocol for pain management in PHC is based on an integration of perspectives from medical and behavioural sciences. The rationale of the programme is a theoretical understanding of human behaviour and individual’s incentives for health behaviour change that emanates from cognitive-behavioural principles, and the self-efficacy construct (Bandura, 1986; Bandura, 1997; Turk & Okifuji, 1993; Turk et al., 1983). Empirical support for the incorporation of psychological and psychosocial factors in a model of secondary prevention of pain and pain management (Linton, 2000; Turk & Flor, 1999), and empirical support for the effectiveness of physical activity and BT and CBT in the treatment of persistent MSP (Morley et al., 1999; van Tulder et al., 2003a;b) have further guided the content and structure of the programme.

The main clinical philosophy behind the programme is to guide patients towards resumed activity related to important and frequent instances of everyday life. Personal treatment goals are elicited, and followed by functional behavioural analyses specifying the physical, cognitive, and behavioural skills deemed necessary for goal achievement. Subsequently, treatment strategies targeting empirically supported psychological risk factors, e.g. fear of movement and negative beliefs (Vlaeyen & Linton, 2000) are applied. Potential activity promoting factors, e.g. physical activity and self-efficacy (Arnstein et al., 1999; Denison et al., 2004) are continuously reinforced.

The programme was applied in a small format, i.e. in experimental single case studies (Study II) before it was launched in the experimental group study (Study III). The successful application of the programme in Study II stipulated seven intervention phases described below, as well as a documentation of principles for the tailoring and the didactic strategies to be applied by the physical therapists in the group study.

The following section describes the individually tailored behavioural medicine treatment protocol as carried through in the group study. Subsequently, the training programme and the supervision of participating physical therapists are briefly summarised.

Content

Management of important and frequent everyday life activities and situations while controlling the influence of pain, is the focus of the programme. Strategies aimed at increased physical activity, motor (re)learning, and cognitive restructuring (e.g. self-monitoring, recognition, and modification
of negative thoughts and monologues during activity performance) are combined. Contextual factors and the organization of tasks to stimulate activity and social involvement without exacerbating the pain are also considered.

The intervention comprises seven general phases to be employed in each participant (Table 2). Within each phase, the strategies are individualized in accordance with prioritised goals and functional behavioural analyses (Haynes et al., 1997).

The seven phases of the programme

1. Behavioural goal identification and assessment

Initially, a priority list of each patient’s behavioural goals for the forthcoming treatment is created by use of a clinical version of the PGPQ\(^1\). The patients are asked to list important and specific activities and situations that they (1) are unable or have difficulties performing due to pain and (2) expect to improve by means of the treatment. The goals are then discussed with reference to (a) importance, i.e. the patient’s ranking or priority of the goals, (b) frequency, i.e. how often activities occur in patient’s everyday life, and (c) magnitude of efficacy expectations, i.e. the ordering of the goals by the patient’s perception of level of difficulty (Bandura, 1977). One single behavioural goal is then selected as the first target for analysis and treatment. This goal must be highly ranked by the patient and occur frequently in everyday life. Further, the patient should rank the goal as one of the most easily attained. The clinical version of the PGPQ makes systematic assessments of individuals’ self-efficacy, fear, avoidance, readiness to adopt new behaviours, and frequently used coping strategies possible. Finally, an individualized physical examination is done. The information is subsequently used to tailor the diary for the second phase of the programme.

2. Self-monitoring

A diary is tailored to monitor activity performance related to the initially selected behavioural goal. Factors assumed related to activity performance are monitored and recorded by the patient. Examples of factors included in the self-monitoring are situation-specific conditions, expectancies (e.g. self-efficacy), fears, negative thoughts, motor behaviours, evaluation on actual performance, responses from significant others, and immediate consequences of behaviour. The self-monitoring provides information that can be used to reconceptualise the pain problem from overwhelming to manageable, and it is way to help individuals recognizing internal monologues, motor behaviours, and daily routines. It can also provide individuals with a sense of control over the situation.

\(^1\) The clinical version of the PGPQ should be distinguished from the outcome measure PGPQ. The clinical version is further described in Paper II and in the Discussion section, p. 67.
3. Individual functional behavioural analysis
Data collected in phases 1 and 2 are used for the functional behavioural analysis. The functional analysis is the identification of important, controllable, causal functional relationships applicable to specified behaviours for an individual (Haynes et al., 1997, p. 654). Thus, according to the S-I-R-C-format antecedents or situations (S), individual capabilities (I), behavioural responses (R), and short-, and long-term consequences (C) (Kirk, 1995) related to the behavioural goal are identified. Preliminary hypotheses of relations between these variables are then introduced and discussed with the patient. The initial functional behavioural analysis is focused on the selected initial goal, and the variables included must have a potential for change. Each hypothesis results in further specification and operationalization of the treatment goal and justifies the treatment strategies. The patient’s progress is continuously evaluated in relation to the hypothesized relationships between the functional variables and the goals. This feedback is supposed to contribute to the patient’s gain of knowledge and sense of control over the situation.

The functional relationships would be open to modification during treatment according to changes in the adaptation to pain and treatment gains, and to the different treatment goals. In the end, attainment of initially prioritised goals would determine when to discharge the patient, which makes the goal setting procedure crucial.

4. Basic skills acquisition
This phase deals with acquisition of skills deemed necessary for goal attainment as specified by the previous functional analysis. Voluntary activation of muscles, co-ordination of movement patterns, strength, endurance, and mobility are examples of possible motor skills to acquire. Cognitive skills are also practiced, for example recognition of negative interpretations and cognitions, modification of self-instructions to include positive statements, and interpretations and reactions to bodily sensations. Relaxation techniques are practised, and self-efficacy is reinforced by mastery experiences and feedback from the physical therapist. Daily routines including activity planning and organisation of the surrounding environment are also discussed, for example the organisation of events with respect to fluctuations in pain and realistic efforts needed to manage the activities. Finally, physical activity according to individual’s preferences is initiated during this phase.

5. Applied skills acquisition
The acquired basic skills are merged to shape more complex behaviours, i.e. behaviours including necessary motor skills, cognitive skills, and problem-solving skills deemed necessary to attain the behavioural goal. First,
behaviours are practiced in contrived environments at the physical therapy clinic, i.e. the patient practices skills with guidance from the physical therapist in a situation analogue to the everyday life situation. Strong emphasis is put on the patient’s ability to combine basic skills to an appropriate motor behaviour.

Second, homework assignments including application of skills in everyday life situations are agreed upon, and the training and completion of tasks are recorded by the patient in a diary.

6. Generalisation
When the initially selected goal is attained, the next goals on the priority list are targeted, and the procedure is repeated, i.e. the functional behavioural analysis is complemented, additional basic skills are practiced when needed, and subsequently applied in contrived as well as in everyday life situations.

7. Maintenance and relapse prevention
Finally, patients are prepared for relapses that are commonly present in the process of behaviour change (Prochaska et al., 1992). High-risk situations are therefore identified and problem-solving strategies are discussed and extended to equip the patient with an arsenal of strategies to use in different situations. This results in a personal, written relapse prevention and management document. Finally, strategies for maintaining performance in relation to attained goals are discussed and reinforced. The patients are supposed taking over the responsibility for additional goal attainment and management of relapses.

Organisation and scheduling
Eight to ten therapist-led sessions are scheduled over approximately 2–3 months. However, patients themselves, through homework assignments, manage the principal part of the treatment. In that way patients are involved as active and collaborative agents, capable to learn more adaptive ways of managing pain and overcome barriers for functioning in everyday life (Turk & Okifuji, 1993). The therapist-led sessions are primarily used to progress and tailor the intervention through its phases and to check on previous tasks. Two booster sessions are included after 1 and 3 months respectively. The patients receive personal files including self-monitoring diaries, exercise sheets, educational material, individual maintenance plan, and relapse prevention and management strategies. Table 2 gives an overview of the structure, content, and strategies for the intervention. The individual tailoring is detailed and exemplified in Paper II.
<table>
<thead>
<tr>
<th>Session</th>
<th>Phases</th>
<th>Examples of components and clinical strategies</th>
<th>Examples of homework assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Behavioural goal identification and assessment</td>
<td>Creation of a behavioural goal priority list including: • Goal identification • Goal ranking (importance, frequency, level of difficulty)</td>
<td>To complete, modify, and reflect over the goal priority list</td>
</tr>
<tr>
<td></td>
<td>Introduction: purpose, responsibilities</td>
<td>Estimates of: • Activity level • Perceived self-efficacy • Fear, avoidance • Readiness to adopt new behaviours • Expectations for treatment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pain history</td>
<td>Physical assessment</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Self-monitoring</td>
<td>Selection of first target, i.e. behavioural goal to start with Tailoring of a self-monitoring diary for prospective recording (e.g. activity, situation, pain, cognitions, motor behaviour, consequences)</td>
<td>To monitor activity in everyday life according to agreed quota</td>
</tr>
<tr>
<td>3</td>
<td>Functional behavioural analysis</td>
<td>Discussion of hypothesized relationships between assumed determinants of disability and behavioural goal Further operationalization of goals and intermediate objectives</td>
<td>Continuing self-monitoring To engage in a physical activity of own choice</td>
</tr>
<tr>
<td>4–5</td>
<td>Basic skills acquisition</td>
<td>Motor skills, cognitive skills, and problem-solving skills constituent to the behavioural goal and objectives are introduced, trained, and recorded</td>
<td>To practice basic exercises To record dose, perception of success and barriers for exercising in an exercise diary</td>
</tr>
<tr>
<td>6–7</td>
<td>Applied skills acquisition contrived situations, everyday life situations</td>
<td>Basic skills are merged to shape adequate behaviours Supervision in analogue situations at the clinic Agreement of quota for applied activities training in everyday life</td>
<td>To apply skills and practice activities in everyday life</td>
</tr>
</tbody>
</table>
Training of physical therapists

**Treatment manual and working sheets**

Experiences from the first phase of the project that included the evaluation of effects in individuals in Study II, resulted in a “principle-driven” treatment manual. The manual prescribed how treatment should be individually tailored, and likewise adhere to the overall framework of the programme. In addition, eight different working sheets including 1) goal identification and goal assessment (clinical version of the PGPQ), 2) a prototype for a self-monitoring diary, 3) functional behavioural analysis form, 4) goal setting and treatment planning form, 5) homework assignment form, 6) exercise diary, 7) maintenance and relapse prevention plan, and 8) session planning and documentation were produced.

**The training programme**

Four physical therapists were trained and supervised to provide the individually tailored intervention in the group study. Their clinical experience ranged from 2 to 20 years. One psychologist (main supervisor) and one physical therapist (author) carried out the training programme during the autumn and winter 2002/2003. It included seven 3-hour sessions covering the seven phases of the programme and the content of the treatment manual.

**Session 1 – introduction, problem- and behavioural goal identification and assessment**

A theoretical overview of the bio-psycho-social explanatory model of pain and the behavioural medicine perspective opened the programme. Literature covering pain management and behavioural and cognitive-behavioural principles were distributed to the participants. The first phase of the

---

**Table 2 continued…**

<table>
<thead>
<tr>
<th>8–12</th>
<th>Generalisation</th>
<th>Subsequent goals on the priority list are targeted</th>
<th>See above</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Continuing functional behavioural analysis</td>
<td>To extend the application of skills to new activities and situations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skills acquisition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintenance and relapse prevention</td>
<td>Strategies for maintenance of skills are discussed</td>
<td>To document problem-solving strategies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Future risk situations are identified, management strategies are discussed and documented</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Booster sessions</td>
<td>Rehearsal, problem-solving</td>
<td>Continuing application</td>
</tr>
</tbody>
</table>

---
intervention, i.e. identification and assessment of behavioural treatment goals was introduced and discussed. A homework assignment covering the application of the clinical version of the PGPQ to regular patients was agreed upon.

Session 2 – self-monitoring, functional behavioural analysis, and goal setting
The previous homework assignment was discussed and strategies for overcoming difficulties and barriers for implementation were formulated. Didactic strategies and working sheets for tailoring of self-monitoring diaries, the synthesizing of collected clinical information to functional behavioural analysis, and operationalization of goals and intermediate objectives were introduced. New homework assignments including self-monitoring tasks in regular patients were formulated.

Henceforth, each session was opened with discussions and feedback on previous homework, as well as strategies to overcome barriers for the implementation. All sessions were ended with new homework assignments. This also applies to the structure of the sessions in the treatment programme and was used as a didactic feature to reinforce the clinical didactic strategies for the treatment provision at hand.

Session 3 – functional behavioural analyses, basic skills acquisition, and clinical didactic strategies
The third session was focused on elaboration of functional analyses based on clinical patient data. How to select basic exercises in accordance with the hypotheses generated by the functional analyses were included. Strategies for patient education, homework assignments for patients, negotiation of exercise doses, exercise diary documentation, and feedback and positive reinforcement were also discussed.

Session 4 – clinical didactic strategies
The themes that were introduced in session 3 were continued. Special emphasis was put on necessary therapist skills to introduce the new programme to the patients, to avoid focusing on pain intensity, and to avoid reinforcements of patients’ negative cognitions and fears.

Session 5 – applied skills acquisition
The application of acquired basic skills in contrived situations at the physical therapy clinic and in everyday life was discussed. A videotape from one of the physical therapists was watched and commented on. Strategies for applied training, especially to shape appropriate motor behaviours, were emphasised. Physical therapists were also encouraged to accompany patients in their natural settings to get an idea of the value and potency of this treatment phase.
Session 6 – generalisation of skills and maintenance and relapse prevention
This session comprised strategies for generalisation of skills to subsequent behavioural goals on the goal priority list. The creation of personal maintenance and relapse prevention programmes in co-operation with each patient was worked on.

Session 7 – rehearsal and research design
The tactics within each phase of the intervention were rehearsed. The design of the group study was then presented and the group worked together to clarify the treatment manual for the study.

Supervision of therapists
Clinic-based individual supervision was provided between the sessions of the training programme. The physical therapists were observed, and occasionally videotaped, together with regular patients. This documentation was used for supervision and feed-back on direct clinical performance.

Clinic-based individual supervision and group-based supervision was continued throughout the entire group study to monitor and maintain acquired “treatment provider skills” (Bellg et al., 2004). The latter was scheduled regularly once a month during the intervention phases, i.e. the total amount of group-based supervision during the group study was 10x3 hours. In addition, individual checks were done regularly on the telephone, or in the clinic, depending on the needs of each physical therapist.

The physical exercise intervention
The control condition was chosen to be the equivalent with “best possible standard care” according to empirical evidence for physical therapy in persistent musculoskeletal pain (Liddle et al., 2004; McQuay et al., 1999; van Tulder et al., 2003a). It comprised a structured physical exercise intervention with 8 to 10 scheduled sessions. Exercises were individually adapted with regard to each patient’s physical impairments and physical fitness. The dose (exercise quotas, times per week or day) was determined from patients’ physical conditions, evidence-based principles, and consensus following the ACSM guidelines for physical activity programmes (Johnson, 2000). Manual treatment (e.g. massage, vertebral manipulation, soft tissue mobilization), acupuncture, ultra-sound, or transcutaneous nerve stimulation were not allowed.

Analyses of the content of the interventions provided in the group study showed that predominant exercises included strengthening and muscular endurance tasks (applied in 94% of the exercise programmes), co-ordination,
balance and dynamic stability (94%), flexibility and stretching (88%), aerobic capacity (65%), and relaxation (10%).

Participants were instructed to exercise on their own between sessions recording time, duration, number of repetitions, and weights in an exercise diary during all home-exercise occasions. They were encouraged to go on exercising after the treatment period, but unlike the experimental group, no specific instructions or strategies were given for maintenance.

**Instructions for therapists**

Four physical therapists with a clinical experience ranging from 2 to 32 years provided the control intervention in the group study. The physical exercise intervention was well in concordance with their professional competence and no special training was given. Before the start of the group study, they received a treatment manual covering principles and strategies for the implementation of the exercise intervention. The content of the intervention was clarified and they received information and discussed the components that must be controlled for, i.e. components not allowed in the control condition including behavioural goal setting, functional behavioural analyses, cognitive skills training, applied activities training, and maintenance and relapse prevention strategies.

**Treatment fidelity**

Study III included several treatment fidelity checks over the course of the trial, which are briefly summarised below. Patient-reports of treatment content, therapists’ documentation of treatment content session by session, and individual working sheets were collected to obtain an estimate of the proportions of subjects in each condition that received the programme as it was intended.

The session records from the experimental condition showed that the median number of sessions was 9 (25th percentile = 8, 75th percentile = 10) and the mean duration of scheduled treatment (booster sessions excluded) was 3.2 months (SD 1.3). In the control group the median number of sessions was 10 (25th percentile = 9, 75th percentile = 12), and the mean duration of scheduled treatment was 2.8 months (SD 1.0). Ninety-nine percent of the scheduled exercise sessions were supervised by a physical therapist. One single participant in the sample reported that manual treatment had been provided.

The examination of session records, documentation, and working sheets revealed that the intervention was implemented with all planned components to 42% of the participants in the experimental group. These included the seven phases, reinforcing feedback, homework assignments, physical activity, and booster sessions. Most commonly lacking were documented
measures to generalise skills to subsequent goals on the goal priority list (27% of the participants), followed by failure to implement regular physical activity of own choice (18%).

The exercise sheets from the control condition did not comprise any reports of behavioural goals, cognitive skills training, applied activities training, or relapse and maintenance strategies. Thus, the physical exercises were implemented in accordance with the instructions to the physical therapists.

To sum, the treatment fidelity checks showed that the treatment dose was equivalent and within the stipulated range within and across conditions. The original intention of withholding manual and complementary physical medicine treatment was fulfilled in both conditions. Most of the components of the experimental intervention were delivered by exception for generalisation of skills to subsequent goals on the priority list. This was probably due to the limited number of sessions and length of the treatment period as determined by the design of the study. The treatment sessions of the control condition were supervised to a very high degree. The lack of documented behavioural goals, cognitive skills training, applied activities training, and strategies for maintenance and relapses indicates that these main components in the experimental condition were controlled for by the design of the trial.

Measures

The measures in the project covered physical, cognitive, behavioural, psychosocial dimension, participants’ overall reports of intervention effects, and societal costs. The outcome variables included in the four studies of the present thesis are outlined below.

Patients’ priorities of behavioural treatment goals

The Patient Goal Priority Questionnaire (PGPQ) was introduced in the first study of the project. It is a patient-specific measure originally designed for behavioural goal assessment (i.e. to collect data concerning patients’ priorities of behavioural goals) and for use as a tailored outcome measure.

The revised version of the outcome measure consists of two different sections. In the first part of the questionnaire, patients report 1 to 3 activities that they: (1) are unable or have difficulties to perform due to pain, and (2) wish to affect with treatment. The relative importance of the activities is ranked by the patients, with 1 representing the most important activity (referred to as Prio 1, 2, and 3 in this thesis). In the second part of the PGPQ, patients score current level of (a) behavioural performance on a numerical rating scale (NRS) ranging from 0 to 10 (high scores = severe limitations),
(b) frequency of behavioural performance during the past week on an ordinal scale with five grades (0 = never, 1 = once, 2 = twice, 3 = three to five times, 4 = more than five times), (c) satisfaction with current level of behavioural performance on a NRS ranging from 0 to 10 (high score = high satisfaction), (d) self-efficacy for behavioural performance on a NRS ranging from 0 to 10 (high score = high confidence), (e) fear of behavioural performance on a NRS ranging from 0 to 10 (high score = high fear), (f) expectations of future behavioural performance as a result of treatment on a NRS ranging from 0 to 10 (high score = severe limitations), and (g) readiness to adopt new behaviours to attain expectations of behavioural performance on a NRS ranging from 0 to 10 (high score = high readiness). The above items are scored separately with regard to each of the ranked goals.

The stability of the PGPQ was investigated in two ways before application in Study IV. First, the analyses of agreement between patients’ (a) listing, and (b) ranking of prioritised goals, on two occasions before start of treatment, showed Cohen’s Kappa ($\kappa$) = 0.95 for the content of the priority list, and $\kappa$ = 0.83 for the relative position of the ranks. These data indicated that the PGPQ ratings were stable with respect to goal content and ranks before start of treatment. Second, the test-retest reliability of the ratings on the seven items that are connected to each prioritised goal was calculated. The intra-class correlation coefficients ranged from 0.71 to 0.95 indicating a good reliability of the measure.

In Study I and IV, the first part of the PGPQ; the goal priority list, was used for exploration and description of individuals’ behavioural treatment goals. For the idiographic outcome analyses in Study IV the goal priority list was combined with item a (behavioural performance), item c (satisfaction with behavioural performance), and item f (pre-treatment expectations of behavioural performance). (Study I, IV)

Self-rated disability related to the individual’s prioritised behavioural goals

Patient-specific continuous measures of self-rated disability were the principal outcome measures in Study II. Subjects estimated their current disability daily on 11-point (0–10) NRSs, where low scores indicated low disability. One scale was adapted for each goal that was identified in the first phase of the treatment programme. A pilot study in a PHC sample of 37 patients waiting for physical therapy showed that data on self-reported disability related to prioritised behavioural goals were stable across a 3-week period pre-treatment according to daily self-reports (Dagson and Peterson, unpublished data). (Study II)
Pain-related disability
Pain interference in everyday life was measured with The Pain Disability Index (PDI; Pollard, 1984; Tait, Pollard, Margolis, & Duckro, 1987) that is a 7-item inventory designed to measure interference with role-functioning due to persistent pain in the following areas: 1) family and home responsibilities, 2) recreation, 3) social activity, 4) occupation and education, 5) sexual behaviour, 6) self-care, and 7) life-support activity. Degree of interference was rated on 11-point NRSs, ranging from 0 (no interference) to 10 (total interference). A general disability score ranging from 0 to 70 was then calculated by summing scores of the seven items. A Swedish version of the PDI (Denison et al., 2004) was used in this project. The internal consistency was high in both samples; Cronbach’s Alpha = 0.85 (Study I), and 0.83 (Study III).

Life satisfaction
Life satisfaction was estimated with The Quality of Life Scale (QOLS; Chibnall & Tait, 1990), which measures satisfaction with the following seven areas: 1) social life and experiences, 2) family life and experiences, 3) hobby and recreational experiences, 4) educational and intellectual development, 5) the experience of daily living (e.g. work), 6) romantic experiences, and 7) expectations and hopes for the future. Participants scored level of satisfaction on 7-point scales (1 = totally unsatisfying and 7 = completely satisfying). A Swedish version of the QOLS (Johansson, 1999) was used in this project. The internal consistency in the group study sample was high; Cronbach’s Alpha = 0.80. (Study III)

Pain
Average, maximal, and mildest pain intensity experienced over the past two weeks were scored on three NRSs with anchors 0 (no pain) and 10 (worst pain imaginable/unbearable pain). The validity of NRSs for pain intensity ratings is well documented and findings include positive, significant correlations with other measures of pain intensity. NRSs have also demonstrated sensitivity to treatments that are expected to produce pain intensity changes (Jensen & Karoly, 2001). (Study II, III)

Perceived pain control with respect to participants strategies to manage or handle the pain during an average day, was scored on a 7-grade NRS with anchors 0 (no control at all) and 6 (total control; Study II; Rosenstiel & Keefe, 1983) or an 11-grade NRS 0 (no control at all) and 10 (total control; Study III).
Self-efficacy in performing common everyday life activities

A Swedish version of The Self-Efficacy Scale (SES) was used to measure the strength of perceived self-efficacy in performing 20 common everyday life activities (Altmaier, Russell, Kao, Lehmann, & Weinstein, 1993; Denison et al., 2004). The activities covered are: taking out the trash, concentrating on a project, going shopping, playing cards, shovelling snow, driving the car, eating in a restaurant, watching television, visiting friends, working on the car, raking leaves, writing a letter, doing a load of laundry, working on a house repair, going to a movie, washing the car, riding a bicycle, going on vacation, going to a park, and visiting relatives. The response format is 11-point NRSs where 0 = not at all confident and 10 = very confident. Participants scored their confidence in performing each of the 20 activities in spite of pain. A general self-efficacy score ranging from 0 to 200 was computed by summing ratings of the 20 activities. Data from a Swedish PHC sample including the sample used for Study I in this thesis showed that the internal consistency was high; Cronbach’s Alpha = 0.93. (Study III)

Fear of movement/(re)injury

Fear of movement and (re)injury was measured using a Swedish version of The Tampa Scale of Kinesiophobia (TSK) (Denison et al., 2004; Kori, Miller, & Todd, 1990). TSK comprises 17 items with a 4-grade format where 1 = strongly disagree and 4 = strongly agree. A total score ranging from 17 to 68 is calculated, where a higher total sum indicates more fear. Data from a Swedish PHC sample including the sample used for Study I showed that the internal consistency was satisfactory; Cronbach’s Alpha = 0.74. (Study III)

Physical performance

Sit-ups were performed with supported feet, knees bent to 90 degrees and hands striving to reach the bases of patellae (Johnson, 2000). (Study II, III)

Push-ups were performed with the knees and lower part of the legs supported by the floor (women) or on the toes with unsupported legs (men) (Johnson, 2000). (Study II, III)

Back-ups were performed prone on a backboard with 55 degrees of flexion in the hips as starting position. (Study III)

The total numbers of correct performed repetitions were recorded for each of the three tests.

Functional lifting-ability was assessed by The PILE cervical lifting test (Mayer et al., 1988). The participants were asked to lift a plastic case with weights from waist to shoulder (0.72–1.34 m). The initial weight was 2 kilos
for the women and 4 kilos for the men. Four lifts were performed during 20 seconds; the weight was then increased by 2 kilos every fourth lift. The weight managed during the final trial was divided by the adjusted body weight (Mayer et al., 1988). Thus, the maximal weight/kilo adjusted body weight was used as the test result. Acceptable inter- and intra-rater reliability has been shown in a Swedish sample of persons with spinal pain (Ljungqvist, Harms-Ringdahl, Nygren, & Jensen, 1999). (Study II, III)

In The stair-climbing test (Ljungquist, Fransson, Harms-Ringdahl, Björnham, & Nygren, 1999), the number of climbed stairs during a period of 35 seconds was counted. The test has shown acceptable inter- and intra-rater reliability in a Swedish sample of persons with spinal pain (Ljungqvist et al., 1999). (Study III)

Active range of movement (ROM) in affected joints was measured with a goniometer. Active neck ROM was measured using a Myrin meter, i.e. a compass with an inclination needle (Lic Rehab Svetsary, Solna, Sweden). Active thoracic and lumbar ROMs were measured with a kyphometer as described by Öhlén (1989). (Study II)

Isometric muscle endurance tests in neck extensors and flexors, and back extensors were performed as described by Ljungquist (2002). (Study II)

Participant global ratings of improvements and treatment satisfaction

Study participants evaluated the impact of the interventions 3 months post-treatment on (a) performance of daily activities (much better = 0, better = 1, no difference = 2, worse = 3) and (b) overall satisfaction with daily life compared to before start of treatment (much more satisfied = 0, more satisfied = 1, no difference = 2, less satisfied = 3), (c) confidence in self-management of future risk situations (very confident = 0, confident = 1, somewhat uncertain = 2, uncertain = 3, very uncertain = 4), (d) application of acquired skills (yes/no), (e) satisfaction with treatment (very satisfied = 0, satisfied = 1, fairly unsatisfied = 2, very unsatisfied), (f) regular physical activity (yes/no), and (g) the probability of future maintenance of behavioural changes (very likely = 0, likely = 1, fairly likely = 2, not likely = 3). (Study III)
Data analysis

The data analyses included in the thesis are briefly summarised below. For a detailed description of data management and statistical considerations throughout the project, it is referred to the separate papers.

Attrition and missing data were handled in different ways in the separate studies. In Study I, missing values in the generic measure (PDI) were substituted with the mean of each individual’s total item scores to obtain complete data sets. No substitutions were done for missing data in the patient-specific measure (PGPQ) since the purpose with this measure was to obtain idiographic data. This also applied for Study IV. In Study III, occasional missing items in the separate questionnaires were substituted with the mean of the individual’s total item scores. Questionnaires unanswered as a whole were handled with intention-to-treat analyses (ITT) using the longitudinal imputation method of last-value-carried-forward (Twisk & de Vente, 2002).

In Study I and IV, participants’ behavioural goals were categorised according to a system based on the seven domains in the PDI, and an additional category labelled “general functional ability”. The inter-rater reliability of the category system was analysed with Cohen’s Kappa, which indicated a high reliability.

Correlation between two variables was analysed with Pearson’s product-moment correlation (Study I, IV). Differences across the three major ranks (Prio, 1, 2, 3) of the dependent variables current behavioural performance, satisfaction with current behavioural performance, and expectations of future behavioural performance were analysed with univariate repeated measures ANOVAs (Munro, 1997; Study I).

Individual-level data from the continuous dependent measures in the experimental single case studies (Study II) were visually inspected with regard to trends and changes in levels and variability between phases (Kazdin, 2003). For the presentation in the thesis, mean values and standard deviations for three weeks at baseline, and two weeks post-treatment were reported. Baseline data were checked for serial dependency by calculation of autocorrelation coefficients. Data collected by the generic measure was presented as raw scores (Study II).

In Study III, the main outcome variable of pain-related disability and the complementary outcome variables of self-efficacy and fear of movement were analysed with 2 (experimental group/control group) x 3 (baseline/immediately post-treatment/3-month follow-up) repeated measures ANOVA designs. The “Greenhouse-Geisser epsilon” was used for the univariate tests of interaction effects since the assumptions of equality of error variances were violated (Munro, 1997). Bonferroni corrections were made for the within-group comparisons over time and between-group comparisons at the different points of measurement to further guard against
Type I-errors. Three separate MANOVAs for repeated measure designs were used to analyse the outcomes of life satisfaction (7 variables), pain (4 variables), and physical performance (5 variables). Pillai’s Trace was chosen for reports of the sum of explained variances (Tabachnick & Fidell, 2001). Univariate ANOVAs with Bonferroni correction were performed to detect specific variables that contributed to the interaction and main effects in the multivariate analyses. In cases where the assumption of compound symmetry was not met, “Greenhouse-Geisser epsilon” was used to test the F-value for significance (Munro, 1997).

The analyses of the self-report measures in study III were conducted in two ways, i.e. analyses with completers only, as well as ITT-analyses including all randomized participants with eligible baseline-measures (n = 122). Since both methods revealed the same overall effects, analyses with completers only are reported in the thesis.

The relative proportions of ratings of global improvements across treatment conditions were analysed using cross-tabulation and chi-square tests (Study III). The Jacobson and Truax methodology for determination of clinically significant changes (Jacobson & Truax, 1991) was used for the idiographic outcome analyses of data from the PGPQ regarding behavioural performance, satisfaction, and pre-treatment expectations three months post-treatment (Study IV). Participants’ scores were plotted on charts and classified into outcome categories (e.g. behavioural performance; “Not disabled”; “Improved”; “Unchanged”; “Deteriorated”) in accordance with the two-fold criterion of reliable change and clinically significant cut-off point (Jacobson & Truax, 1991). The effectiveness of the two interventions was compared using chi-square tests. The congruency of the classification of outcome variables was illustrated by cross-tabulations of variables and categories. Agreement of classification of outcome variables on an individual level was analysed with Cohen’s Kappa (Study IV).

Alpha levels of 0.05 or below were regarded as statistically significant.
Results

Behavioural goal assessment

Study I

The aim of the first study in the thesis was to explore individuals’ priorities of behavioural goals for physical therapy, using the recently developed preliminary version of the PGPQ in a sample of patients with persistent musculoskeletal pain in PHC. In addition, this study examined self-reports of current behavioural performance, satisfaction with current behavioural performance, and expectations of future behavioural performance. Finally, the concurrent validity of the PGPQ in relation to an established, generic disability measure – the PDI (Tait et al., 1987) was estimated.

One-hundred-and-ninety-seven participants listed and ranked behavioural goals for physical therapy by means of the PGPQ. The goals differed between individuals and included many different domains of everyday life (Table 3). Most frequently ranked as Prio1 (i.e. the goal most important to achieve) were goals related to occupation and education. Goals related to responsibilities at home and to the family were most common in Prio2 and Prio3. Approximately 50% of the listed goals were sufficiently specified by the respondents, i.e. tied to a particular task or situation in everyday life. There were no significant differences across the major ranks of Prio1, 2, and 3 regarding current behavioural performance $F(2, 304) = 0.28, p = 0.754$, satisfaction with current behavioural performance $F(2, 308) = 0.040, p = 0.961$, and expectations of future behavioural performance $F(2, 300) = 0.66, p = 0.518$. The correlations between these three variables of the PGPQ and the PDI were low to moderate (range -0.16 – -0.46, $p < 0.05$), which indicated patient-specific properties of the new measure.

To conclude, the relevance of an individualised and behavioural focus in physical therapy management of musculoskeletal pain was demonstrated in this study. The usefulness of the PGPQ in eliciting patient-specific prioritised behavioural goals for physical therapy was also shown. At this stage of the project an elaborated version of the PGPQ was assumed useful as (a) a clinical tool for identification of the patient’s priorities of behavioural goals for PT, (b) a clinical tool for collaborative formative evaluation during treatment, and (c) a complementary outcome measure in
research for assessment of clinically significant changes related to behavioural performance.

Table 3. Results of participants’ ranking of behavioural goals for physical therapy according to the Patient Goal Priority Questionnaire (PGPQ)

<table>
<thead>
<tr>
<th>Goal category</th>
<th>Priority 1</th>
<th>Priority 2</th>
<th>Priority 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Study I</td>
<td>Study IV</td>
<td>Study I</td>
</tr>
<tr>
<td></td>
<td>(n=194)</td>
<td>(n=82)</td>
<td>(n=187)</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Study I</td>
<td>Study IV</td>
<td>Study I</td>
</tr>
<tr>
<td></td>
<td>(n=164)</td>
<td>(n=70)</td>
<td>(n=187)</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Family, home responsibilities</td>
<td>21.6</td>
<td>10.1</td>
<td>32.6</td>
</tr>
<tr>
<td>Recreation, hobbies</td>
<td>16.5</td>
<td>19.0</td>
<td>23.5</td>
</tr>
<tr>
<td>Social activity</td>
<td>0.5</td>
<td>0</td>
<td>2.1</td>
</tr>
<tr>
<td>Occupation, education</td>
<td>29.4</td>
<td>41.8</td>
<td>11.2</td>
</tr>
<tr>
<td>Sexual behaviour</td>
<td>0.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Self-care</td>
<td>7.7</td>
<td>5.1</td>
<td>7.0</td>
</tr>
<tr>
<td>Life-support activity</td>
<td>5.2</td>
<td>6.3</td>
<td>3.2</td>
</tr>
<tr>
<td>General functional ability</td>
<td>18.6</td>
<td>16.4</td>
<td>20.4</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>1.3</td>
<td>0</td>
</tr>
</tbody>
</table>

1 E.g. to sit, walk, stand up, move, lift

Study IV

The principal aim of Study IV was to compare the clinical significance of two interventions for patients with persistent MSP, using behavioural goals elicited by the outcome measure PGPQ as the basis for idiographic analyses. Table 3 presents the results of the behavioural goal identification and goal categorisation for the total sample in Study IV. Consistent with Study I, goals related to occupation and education were most commonly ranked in Prior1, whereas goals related to hobbies and recreation were most frequently ranked in Prior2 and Prior3 in this study.

Analyses of the relations between participants’ behavioural performance related to prioritised goals and satisfaction with behavioural performance at 3 months post-treatment showed significant correlations, $r = -0.80$, $p = 0.0001$ (Prior1), $r = -0.77$, $p = 0.0001$ (Prior2), $r = -0.83$, $p = 0.0001$ (Prior3). Thus, behavioural performance was strongly related to satisfaction with behavioural performance.
Individually tailored behavioural medicine treatment

Study II: description and evaluation of effects using the experimental single-case format

The primary aim of the second study was to describe and evaluate the new individually tailored behavioural medicine treatment protocol. More specific aims were: (1) to describe the programme and to illustrate how it was individually tailored for representative patients with persistent MSP in a PHC setting and (2) to study and describe the effects of the intervention on self-rated disability and pain in experimental single-case studies.

The treatment protocol is comprehensively described in the methods section of this thesis, and the individual tailoring in two patients with persistent MSP is detailed in paper II limiting this outline to a summary of effects.

All patients in the conducted series of four single-case studies attained pre-set individual behavioural goals reporting low or no disability at the end of the treatment period. In addition, perceived pain control increased, and reported pain intensity decreased (Table 4). These results were maintained at the one-year follow-up for the two participants that were followed up.

In conclusion, detailed descriptions, treatment manuals, and working sheets were developed during this study. Individualised procedures for goal identification, prospective self-monitoring, and functional behavioural analysis were especially emphasised. Positive treatment outcomes were reported from four participants, and their goals for self-rated disability related to important behavioural goals were achieved. The utility of the experimental single-subject design in the development of a treatment programme and in the analysis of its effects in individual cases was also demonstrated.

Study III: effects of the individually tailored treatment protocol when compared to a physical exercise intervention

The third study evaluated the experimental effects of the individually tailored protocol in PHC-patients with persistent MSP. The efficacy of the individually tailored protocol was compared to that of a physical exercise intervention using pain-related disability as the main outcome measure. It was hypothesised that both interventions would reduce disability, but the individually tailored protocol was assumed more effective in comparison to physical exercises. Effects on pain, life satisfaction, fear-avoidance beliefs, self-efficacy in performing common everyday life tasks, and physical performance were also studied.
Table 4. The series of experimental single-case studies. Participants’ (P) raw scores at the Pain Disability Index (PDI), mean scores and (standard deviations) at baseline (Pre) and post-treatment (Post) for pain intensity (PI), pain control (PC), and self-rated disability related to most important behavioural treatment goals (Prio1, 2, 3, 4)

<table>
<thead>
<tr>
<th>P</th>
<th>PDI Pre/Post</th>
<th>PI Pre/Post</th>
<th>PC Pre/Post</th>
<th>Prio1 Pre/Post</th>
<th>Prio2 Pre/Post</th>
<th>Prio3 Pre/Post</th>
<th>Prio4 Pre/Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>42/7</td>
<td>4.0/2.0</td>
<td>3.4/0.9</td>
<td>3.2/0.9</td>
<td>3.2/1.0</td>
<td>3.3/0.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.6/0.7)</td>
<td>(1.1/0.4)</td>
<td>(1.3/0.3)</td>
<td>(0.7/0.3)</td>
<td>(1.7/0)</td>
<td>(1.8/0.4)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10/3</td>
<td>3.3/1.1</td>
<td>2.9/1.0</td>
<td>3.0/0.8</td>
<td>2.4/0</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.8/0.5)</td>
<td>(0.8/0)</td>
<td>(0.5/0.4)</td>
<td>(0.8/0.4)</td>
<td>(0.6/0)</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>30/2</td>
<td>5.3/0.3</td>
<td>4.1/0</td>
<td>10.0/0.1</td>
<td>10.0/0</td>
<td>10.0/0.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.5/0.7)</td>
<td>(1.7/0)</td>
<td>(3.6/0)</td>
<td>(0/0.3)</td>
<td>(0/0)</td>
<td>(0/0.4)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>18/10</td>
<td>4.8/2.4</td>
<td>4.6/1.0</td>
<td>5.2/2.4</td>
<td>4.8/2.4</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.3/1.2)</td>
<td>(0.9/1.3)</td>
<td>(0.9/0)</td>
<td>(1.1/1.1)</td>
<td>(1.6/1.4)</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

Note:
PDI (0-70), low scores indicate low disability
PI (0-10), low scores indicate low pain intensity
PC (0-6), low scores indicate poor pain control
Prio1, 2, 3, 4 (0-10), low scores indicate low disability

Pain-related disability
The univariate test of repeated measures ANOVA revealed a significant time x condition interaction, \( F(1.87, 147.5) = 4.88, p = 0.01 \) for pain-related disability. The post hoc analyses with separate ANOVAs showed a significant condition x time interaction immediately post-treatment \( F(1, 169.9) = 7.61, p = 0.007 \), but not at the 3-month follow-up \( F(1, 109.3) = 1.68, p = 0.198 \), where the disability levels were maintained in both conditions (Figure 2). Means and standard deviations for the two groups are reported in Table 5.
Life satisfaction
The MANOVA for repeated measures at baseline, immediately post-treatment and 3-month follow-up across treatment conditions, did not show any significant time x condition interaction, $F(14, 65) = 0.86, p = 0.605$. Significant time effects were found, $F(14, 65) = 3.87, p = 0.0001$. Separate, univariate, post-hoc ANOVAs showed that satisfaction increased in three areas, i.e. hobbies and recreation, the experience of daily living (e.g. work), and romantic experiences. Means and standard deviations for the separate areas are reported in Table 5.

Pain
The MANOVA for repeated measures of pain variables at baseline, immediately post-treatment and 3-month follow-up across treatment conditions implied a significant time x condition interaction, $F(8, 71) = 2.5, p = 0.02$. Subsequent, univariate, post-hoc ANOVAs revealed significant
contributions from maximum pain intensity, \( F(1.7, 130.8) = 3.9, p = 0.022 \) and pain control \( F(1.9, 150.0) = 7.6, p = 0.001 \). All included pain variables changed over time, \( F(8, 71) = 27.4, p = 0.0001 \). Means and standard deviation for the separate pain variables are reported in Table 5.

**Self-efficacy in performing common everyday life activities**

The univariate test of repeated measures ANOVA did not result in any significant time x condition interaction, \( F(1.8, 115.3) = 2.1, p = 0.131 \). Significant time effects were found, \( F(1.8, 115.3) = 18.3, p = 0.0001 \). Mean values and standard deviations are reported in Table 5.

**Fear of movement/(re)injury**

The univariate test of repeated measures ANOVA showed a significant time x condition interaction, \( F(1.73, 135.2) = 4.2, p = 0.022 \). The post-hoc analyses with separate ANOVAs showed a significant interaction effect immediately post-treatment \( F(1, 78) = 4.2, p = 0.044 \), but not at the 3-month follow-up \( F(1, 78) = 1.2, p = 0.271 \). Mean values and standard deviations are reported in Table 5.

**Physical performance**

The MANOVA for repeated measures of physical performance at baseline and immediately post-treatment across conditions did not show any significant time x condition interaction, \( F(5, 78) = 0.969, p = 0.442 \). The analysis showed a significant time effect, \( F(5, 78) = 12.81, p = 0.0001 \). Table 6 displays mean values and standard deviations for each of the included physical performance variables.

**Summary of findings**

Study III showed that the individually tailored behavioural medicine intervention resulted in larger reductions of pain-related disability than the physical exercise intervention. Treatment gains were maintained at the 3-month follow-up. Hence, the a priori hypothesis for the main outcome variable was confirmed.

Self-reported maximum, minimum, and average pain intensity decreased, and control over pain increased in both groups. However, those receiving individually tailored treatment reported less maximum pain and higher pain control when compared to those receiving physical exercises. A larger decrease in fear of movement was found in the individually tailored treatment group when compared to the physical exercise group. Life satisfaction related to hobbies and recreation, experience of daily living, and romantic experiences increased over the course of the study for both groups. Similarly, participants’ self-efficacy in performing common everyday life activities increased for both groups. The two interventions rendered similar increases in physical performance.
Table 5. Means and standard deviations at baseline, post-treatment, and at 3-month follow-up for pain-related disability, life satisfaction, pain, self-efficacy, and fear of movement

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Baseline</th>
<th>Post-treatment</th>
<th>3-month follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Experimental</td>
<td>23.4 (11.6)</td>
<td>7.1 (7.9)</td>
<td>7.7 (8.4)</td>
</tr>
<tr>
<td>Control</td>
<td>27.1 (14.1)</td>
<td>18.8 (14.7)</td>
<td>16.4 (13.2)</td>
</tr>
<tr>
<td><strong>Life satisfaction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social life</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>5.8 (1.2)</td>
<td>6.0 (1.3)</td>
<td>6.1 (1.2)</td>
</tr>
<tr>
<td>Control</td>
<td>5.0 (1.3)</td>
<td>5.1 (1.5)</td>
<td>5.4 (1.3)</td>
</tr>
<tr>
<td>Family life</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>6.0 (1.2)</td>
<td>6.3 (1.3)</td>
<td>6.2 (1.1)</td>
</tr>
<tr>
<td>Control</td>
<td>5.6 (1.2)</td>
<td>6.0 (1.1)</td>
<td>5.6 (1.3)</td>
</tr>
<tr>
<td>Hobby, recreation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>4.6 (1.6)</td>
<td>5.6 (1.6)</td>
<td>5.8 (1.1)</td>
</tr>
<tr>
<td>Control</td>
<td>4.1 (1.5)</td>
<td>4.8 (1.2)</td>
<td>5.0 (1.6)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>4.9 (1.4)</td>
<td>4.7 (1.6)</td>
<td>5.0 (1.5)</td>
</tr>
<tr>
<td>Control</td>
<td>4.0 (1.5)</td>
<td>4.6 (1.6)</td>
<td>4.6 (1.6)</td>
</tr>
<tr>
<td>Daily living</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>4.3 (1.6)</td>
<td>4.9 (1.6)</td>
<td>5.3 (1.6)</td>
</tr>
<tr>
<td>Control</td>
<td>3.8 (1.6)</td>
<td>4.4 (1.6)</td>
<td>4.5 (1.6)</td>
</tr>
<tr>
<td>Romantic experiences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>4.8 (1.7)</td>
<td>5.1 (1.7)</td>
<td>5.2 (1.7)</td>
</tr>
<tr>
<td>Control</td>
<td>4.4 (1.8)</td>
<td>5.0 (1.8)</td>
<td>5.0 (1.8)</td>
</tr>
<tr>
<td>Future, hopes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>5.3 (1.3)</td>
<td>5.6 (1.4)</td>
<td>5.8 (1.4)</td>
</tr>
<tr>
<td>Control</td>
<td>4.8 (1.5)</td>
<td>5.1 (1.4)</td>
<td>5.1 (1.5)</td>
</tr>
<tr>
<td><strong>Pain</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain max</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>7.4 (1.8)</td>
<td>4.0 (2.6)</td>
<td>3.8 (2.6)</td>
</tr>
<tr>
<td>Control</td>
<td>8.0 (1.9)</td>
<td>6.2 (3.0)</td>
<td>5.6 (3.1)</td>
</tr>
<tr>
<td>Pain min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>2.6 (1.9)</td>
<td>0.6 (0.9)</td>
<td>0.6 (1.0)</td>
</tr>
<tr>
<td>Control</td>
<td>2.9 (2.0)</td>
<td>1.4 (1.8)</td>
<td>1.8 (2.0)</td>
</tr>
<tr>
<td>Pain average</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>5.6 (1.8)</td>
<td>2.4 (1.8)</td>
<td>2.2 (1.9)</td>
</tr>
<tr>
<td>Control</td>
<td>6.6 (2.1)</td>
<td>3.8 (2.4)</td>
<td>3.8 (2.5)</td>
</tr>
<tr>
<td>Pain control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>5.4 (2.6)</td>
<td>7.2 (2.7)</td>
<td>8.0 (2.0)</td>
</tr>
<tr>
<td>Control</td>
<td>5.4 (2.4)</td>
<td>6.3 (2.2)</td>
<td>5.7 (2.9)</td>
</tr>
</tbody>
</table>
### Table 5 continued…

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Condition</th>
<th>Baseline Mean (SD)</th>
<th>Post-treatment Mean (SD)</th>
<th>3-month follow-up Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-efficacy</strong></td>
<td>Experimental</td>
<td>146.3 (36.6)</td>
<td>172.3 (28.5)</td>
<td>177.1 (23.5)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>145.3 (38.9)</td>
<td>155.4 (40.8)</td>
<td>163.0 (30.5)</td>
</tr>
<tr>
<td><strong>Fear of movement</strong></td>
<td>Experimental</td>
<td>30.2 (8.0)</td>
<td>25.8 (6.6)</td>
<td>23.8 (6.0)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>32.7 (7.9)</td>
<td>31.2 (8.9)</td>
<td>30.4 (9.6)</td>
</tr>
</tbody>
</table>

**Note:**
Disability: Pain Disability Index (0–70), low scores indicate low disability
Life satisfaction: Quality of Life Scale (7 items 1–7), low scores indicate low quality life
Pain: intensity (3 items 0–10), low scores indicate low pain intensity, control (1 item 0–10),
low scores indicate poor control
Self-efficacy: The Self-Efficacy Scale (0–200), low scores indicate low self-efficacy
Fear of movement: The Tampa Scale of Kinesiophobia (17–68), low scores indicate less fear

### Table 6.
Means and standard deviations for physical performance (sit-ups, back-ups, push-ups, stair climbing, and functional cervical lifting/PILE cervical) at baseline and immediately post treatment.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Condition</th>
<th>Baseline Mean (SD)</th>
<th>Post-treatment Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sit-ups</strong></td>
<td>Experimental</td>
<td>16 (17.4)</td>
<td>19 (11.5)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>12 (13.4)</td>
<td>18 (16.6)</td>
</tr>
<tr>
<td><strong>Back-ups</strong></td>
<td>Experimental</td>
<td>16 (10.4)</td>
<td>22 (9.0)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>18 (12.4)</td>
<td>22 (10.6)</td>
</tr>
<tr>
<td><strong>Push-ups</strong></td>
<td>Experimental</td>
<td>8 (7.1)</td>
<td>12 (9.9)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>8 (11.1)</td>
<td>10 (8.0)</td>
</tr>
<tr>
<td><strong>Stair climbing</strong></td>
<td>Experimental</td>
<td>64 (14.5)</td>
<td>67 (16.8)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>64 (15.1)</td>
<td>69 (16.8)</td>
</tr>
<tr>
<td><strong>PILE cervical</strong></td>
<td>Experimental</td>
<td>0.15² (0.05)</td>
<td>0.17 (0.07)</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>0.18 (0.08)</td>
<td>0.19 (0.07)</td>
</tr>
</tbody>
</table>

¹ Experimental/control group n = 42/42
² Max weight (kg)/adjusted body weight
Clinical significance

Study III: the benefit of treatment outcomes

Participants’ global ratings of improvements and treatment satisfaction three months post-treatment were investigated in study III to get an approximate estimation of participants’ perceived benefits.

The estimations of ability to perform daily activities compared to pretreatment differed between conditions, $\chi^2(3, n = 81) = 15.2, p = 0.002$. Higher proportions of the experimental group perceived their activity performance to be much better or better when compared to the control group.

Participants’ satisfaction with daily living also differed between groups, $\chi^2(3, n = 81) = 17.6, p = 0.001$. A higher proportion of participants in the experimental group reported increased satisfaction with daily living when compared to the control group.

Participants’ confidence in self-management of future risk situations differed between groups to the advantage of the experimental group, $\chi^2(4, n = 81) = 10.3, p = 0.036$. Further, all patients in the experimental group reported that they applied learned skills in daily life compared to 69% in the control group, $\chi^2(1, n = 80) = 14.0, p = 0.0001$.

Satisfaction with treatment differed between groups. A higher proportion of participants in the experimental group were very satisfied compared to controls $\chi^2(2, n = 78) = 7.3, p = 0.026$. No differences between groups were found for physical activity, $\chi^2(1, n = 78) = 1.5, p = 0.224$, or perceived likelihood of future maintenance of cognitive and behavioural changes $\chi^2(3, n = 73) = 6.3, p = 0.097$.

To sum, participants in the experimental group generally reported more benefit from treatment than participants in the control group, except for physical activity and estimated likelihood of future maintenance of changes where proportions were comparable. The results of Study III thus indicated that a higher proportion of participants receiving individually tailored treatment experienced clinically significant effects when compared to those receiving physical exercises. This finding was further explored in Study IV.

Study IV: idiographic outcome analysis of the clinical significance of treatment outcomes

The principal aim of study IV was to compare the clinical significance of the two interventions three months post-treatment, using the outcome measure PGPQ in combination with the Jacobson and Truax methodology (1991). The classification of treatment outcomes regarding behavioural performance, satisfaction with behavioural performance, and fulfilled pre-treatment expectations is shown in Table 7.
The proportions of participants who reliably improved behavioural performance differed across conditions in two of the three highest ranked treatment goals, $\chi^2(1, n = 80) = 7.91, p = 0.05$ (Prio1), $\chi^2(1, n = 79) = 4.05, p = 0.044$ (Prio2), and $\chi^2(1, n = 68) = 3.32, p = 0.069$ (Prio3).

The proportions of participants who reliably increased satisfaction with behavioural performance differed across conditions in all three goal priorities, $\chi^2(1, n = 79) = 5.79, p = 0.016$ (Prio1), $\chi^2(1, n = 77) = 8.73, p = 0.003$ (Prio2), and $\chi^2(1, n = 68) = 16.50, p = 0.0001$ (Prio3).

Table 7. Classification of treatment outcomes of behavioural performance, satisfaction with behavioural performance, and pre-treatment expectations across treatment conditions according to the Jacobsen and Truax methodology for determination of clinically significant changes

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Priority 1</th>
<th>Priority 2</th>
<th>Priority 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exp$^1$ n=40</td>
<td>Cont$^2$ n=42</td>
<td>Exp n=38</td>
</tr>
<tr>
<td><strong>Behavioural</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not disabled</td>
<td>27 (68%)</td>
<td>18 (43%)</td>
<td>30 (79%)</td>
</tr>
<tr>
<td>Improved</td>
<td>5 (12%)</td>
<td>2 (5%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Unchanged</td>
<td>8 (20%)</td>
<td>18 (43%)</td>
<td>7 (18%)</td>
</tr>
<tr>
<td>Deteriorated</td>
<td>0 (0%)</td>
<td>2 (5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completely</td>
<td>27 (68%)</td>
<td>16 (38%)</td>
<td>29 (77%)</td>
</tr>
<tr>
<td>More</td>
<td>3 (7%)</td>
<td>3 (8%)</td>
<td>4 (10%)</td>
</tr>
<tr>
<td>Unchanged</td>
<td>8 (20%)</td>
<td>17 (40%)</td>
<td>5 (13%)</td>
</tr>
<tr>
<td>Less</td>
<td>2 (5%)</td>
<td>3 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td><strong>Expectations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exceeded</td>
<td>1 (3%)</td>
<td>2 (5%)</td>
<td>3 (8%)</td>
</tr>
<tr>
<td>Fulfilled</td>
<td>33 (83%)</td>
<td>23 (55%)</td>
<td>28 (76%)</td>
</tr>
<tr>
<td>Not fulfilled</td>
<td>5 (13%)</td>
<td>15 (36%)</td>
<td>6 (16%)</td>
</tr>
</tbody>
</table>

$^1$Individually tailored treatment  
$^2$Physical exercises  
Note:  
When numbers in columns do not add to n or 100%, there is an internal drop-out in PGPQ data
The proportions of participants who fulfilled pre-treatment expectations differed across conditions in all three goal priorities, \( \chi^2(1, n = 79) = 6.34, p = 0.012 \) (Prio1), \( \chi^2(2, n = 77) = 8.58, p = 0.003 \) (Prio2), and \( \chi^2(1, n = 66) = 5.14, p = 0.023 \) (Prio3).

In conclusion, the individually tailored behavioural medicine intervention resulted in higher proportions of reliable improvements in behavioural performance, satisfaction with performance and fulfilled pre-treatment expectations than the physical exercise intervention. The improvements were exclusively related to each participant’s most important behavioural goals for treatment.

**Study IV: concurrent validity of the classification of outcomes**

The methodological aim of Study IV was to describe the concurrent validity of behavioural performance, satisfaction with behavioural performance, and fulfilled pre-treatment expectations when applying the Jacobson and Truax (1991) classification of clinical significance of treatment outcomes at three months post-treatment.

High proportions of individuals who were classified as "not disabled" were concurrently classified as "completely satisfied". With no exception, they also fulfilled or exceeded their own pre-treatment expectations. A higher proportion of “unchanged” individuals was classified as neither more, nor less satisfied (i.e. “unchanged”) or “less satisfied”, than as “more satisfied” or “completely satisfied”. Further, many of those who remained statistically “unchanged” did not fulfil pre-treatment expectations, while some individuals actually did. Those who “improved” or “deteriorated” were too few for conclusive analyses.

Analyses of agreement of the Jacobson and Truax (1991) classification of behavioural performance and satisfaction with behavioural performance showed \( \kappa = 0.49, p = 0.0001 \) (Prio1), \( \kappa = 0.60, p = 0.0001 \) (Prio2), and \( \kappa = 0.68, p = 0.0001 \) (Prio3). Agreement of the classification of behavioural performance and fulfilled pre-treatment expectations was estimated to \( \kappa = 0.64, p = 0.0001 \) (Prio1), \( \kappa = 0.70, p = 0.0001 \) (Prio2), and \( \kappa = 0.66, p = 0.0001 \) (Prio3). Thus, the concurrent validity of the outcome classification was regarded moderate for the included variables (Landis & Koch, 1977).
Discussion

The results implied that a treatment protocol that was individually tailored to each participant’s behavioural treatment goals and assumed determinants of pain-related disability, was more effective in reducing pain interference in everyday life, pain intensity, fear of movement, and in increasing pain control when compared to an intervention including physical exercises. Further, the individually tailored treatment had higher impact on participants’ goal achievement regarding activity in everyday life and overall satisfaction. In addition, the studies contribute methodologically to clinical intervention research by development and incorporation of an idiographic outcome measure and idiographic outcome analyses in the formal evaluation of clinical significance.

The following sections will further elucidate the findings and development of methods in relation to current research regarding goal assessment, tailored treatment protocols, and evaluation of clinical significance.

Behavioural goal assessment

Participants’ priorities

Study I was the first study to use the PGPQ to elaborate patient-specific behavioural goals for physical therapy. The participants listed and ranked behavioural goals that included many different domains of everyday behaviour. Contrary to arguments maintaining that people with disabilities have difficulties in establishing personal treatment goals (Kirschner, Stocking, Wagner, Foye, & Siegler, 2001; Struhkamp, 2004), the goals elicited in Study I were directly applied to the personal setting. Participants seemed to have few difficulties setting behavioural goals instead of traditional physical therapy goals including pain intensity and physical impairments (Rothstein, 1994), when they were explicitly asked for it. The relevance of a behavioural focus in physical therapy management of pain was thereby demonstrated in Study I supporting the incorporation of behavioural goals as central outcomes (Kaplan, 1990).

The results of the goal ranking were consistent in study I and IV regarding the most frequently highest ranked goal category. Goals related to
occupation and education were most frequent in Prio1 in both samples. Goals related to responsibilities to the home and family occurred most frequently in Prio2 and 3 in Study I, whereas recreation and hobbies were most frequent in these two ranks in Study IV. Since the literature hitherto has been focused on the occurrence (or non-occurrence) of patient involvement in goal setting (e.g. Arnetz et al., 2004; Baker et al., 2001; Northern, Rust, Nelson, & Watts, 1995; Payton & Nelson, 1996; Payton et al., 1998), goal setting strategies and measures (Cott & Finch, 1990; Law et al., 1990; Payton et al., 1990; Pollock, 1993; Randall & McEwen, 2000; Stratford, Gill, Westaway, & Binkley, 1995), studies for comparison of goal content are hard to bring forth.

Goal setting – a treatment component by its own merits

Patients with persistent MSP are often dismissed in pain rehabilitation due to their “poor motivation” for treatment, but this is unfortunate before permitting patients to identify and prioritise among goals on their own. Important goals can instil motivation for necessary efforts and task performance, and there is a relationship between goal setting, self-efficacy, personal goals and task performance (Locke & Latham, 2002; Locke & Latham, 1990). Viane et al. (2004) further argue that a committed goal striving makes the individual sensitised to cues that are congruent with the particular goal. Information that is incongruent with the goal is simultaneously reduced. Thus, ongoing goal-directed behaviour may help reducing attention to pain. Tan, Cheatle, Mackin, Moberg, & Esterhai Jr (1997) found that a specific goal of return to work was the single best predictor of return to work outcome in patients with chronic musculoskeletal pain admitted to a university pain management programme. This finding was supported by Grahn, Ekdahl, & Borgquist (2000) who operationalized motivation for change as patients’ ability to present goals, and sub-goals together with beliefs of one’s own ability to make efforts and perceive support from others necessary to reach the goals. Motivation for change predicted working ability and health related quality of life two years after multidisciplinary rehabilitation of patients with chronic pain. In another recent study, Arnetz et al. (2004) found that active patient involvement in establishing physical therapy goals at a rheumatology rehabilitation clinic had beneficial effects on physical impairment outcomes and patient ratings of the quality of care. Moreover, a recent review reported beneficial effects of goal setting for physical activity behaviour change (Shilts, Horowitz, & Townsend, 2004). Thus, the current literature supports the inclusion of systematic goal setting procedures in treatment protocols. The designs of the studies in this thesis did not permit any conclusions about the particular contribution of the systematic behavioural goal-setting component, but rather evaluated the individually tailored treatment protocol as a whole.
Nevertheless, the emphasis on systematic, patient-specific goal assessment and evaluation was kept in all studies, which contributed to continuing method development over the course of the project.

Elaboration of methods

The PGPQ explicitly asks patients to specify their goals to certain activities and situations of everyday life. However, the number of sufficiently specified goals in Study I was not satisfactory. The participants tied approximately 50% of the listed goals to particular tasks or situations. Tied goals are crucial for pain management interventions, since it is difficult to apply behavioural principles (including motor learning principles) without addressing specific tasks and the specific environment in which individuals perform activities (Linton, Melin, & Götestam, 1984; Schmidt, 1999; Shumway-Cook & Wollacott, 2000). Consequently, the item-formulation was improved, and elucidating examples of behavioural goals were provided in the elaborated version of the PGPQ that was used in Study IV. Since recent findings have shown the predictive value of cognitive-behavioural factors to disability (Ayre & Tyson, 2001; Denison et al., 2004), items for self-reported self-efficacy, fear of performance of goal-related behaviour, and readiness to change were included and related to each of the ranked goals in the elaborated version of the PGPQ.

A clinical version of the PGPQ was also developed to serve the purpose of behavioural goal identification and assessment in the clinical setting. The use of the clinical version would help creating an individual profile of each patient. Behavioural goals and systematically derived cognitive-behavioural data could thus be used to integrate nomothetic and idiographic empirical research findings with the results of the assessment of the individual patient, that is – the original idea behind the elaboration of functional behavioural analyses (Haynes et al., 1997), and the selection of individually tailored pain management strategies.

Tailored treatment protocols

Principal outcomes

Support for the effectiveness of tailored treatment protocols has previously been reported on measures of depression, pain intensity and control, fatigue, helplessness, compliance with medication, pain-interference in daily life, and active coping (Dworkin et al., 2002a;b, Evers et al., 2002; Turk et al., 1996). In these studies, treatments were tailored in advance to homogeneous patient subgroups sharing similar psychological and psychosocial characteristics. Evers et al. (2002) went further and based their cognitive-behavioural
treatment protocols on patients’ choices of important problem areas (i.e. pain and functional disability, fatigue, negative mood, and social relationships). However, the treatment modules comprised standardized cognitive-behavioural protocols rather than individually tailored treatment protocols. Different strategies for treatment adoption have previously been described by Kreuter & Skinner (2000), who emphasised the difference between (1) pre-standardized interventions developed for a defined subgroup population sharing certain characteristics, and (2) the creation of intervention strategies “intended to reach one specific person, based on characteristics that are unique to that person, related to the outcome of interest, and have been derived from an individual assessment” p. 1. The use of interventions based on the second definition of tailoring has previously been reported in the field of health education and communication (e.g. Kreuter, Bull, Clark, & Oswald, 1999; Marcus et al., 1998; Skinner, Strecher, & Hospers, 1994), but hitherto not in the pain literature. The findings of this thesis implied that treatment that was individually tailored, using the second definition above, had beneficial effects in patients with MSP.

The initial experimental single subject studies (Study II) were principally aimed at method refinement, but the design also made assessment of outcomes in relation to treatment process possible, and causal inferences could be drawn in the individual cases (Kazdin, 1982). Positive outcomes were reported from the four participants, whose goals for self-rated disability were attained. The results were maintained one year post-treatment for the two participants that were followed-up. To that, pain intensity decreased and pain control increased in all participants. The results from study II were replicated in the statistical evaluation of group effects in Study III, which also rendered positive effects on the complementary outcome of fear of movement.

The individually tailored treatment protocol introduced in this thesis differed from the tailored precursors, since it acknowledged the findings in Study I pointing to that prioritised everyday life activities vary substantially between individuals. Similarly, psychological and physical capabilities, and social contexts vary between individuals with persistent MSP (Linton et al., 1984). Further, individuals’ responses and adaptation to pain change continuously over time (Broderick et al., 2004). The tailoring was, in consequence, made according to individuals’ priorities of behavioural goals and to personal, modifiable determinants of disability through the systematic application of individual functional behavioural analyses (Haynes et al., 1997). The functional relationships (Haynes & O’Brien, 1990) were held open for reinterpretation, and subsequently both the functional behavioural analyses and treatment strategies were modified according to changing individual capabilities. Previous tailored treatment protocols in the area of pain did not take these aspects into account, since protocols were standardized in advance. Such ways of tailoring may be too general to target
the specific behaviours of each particular individual, and thus not fully bring about behavioural changes.

The individually tailored intervention had no explicit rationale for targeting pain intensity, but rather teaching patients not to conflate pain and activity, and exercising control over important activities and situations. Nevertheless, control over pain increased and reported maximum pain intensity decreased more in the experimental group than in the control group. Participants were informed in advance not to focus on decreases in pain intensity but rather to regard such effects as a possible bonus, which makes these findings encouraging. Effects on pain intensity and control may have great motivational value, and indicate that the treatment contributes to less suffering for the affected patients.

The positive outcomes related to the individually tailored treatment also included lowered fear of movement. Two recent studies have shown that physical therapy with a supplement of fear-avoidance-based principles reduces fear-avoidance in patients with acute as well as chronic low back pain (George et al., 2003; Von Korff et al., 2005). However, one of the studies showed that this was valid only for those with heightened fear-avoidance (George et al., 2003). Patients with low fear-avoidance benefited more from standard care physical therapy indicating that inclusion of psychological treatment for those who do not need it can be counterproductive. The tailoring within the programme of this thesis was supposed to identify and address pain beliefs (e.g. fear-avoidance in relation to elaborated goals). However, actions were only taken for individuals that held these particular beliefs, thus taking care of conceivable problems of treatment imprecision similar to the ones found by George and colleagues.

The findings in Study III suggest that moderate increases in physical performance are not sufficient to achieve large reductions in disability. Physical performance was similar in both groups and increased slightly over the course of treatment but disability levels differed significantly at the two post-treatment follow-ups in advantage for those who received individually tailored treatment. It is likely that the integration of physical, cognitive, and behavioural skills acquisition and the supervised application of acquired skills to everyday life situations were crucial. The interactions between personal capabilities, behaviours and the environment (Bandura, 2001) are necessary to acknowledge in treatment to modify ineffective ways of coping that have been acquired over the course of pain.

Study III included an evaluation of life satisfaction in key areas of daily life. Life satisfaction related to hobbies and recreation, experience of daily living, and romantic experiences increased significantly in both groups. However, the effects sizes were not large, and the general improvements might have been subjected to participation in a treatment programme including a scientific evaluation (Kazdin, 1998). The short follow-up period may also explain why significant changes in life satisfaction are unlikely.
Future studies of long-term effects are warranted to evaluate the impact of the interventions on life satisfaction.

**Didactic strategies for reinforcement of self-efficacy**

Didactic strategies were built into the programme to instil self-efficacy for behavioural performance and self-management of pain, which may further have increased the effects of the individually tailored treatment. Treatment was planned and progressed with regard to the patients’ beliefs about their own capability. The ordering of goals by their difficulty level, or magnitude of self-efficacy expectations (Bandura, 1986), and the ratings of self-efficacy strength were introduced to promote engagement in problem-solving. From a motivational aspect, the initial engagement in a behaviour where the individual held reasonably high efficacy expectations, and thus was likely to succeed with, was desirable.

Therapists were taught how to provide reinforcing feedback emphasising patients’ own achievements between the scheduled sessions. The structure of the programme also facilitated a *gradual experience of mastery* over important aspects of everyday life. Self-efficacy expectations are mainly derived from successful performances of behaviours, and can be generalised across behaviours and situations (Bandura, 1997), which was used in the programme by the systematic skills acquisition and progression of goal achievements according to the goal priority list.

The analyses of self-efficacy showed that participants’ self-efficacy for performance of everyday life activities increased over the course of treatment, but levels were similar for the two conditions. A plausible explanation is that self-efficacy should be regarded as a state characteristic closely tied to particular behaviours and situations (Bandura, 1997). The choice of a generic measure for evaluation in Study III might therefore not have captured important changes in self-efficacy for the experimental group. It would have been of large explanatory value to conduct analyses of self-efficacy in performing behaviours related to the prioritised treatment goals, which is a possibility for future studies by use of data collected with the PGPQ.

**Clinical significance**

**Elaboration of outcome analyses**

Participant ratings of global improvements and treatment satisfaction suggested that the individually tailored treatment had higher impact on participants’ activity performance and satisfaction with everyday life than the physical exercise intervention. These results were further elaborated in Study IV by use of PGPQ data and idiographic outcome analyses of the
clinical significance of treatment outcomes. The PGPQ defined domains of everyday life subsequently included in the evaluation of clinically meaningful changes. Study IV thereby moved the statistical analyses beyond the standardized group data of Study III, and provided an alternative solution to the pertinent problems in clinical intervention research of over-reliance on statistical group evaluations (Wise, 2004), and the common choice of generic measures in evaluation of clinical significance (Kazdin, 1999).

The PGPQ is a distinct “state-measure” that provided an instant view of individuals’ treatment goals and self-rated behavioural performances. This means that the content and the ranking of the priority list were expected to change over time concurrently with individuals’ goal achievements, experienced failures and changed internal values. Yet the PGPQ targeted treatment goals constituting the initial reason for patients to encounter physical therapy. The application of the PGPQ in the trial therefore added a dimension to treatment evaluation that ought to be informative for researchers and clinicians.

The analyses showed that the individually tailored intervention had high impact on the performance of individuals’ highest ranked everyday life activities. It also resulted in higher proportions of clinically significant outcomes, applying the Jacobson and Truax (1991) methodology, than the physical exercise intervention. In one of the few previous applications of the Jacobson and Truax methodology in patients with chronic pain participating in a behavioural pain management programme, reliable change rates of 47% were reported, while 41% had clinically significant improvements (i.e. recovered; Slater, Doctor, Pruitt, & Hampton Atkinson, 1997). These figures are consistent with behavioural interventions on marital conflicts, agoraphobia, depression, and conduct disorders (Jacobson & Truax, 1991), although the interventions are not directly comparable. Improvement rates reported in this thesis were higher, most pronounced in the individually tailored treatment group. Inclusion of ITT- analyses for clinical effectiveness (e.g. Williams et al., 1999; Laupacis, Sackett, & Roberts, 1988) would have moderated the improvement rates somewhat, but they would still have been high. However, the group-study differed in some important aspects from previously reported effectiveness evaluations of behavioural interventions. The evaluation of clinical significance was integrated with the design of the original trial, contrary to the study by Slater and colleagues (1997). This strengthens internal validity and the causal inferences about clinically significant effects across treatment conditions. The high improvements rates may also reflect that the PGPQ was closely tied to the functional behavioural analyses and the treatment strategies included in the individually tailored treatment. Thus, it captured proximal outcomes directly targeted by the treatment programme.

Slater and colleagues (1997) used established and generic measures of pain (McGill Pain Questionnaire), disability (Sickness Impact Profile), and
depression (Beck Depression Inventory) for their analyses of clinical significance. The advantage of using generic measures is that comparisons across intervention studies are facilitated. However, such measures may not be sufficiently sensitive to detect clinical improvements in individual patients (Deyo & Inui, 1984; Turk et al., 1993), and more aggravating, changes in standardized, generic measures do not guarantee impact on individuals’ everyday lives, although they are clinically significant.

To sum, Study IV added a new dimension to the evaluation of the interventions by complementing the conventional outcome assessments with idiographic analyses. The PGPQ captured clinically significant changes, meaningful in individuals’ everyday lives (Kazdin, 2001), and the method of derivation of clinical significance adhered to the original intention of calculating clinical significance. That is, data were reported in a way that was clinically meaningful, given the expectations that participants had about treatment (Jacobson, Roberts, Berns, & McGlinchey, 1999). The individually tailored treatment resulted in higher proportions of reliable improvements than the physical exercise intervention.

The meanings of measurement

Kazdin (1999; 2001) recently questioned current ways of operationalizing clinical significance contending that a majority of available outcome measures hardly reflect the original construct of important therapeutic changes in everyday life. Measures of symptom remissions are the most commonly applied, and measures based on patient’s views of what constitutes a successful outcome have not previously been used.

In this thesis, the PGPQ was developed and employed to connect the outcome analyses of clinical significance to participants’ views of important outcomes in terms of behavioural goals of treatment. Kazdin (1999) has previously pointed out this as a non-existent but urgent area for intervention research. He further stresses the idea that clinical significance is multidimensional and that composite measures or dimensions should be used in the measurement of clinical significance. In study IV, three dimensions of the PGPQ were used to obtain a comprehensive evaluation of clinical significance including level of behavioural performance, satisfaction with performance and level of goal achievement.

The use of multiple outcomes raised the issue of concurrent validity. Study IV showed that participants classified as “not disabled” were distinguishable from those “improved”, “unchanged”, and “deteriorated” in that their pre-treatment expectations were invariably fulfilled or exceeded at the 3-month follow-up. Interestingly, there were individuals being classified as “unchanged” who fulfilled their pre-treatment expectations. The Jacobson and Truax methodology has been questioned as being too conservative (Lunnen & Ogles, 1998; Tingey et al., 1996), e.g. the size of the
measurement error may not be adequate to determine the minimum unit of meaningful changes to the individual. Minor changes, although not statistically reliable, could then be sufficient and important to particular individuals. Individuals may also hold unrealistically low expectations about their own ability and for those, even minor changes in behavioural performance could be sufficient to fulfil pre-treatment expectations.

Behavioural performance was significantly correlated with satisfaction at three months post-treatment, and high proportions of those who were classified as "not disabled" or "improved" were concurrently classified as “completely satisfied” or “more satisfied”. This is similar to Ankuta and Abele’s (1993) findings where patients who experienced clinically significant changes reported higher levels of satisfaction than those who remained unchanged. A large proportion of individuals designated as “unchanged” in behavioural performance did not change their satisfaction (“unchanged”) or was designated “less satisfied”. However, some individuals that were "unchanged" in behavioural performance were concurrently designated as “completely satisfied” or "more satisfied". It is possible that for these individuals, minor changes in behavioural performance, obscured by the stringent criteria of reliable change, were sufficient to increase satisfaction. Still others may have changed standards of the self-evaluation of satisfaction with behavioural performance – that is, response-shifts (Sprangers & Schwartz, 1999) occurred because of changed internal standards, values, or conceptualization.

In conclusion, the ecological validity (George et al., 2000) of pain management interventions ought to be increased by applying idiographic outcome analyses of clinical significance in scientific evaluations. The concurrent validity of the outcomes evaluated in Study IV was high only for those classified as “not disabled” otherwise it was moderate. These findings justify the inclusion of complementary outcome variables to capture clinically significant changes along multiple outcomes of practical value in everyday life.

Methodological considerations

Measures
The outcomes of this thesis are mainly based on self-report measures. The generic measures were chosen because they covered important behavioural aspects of the pain experience and have shown satisfactory psychometric properties, although the Swedish versions of the questionnaires have not been extensively investigated. The use of patient-specific measures made data analyses more complex. Nevertheless, the introduction of the PGPQ contributed to collection of patient-specific data in a structured and
systematic way. Further, the PGPQ was elaborated using the results of Study I, and subjected to necessary reliability testing before use in the group-study.

The standardized physical performance tests were regarded as complementary outcomes, and not supposed to reflect performance on actual goal behaviour. Direct observations of behavioural performance would have complemented the self-report data collected by the PGPQ and would have offered interesting opportunities for data triangulation.

Internal validity

Experimental single-subject design

The experimental single-subject design offers a unique and systematic approach for the study of new interventions and their effects. The key characteristics of the design (i.e. continuous assessments, baseline assessment, endeavours for stability of performance, and the use of different design phases) provide control and enhance internal validity, which in turn, permit causal inferences to be drawn in each individual case (Kazdin, 2003). Besides, details about a new intervention that may go unnoticed in group studies can be revealed. For example, the data pattern in the single-case studies showed gradual decreases in levels and variations of self-rated disability over the course of the intervention. Study II showed that the changes in disability were related to the phase of applied activities training suggesting this phase of the programme to be crucial. However, according to the data patterns baselines were dependent of each other, which weakened the internal validity somewhat. A plausible explanation for the simultaneous changes in data pattern across several situations is that skills acquired to manage the first situation were generalised.

Another advantage with the experimental single subject design is that it makes refinements of the intervention possible before it is applied in more costly large-scale group designs. Generalisation of findings from experimental single subject designs is usually obtained by either direct, or by systematic replications (Barlow & Hersen, 1984). However, in this thesis the replication of the series of four experimental single case studies were conducted by use of the controlled group-study design upon which Study III and IV are based.

Controlled group-study design

The group-study included several design considerations. The control intervention was designed to be equivalent with “best possible standard physical therapy”, and thus corresponded to regular individualisation of treatment in the area of physical exercises. In that way, it was optimised as a control condition. The study also included several treatment fidelity checks (Bellg et al., 2004), which showed that behavioural components such as goal
setting, integrated functional behavioural analyses, applied activities training, relapse prevention and maintenance programmes, and positive reinforcement of participants’ self-efficacy for activity were controlled for by the trial design, i.e. not provided in the control group.

To increase therapists’ adherence to the study protocols, treatments were structured in manuals, and for the experimental intervention, accompanied by working-sheets covering the seven phases of the programme, as well as session planning and evaluation. The physical therapists providing the experimental intervention practiced their new skills on regular patients during nine months before start of participant inclusion. They were also continuously supervised by means of observations and video-recordings of random sessions and in group-based discussions and problem-solving during the entire trial to minimise drifts in provider skills (Bellg et al., 2004). The fidelity checks showed that most key components of individualisation and application of skills were provided in each participant, with exception of a scheduled generalisation of skills to more than one behavioural treatment goal that was lacking in about one forth of the experimental group. Analyses of participants’ adherence to the programmes showed that most “completers” attended the amount of treatment sessions required and that the dose was comparable across conditions.

This thesis was restricted to reports on short-term effects limiting the possibilities for cost analyses and conclusions about the permanence of effects. However, since this is the first study reporting the impact of the new individually tailored treatment to patients with MSP the separation of the experimental effects from the long-term effects is of great value. Current data can be interpreted with a reasonable control of threats to internal validity, whereas the long-term data will necessarily be influenced by extraneous variables to a higher degree.

External validity
Since this thesis evaluated the first applications of the individually tailored treatment protocol, strives for internal validity have been of prior concern. In Study II, treatments were provided by the undersigned researcher at one PHC clinic. To increase the external validity of the implementation, eight physical therapists at three different PHC clinics were engaged in Study III. The setting was, however, a controlled research setting with selected patients and continuous supervision of physical therapists limiting the conclusions about the generality of the implementation into regular practice. Yet the strategies for implementation meant that treatments were provided in a setting very close to the regular clinical setting, which is unusual in early stages of intervention research studying new approaches to pain management.
The samples were heterogeneous, including large proportions of women with recurrent and chronic pain and multiple pain sites. This composition of samples corresponds well to the Swedish PHC population seeking consultation for MSP (Andersson, Ejlertsson, Leden, & Scherstén, 1999; Bingefors & Isacsson, 2004; Gerdle et al., 2004). However, future systematic replications are required to study the limits for the generality of the findings.
General Conclusions and Future Directions

A consistently applied behavioural medicine perspective incorporating the bio-psycho-social explanatory model of pain can reduce pain-interference in everyday life activities, decrease pain intensity, increase control over pain, and affect fear-avoidance beliefs in patients with persistent musculoskeletal pain managed in a primary health care setting. Treatment that is tailored to individuals’ priorities of everyday life activities and empirically derived psychological determinants of disability were generally more beneficial for resumption of everyday life activity, increasing satisfaction, fulfilling pre-treatment expectations, and in preparing individuals for self-management of pain when compared to a traditional biomedical approach including physical exercises.

The Patient Goal Priority Questionnaire (PGPQ) that was developed over the course of the project is an idiographic measure that can be used to:

- identify and assess behavioural treatment goals
- elaborate individual functional behavioural analyses relevant for everyday life functioning
- determine the clinical significance of treatment outcomes – that is, whether behavioural medicine pain management interventions produce outcomes of relevance for each individual’s everyday life.

The inclusion of idiographic outcome measures in clinical pain intervention research is necessary and improves the ecological validity of the evaluation of clinical significance.

Implications

The findings demonstrated in this thesis may have several clinical, professional, as well as educational implications.

A consistent application of the bio-psycho-social explanatory model of pain requires methods that are derived from both behavioural and medical sciences. This means that the traditional reductionistic problem-solving model aimed at diagnostic labelling, determination of the origin of pain,
identification of physical impairments and motor deficits, pain control interventions based on pharmacology and physical modalities, and acquisition of physical performance skills should be extended. Behavioural and psychosocial factors must be systemically incorporated in regular PHC and thereby acknowledged in each particular individual seeking consultation due to MSP.

An implementation of the individually tailored treatment programme into regular PHC would benefit from incorporation of general practitioners and psychologists. This would probably enhance the efficacy by making a larger emphasis on psychological and contextual factors possible, e.g. management of anxiety, depression, kinesiophobia, and involvement of significant others, and the workplace. A further important task for the general practitioner would be to give legitimacy to the behavioural medicine approach and to stop searching for patho-physiological reasons to maladaptive coping with persistent pain. Interdisciplinary teams in PHC may, in consequence, manage and elaborate the individually treatment programme in a desirable way in the future.

The significant contribution of physical therapists to behavioural medicine interventions aimed at pain management was shown in this thesis. A further incorporation of knowledge and skills aimed at behaviour modification is warranted for the physical therapy profession to justify and extend the involvement of physical therapists in pain management interventions. Today, there is an explicit intention to affect functional ability and activity within the profession, but strategies are not optimised to target particular behaviours and social contexts. This thesis provides methods possible to adopt by physical therapists to reinforce and guide individuals to modify specific behaviours, cognitions and environments, and thus enhance self-management of pain.

Finally, this thesis has generated data supporting physical therapy interventions based on a behavioural medicine perspective, which invites physical therapy educators to consider:

- equalising the amount of medical and behavioural courses in the basic education of physical therapists
- replacing the commonly used physical therapy problem-solving process with functional behavioural analyses in the area of pain management
- incorporation of didactic strategies for behavioural goal setting, reinforcement of self-efficacy, and applied activities training in the clinical education aimed at pain management.
The experiences from the implementation part of the present project indicate that continuing education and supervision of clinical physical therapists are necessary to precipitate the process of professional behaviour change.

**Suggestions for future studies**

The most immediate research question to answer is whether the effects demonstrated in this thesis will be maintained in the long-term. Of particular interest is also whether further improvements are to be expected, and if any, whether they can be accounted for by the applied interventions. Long-term follow-ups will include cost analyses using outcomes of work absenteeism and health care utilisation. Predictive studies contributing to the understanding of the explanatory value of psychological, psychosocial, physical, and personal factors to adaptation to pain are also planned, including data from the group-study sample.

The inclusion of idiographic outcome measures and analyses as a complement to statistical standard evaluations of treatment outcomes should be proceeded. Of special relevance is to identify suitable complementary variables or measures, i.e. multiple indices of clinical significance (Kazdin, 2001), that capture the original meaning of the construct of clinical significance, but still make comparisons between intervention studies possible.

Future projects regarding individually tailored treatment protocols would contribute to the literature by including factorial designs. These should be aimed at comparing dose-response effects related to determinants of disability, as well as systematic dismantling of treatment components to isolate the necessary and sufficient components of the programme. The idea behind these factorial designs is in the end to derive knowledge about how to intervene with the right individual, at the right time-point, with an optimal intervention, to a reasonable cost, in order to prevent musculoskeletal pain to become persistent and disabling, and facilitate self-management and positive adaptation.
Acknowledgements

I wish to express my appreciation and gratitude to everyone who has supported me during my postgraduate studies. This thesis would not have been possible without the contribution and encouragement from a number of persons. In particular, I would like to thank the following persons for their crucial support during the past five years:

I will always be indebted to professor Per-Olow Sjödén, now sadly departed, for generously sharing his brilliant scientific knowledge, experiences, and perspectives during postgraduate courses, at the Department Board, in the corridor at the Section for Caring Sciences, and in the “fikarum” on Friday afternoons. His skills, constructive feedback, encouragements, and warmth have been of outmost importance and will guide me in my future academic undertakings.

Per Lindberg, for being such an excellent supervisor. His genuine skills and interest in clinical intervention research, strategic thinking, dependability, and lack of prestige mindedness are admirable. From our first meeting, you have made me feel capable and challenged my intellect. Our many creative (and long) discussions belong to the absolute highlights of these years. They have made me go forward without hesitation, no matter how great obstacles there were sometimes. Above all, you always care about the well-being of people around you, making you such a nice person and leader.

Eva Denison, for combining the co-supervisorship with collegial discussions, and honest friendship. Thanks for all your positive reinforcements regarding my research endeavours and for your triggering of creative and analytic thinking. I am not sure I can recognize a “Sävsångare” from an “Enkelbeckasin”, but I certainly can perform a MANOVA! Times together, being in “the middle of the flow of thoughts” for hours, make the peculiar wanderings of life worth sharing and sometimes more easily managed.

Anna Hedin, for being the one who gave me the crucial “push”, telling me that it was time to send in my application for postgraduate studies. Thanks for all thrilling discussions about didactic strategies and for your constant encouragements. But foremost, thanks for being a warm and caring friend of mine. Your continuous concern about my health and your “being there” for me in times when life is rough is invaluable.
Marianne Carlsson, head of the Department of Public Health and Caring Sciences for being such an excellent role model for academic leadership. Thanks for letting me participate in the internal work of the department. It has enriched my studies, and made me open my eyes – I have learnt a lot for the future. Unfortunately I will never compete with your possession of “the best poker face in the world” (August Fors, 2004) that proved to be particularly useful in “Bluffstopp”.

Ulla Waern-Jorild, the head of the PHC Physical Therapy Organisation in Uppsala County Council for her professional visions and never-ending energy. For never having said “NO” or “NEVER”, no matter how innovative or beside the point my ideas for the physical therapy organisation have been over the years. Thanks also to all physical therapists and administrative assistants participating in the research project. Without your genuine efforts and loyalty, there would not have been any intervention and certainly no thesis. Particularly, I am indebted to Viveca Nutti, Lillemor Green-Lundgren, Kristin Fjeldstad, and Anneli Lindblom, for being “those in the world who actually did provide such an intervention” (citing upset anonymous reviewer, should be read; multifaceted, non-orthodox, and terrible). I am also grateful to all patients in pain who have taught me so much about human strengths and capabilities in the face of obstacles.

I will express my appreciation for the staff and fellow doctoral students at the section for Caring Sciences. In particular, I would like to thank Anne Söderlund, for mixing up exciting scientific discussions with relieving laughs and colourful temperament. I will also proffer my thanks to her and Gunilla Berglund, for providing constructive and reinforcing feedback on the final draft of the manuscript of this thesis, to Maria Sandborgh and Annika Nilsson, for contributing to the constructive discussions and friendly atmosphere in the “Behavioural Medicine and Pain Research Group”, to Elisabet Wasteson and Helena Lindstedt, for nice “room-mating” in the very beginning of the studies. Thanks also to Claudia Lampic, for adding a touch of fire to the “fikarums-discussions” and genuinely caring for my well-being, to Frida Anteson, for keeping up the spirit in the “mine” at “plan 2”, to Maj-Britt Sundelin, for thorough financial management, and to Mariann Hedström, for being such a pleasant and supportive fellow doctoral student. We did it at last!

The Faculty of Medical Sciences, Uppsala University, the Primary Health Care Organisation of Uppsala County Council, the Section of the Swedish Council on Technology Assessment in Health Care and Research in Uppsala County Council, the Swedish Foundation for Health Care Sciences and Allergy Research, and the Swedish Research Council who gave their financial support to the research project.

Some very special friends also deserve mentioning for their important support during these years. Cathrin Martin, for sharing the revolutionary experiences of changing contexts and finding our ways through the years of
postgraduate studies. Katarina Lundholm, for turning lonely Friday nights into times in good company with a hilarious attitude and a curiosity about the next step in life. Agneta Nordin-Danfors, for sharing a very special “know-how”, Johan Arvidson, for looking “straight through”, “Die Schwestern im Wald” Anna Engström and Gennet Gebre-Medhin, just “Keep your glance steady!” and go ahead, I will follow! Ingrid Demmelmaier, for never, ever shunning difficulties and for teaching me so much about honesty, integrity, and joy. Åsa Bergström, Ann-Sofie Pejler Carlsson, Catrine Ellwén, Gunnel Karlsson, Maria Landqvist, and Ulla Nyffäll, for being like a very special adopted family for me. No matter where you are, how long since we last met, or how life is developing – you are always there. I would not have managed without you!

Last but in no way least, thanks Per, for all your support and love. You are a marvellous father to our sons, and will be a very special friend of mine for the rest of my life. My mother Lena, for teaching me about distinctness, consciousness of responsibility, and independency. Thanks for your genuine love and care of your grandchildren. Without your help, the thesis would not have been ready yet! To my sources of joy; Axel and August. Axel, you are such a thoughtful and clever boy teaching me so much about respect, negotiation skills and the happiness of being a mother. August, the smile of yours that follows whatever you are occupied with, your frank requests for me to change my job, not to be upset over daily hassles, not to use my “angry voice”, and most important, to prioritise “mulka” before cleaning up the flat, really make me reflect over my behaviours and fill me with endless love. I love you both so much!

Uppsala in April 2005

Pernilla
References


Lewis (Eds.), *Health behavior and health education. Theory, research, and practice* (3rd ed.). San Francisco: John Wiley & Sons, Inc.


Compas, B., Haaga, D., Keefe, F., Leitening, H., & Williams, D. (1999). A sampling of empirically supported treatments from health psychology: Smoking,


92


Acta Universitatis Upsaliensis

Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine 35

Editor: The Dean of the Faculty of Medicine

A doctoral dissertation from the Faculty of Medicine, Uppsala University, is usually a summary of a number of papers. A few copies of the complete dissertation are kept at major Swedish research libraries, while the summary alone is distributed internationally through the series Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine. (Prior to January, 2005, the series was published under the title "Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine").